Book Review

Review of *Safety and Quality in Medical Transport Systems,* John W. Overton, Jr. and Eileen Frazer (Eds.)

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The editors of this book have made an important contribution to the study of safety and quality in medical transportation systems. They provide an integrative framework that examines the safety culture of an organization. The key strength of this book becomes immediately obvious by the well-organized introduction and the articles selected for each section.

In Section I, the editors address the characteristics of organizations "that foster clarity about purpose, vision, and goals." In Chapter 1, "A Brief Overview of the Foundations of Organizational Culture," Ralph N. Rogers discusses the importance of a strong culture in the success of any safety performance and quality management system. Organizational values, beliefs, and objectives must be thoroughly understood by members of an organization to develop a strong organizational culture.

In order to address this, the editors skillfully introduce the concepts of a "Just Culture" in Chapter 2, "Achieving Optimal Outcomes Through Just Culture" by K. Scott Griffith. Griffith describes the spectrum of culture from "blame-free" to "highly punitive" that will be "a key in determining an organizational ability to identify and mitigate risk." He discusses various behaviors that are essential to risk management.

In Chapter 3, Terry L. von Thaden differentiates "Safety Climate and Safety Culture" from a sociotechnical perspective. He observes that definitions of a "safety climate" include a psychological phenomenon that is "closely concerned with intangible issues such as situational, environmental, and personal factors, and that it is a temporary phenomenon." In contrast, a safety culture refers to "shared values among all the group or organization members. It is situational and describes the perceived state of safety."

Von Thaden discusses the key elements of a safety culture such as: organizational commitment, operations interactions, formal safety indicators, informal safety indicators, and safety outcomes. An interesting contribution by von Thaden is his "Safety Culture Grid" or "Safety Culture Matrix" which is a method of assessment that demonstrates the interrelationships among the organizational safety factors such as alignment gaps, leadership perception, employee perception, and degree of collaboration. The culture matrix is most useful for characterizing an organization's safety culture in terms of "consistency, direction, and concurrence." He provides an example of his matrix that compares safety culture across several aeromedical transport operations.

In order to adequately address all the key elements noted to enhance safety and quality in medical transport systems, financial and human resources must be considered and provided. Senior management decision makers very seldom have the luxury to consider the long-term financial and human resources required to provide continuous safety education and skills training. Chapter 4, “The Financial Perspectives of Safety” by Clive Adams examines the role of senior management in the development of robust safety systems that is resilient and able to adjust to changing operational conditions. Thus, safety management effectively becomes a part of the risk management process. Because of a lack of a precise measure of safety effectiveness, it is often difficult for management to appreciate that allocation of resources to safety is a very wise investment. Adams argues that direct insured costs are quite miniscule when compared to the indirect costs of an injured worker, loss of life, and time lost by management and others in investigating an accident that may occur because of a lack of allocation of resources to safety education and skills training.

Section II of the book provides both air and ground perspectives on medical transport operations. First, a general overview of the background and evolution of the various sectors of the air medical transportation system is presented. Second, this is followed by an overview of the ground medical transport system. In Chapter 5, Terry L. von Thaden outlines “The Current Status of Air Medical Transport.” He examines the differences in the development of rotor wing and fixed wing services in the U.S. and in Europe. Differences in critical medical situations under various environmental and regulatory conditions are presented. Von Thaden concludes by noting some of the major challenges in air medical operations today: professionalism and ethics, properly trained personnel, aircraft design, and equipment maintenance/upgrade consideration.

In Chapter 6, ”The Current Status of Ground Medical Transport,” Nadine Levick addresses issues associated with changing the culture of general operational personnel. It is puzzling to learn that “ground ambulance vehicles are exempt from the Federal Motor Carrier Safety Administration (FMCSA) that governs other commercial vehicles.” Levick also notes that ground ambulance vehicles are also exempt from the Federal Motor Vehicle Safety Standards (FMVSS). Other areas that require immediate attention is the fact that health care providers “do not have training in automotive safety and automotive engineering design.” Furthermore, the ambulance manufacturing industry is “grounded outside mainstream automotive safety and occupational protection….. and also not part of the automotive crash worthiness infrastructure.” Thus, general ambulance transport lacks both safety standards and safety oversight. Levick provides key initiatives to optimize safety through safety education, risk management, fleet safety standards, Emergency Medical Services (EMS) practice, policy and fleet management. She discusses safety enhancements later in Chapter 13.

Section III consists of specific chapters that offer in greater detail the various topics noted earlier in improving safety and quality in Emergency Medical Services Transport Systems. In Chapter 7, “An Overview of the Risk-Management Process,” Kimberley Turner argues that a risk-management process provides the requisite framework for safety and quality enhancement in medical transport systems. She notes three different types of risks: uncertainty-based risk, opportunity-based risk, and hazard-based risk and discusses the importance of communication, the context, risk treatment, and monitoring and review of the risk management process.

In Chapter 8, “Safety Management Systems,” Kimberley Turner elaborates on improving safety and quality. She introduces the principle of continuous improvement or “kaizen” and describes the evolution of Safety Management Systems (SMS). The four pillars of SMS as defined by ICAO are safety policy and objectives, safety risk management, safety awareness, and safety promotion. The strength of this chapter is the emphasis on the development of an Integrated Risk and Safety Management Model (IRMSW).

Chapter 9, “Operations Safety: Developing, Executing and Upgrading the Operations Plan” by Bruce A. Tesmer focuses on how an operations safety plan is accomplished “in terms of the sequence of tasks and milestones, timeline, initial risk assessment and risk reduction.” Tesmer describes basic operations protocols, namely philosophies, policies, and procedures. By employing a typical airline flight plan timeline, the operations specifications are developed in an easy to follow manner. Threat and error management and human factors considerations are included to improve the initial operations plan. Based on his considerable experience at a major U.S. airline, Tesmer emphasizes important procedures to “verbalize, verify, and monitor (VVM) and when to use automation.

The importance of reliable communications in the integration of safety system elements is discussed in Chapter 10, “Improving Communications to Improve Safety” by Robin Graham. Graham describes how to manage sensory data such as stereotyping, the halo effect, and “expectancy and the selective use of information.” Other aspects of communications discussed by Graham are information overload and fixation, non-verbal communication, and various communication options that are available for EMS organizations to enhance effective communication in safety culture and safety management organization.

As noted earlier, education and skills training are important components in improving EMS transport safety and quality. Chapter 11, “Training to Improve Operational Safety” by Terry Palmer, discusses the use of scenario-based simulation training. The concept of Team Resource Management (TRM), an important and integral part of a safety culture, is advanced by Palmer. Concepts briefly noted earlier such as communication, assertiveness, teamwork, leadership, situational awareness, and decision making are all

integrated into TRM. He argues that training in TRM is best achieved in an interactional scenario-based simulation environment.

An excellent follow-up to training is Chapter 12, "Operational Safety Training: Learning from the Mistakes of Others" by Roger Coleman. He demonstrates how to make better, safer decisions on aviation operations by learning from the mistakes made by others. Several examples are provided from FAA and NTSB reports. Coleman differentiates between static decision- making, which is based on large amounts of data and analysis, and dynamic decision-making, which is "based on operational risk analysis and real-time decision-making component as the mission is executed." As Coleman has observed, decision making in time-critical situations is extremely difficult. Although it is essential for each new generation of pilots to learn from the mistakes of previous generations, good decision-making is based on good training and learning from the experience of others.

Key factors for optimizing ground transport safety are discussed by Nadine Levick in Chapter 13, "Adjuncts to Safety in Ground Medical Transport." In this chapter, Levick notes several areas where improvements in ground medical transport can be made. Examples include the provision of a risk and safety awareness driver training program, development of ambulance design and safety performance standards and the use of Enhanced Vehicle Stabilization Electronic System. Such a system is effective in preventing vehicle rollover and provides greater vehicle control in sharp turns. Other intelligent transport system (ITS) technologies are also noted by Levick.

The rapid expansion in medical knowledge, transport systems, and associated technologies has also resulted in concomitant human errors. In Chapter 14, "Medical Error-Recognition, Reporting, Managing Response, and Limiting Harm" by Gregory H. Botz and John W. Crommett, the authors acknowledge that advances in patient safety have lagged behind medical knowledge and technological development. They address some of the challenges in the identification and reporting of medical errors.

Botz and Crommett note that reliable and accurate data for the frequency and types of medical errors do not exist for some domains of the medical system and that most health-care providers are prone to underestimating medical errors. They identify three types of errors: medical administration errors, failure to employ indicated tests, and avoidable treatment delays. The establishment of medical and transportation checklists is suggested. As in aviation safety reporting, a mandatory national medical error reporting system should be established as it does not exist at present in 2012.

Another important recommendation associated with the development of an error-reporting system is to incorporate educational strategies in the basic health care provider curriculum and training environment. The development of a patient safety education

strategy will capture medical errors early and will facilitate reporting of medical errors more acceptable by all healthcare personnel.

Medical and transportation errors are prone to occur when healthcare providers are experiencing stress and fatigue. In Chapter 15, “Fatigue Challenges in Emergency Medical Services Operations,” Melissa M. Mallis explains sleep and circadian physiology. She describes how sleep loss can result in performance degradation and decreased alertness that contribute to fatigue. Mallis provides several fatigue countermeasures to manage the effects of sleepiness and fatigue to maintain performance and alertness levels.

There are two categories of countermeasures: either preventative or operational. Preventative strategies are those taken prior to a scheduled work activity, for example, ample rest and sleep. In contrast, operational strategies are those used during the duty period, for example, taking short naps. In this case, caution must be exercised to judge the duration of the nap to eliminate the effects of sleep inertia. Other strategies noted by Mallis are short activities or disengagement from operational task or taking a caffeine break to reduce sleepiness. Again, caution should be exercised to limit caffeine intake and to use it strategically. When sleep is not operationally possible, another approach is the use of a Fatigue Risk Management System (FRMS) which is currently gaining wide acceptance in aviation. FRMS allows for “continuous measurement, monitoring, mitigation, and management of safety risks associated with fatigue-related error.” In any event, fatigue mitigation education and training are the most effective as a fatigue countermeasure strategy.

In order to provide health care to others, healthcare providers themselves must be in good health. To combat sleep deprivation, fatigue, and stress is basically a personal responsibility. Chapter 16, “Individual Provider Wellness and Self-care” by John W. Overton, Jr., Laurie Shiparski and Philip D. Authier examines the challenges of self-care faced by medical transport personnel and they provide solutions for self-care. They argue that self-care is “not selfish attention but builds the resilience to weather stress and difficult times.” This requires time, energy, and consistent attention to one’s own health. The authors note the benefits of “solitude, silence and mindfulness” for enhancing one’s well-being and they suggest developing a self-care protocol (SCP) for renewing and restoring energy. A self-care protocol centers around four domains of individual needs: physical, intellectual, spiritual and emotional-social. Activities that bring joy and energy to the four domains are encouraged in order to renew and restore one’s energy level.

Regardless of the various fatigue and stress mitigating strategies, exposure to continued adverse situations will have a cumulative effect. Chapter 17, “Post Traumatic Stress Disorder in Emergency Medical Services” by Eileen Frazer provides an excellent overview of the history and recognition of post-traumatic stress disorder (PTSD). She describes the various symptoms of PTSD which range from sleepiness, nightmares, grief,

and eventually depression. Physical signs that accompany the various symptoms are headaches and irregular heartbeats. Initial PTSD symptoms may become more severe "including chronic irritability, feelings of constantly being under threat, overeating, alcohol abuse, and perhaps dependency on tranquilizers or painkillers."

Frazer describes a true situation experienced by a flight nurse who was involved in an EMS helicopter crash and who went through the PTSD experience. Various phases of a prevention and treatment protocol called "Eye Movement Desensitization and Reprocessing (EMDR) developed by Dr. Francine Shapiro and the "Critical Incident Stress Debriefing (CISD) developed by Mitchell and Everly are briefly discussed by Frazer.

Section IV introduces the methods and tools used to evaluate and assess organizations. This section consists of relatively brief chapters on a step-by-step guide to implementation of individual programs. Chapter 18, "Measurement and Data" by Donna York Clark, Kate Moore and Donald F.E. Stuhlmiller informs several components of program actions when measuring quality. The chapter focuses on data gathering and the quantification of data to measure quality-critical aspects of medical transport. For this assessment, the Deming Cycle quality-improvement model is employed and objective scientific principles are included to evaluate quality.

The pursuit of improvements in quality measurement requires continuous education, training, and learning. Chapter 19, Essentials of Learning and Improvement" by Donna York Clark, Jacqueline Stocking and David F.E. Stuhlmiller focuses on developing education as an initial step to address the learning needs of diverse individuals. The authors concentrate on three domains most effective for meeting behavioral objectives: cognitive, psychomotor, and affective domains. They discuss instructional methods critical to the learning process. Learners today are from many disciplines, age groups, and diverse ethnicity. Thus, both intrinsic and extrinsic motivators and barriers to learning will vary. These factors must be recognized in the educational learning process in order to improve overall knowledge of safety and quality improvements in medical transport systems.

There are several methodologies to measure quality in healthcare organizations. In Chapter 20, "Practical Applications of Methodologies," Jennifer Hardcastle discusses the LEAN Management System and Sandra Kinkade Hutton provides an overview of Six Sigma. The authors then integrate their expert knowledge of Total Quality Management (TQM), LEAN-Six Sigma approaches to maximize organizational safety and productivity in medical transport systems. Key employee motivational factors are considered in the LEAN management process. Reduced variations in the production process, defect reduction, and a strong and engaged leadership are essential components of the quality improvement process. The authors caution us that implementing LEAN involves a

cultural shift within the organization. Thus, resistance to cultural change may be a formidable barrier if the process is not introduced with a well-planned design.

For any social and organizational cultural change, it is necessary to secure unqualified support at the outset. In Chapter 21,"Teamwork and Integration," Patricia Corbett outlines the elements for effective teamwork: adequate resources, leadership support, and good communication. All of these topics have been discussed in earlier chapters and thus facilitates the author in advancing her argument for effective teamwork. She focuses on the ability to integrate skills, attitudes, and behavioral knowledge to promote a teamwork culture. Corbett describes those attributes that result in a highly functioning team. The various stages in team development and training are based on her integrative knowledge skills from multiple disciplines.

Section V, the final section of the book, focuses on real world challenges in maintaining a culture of safety in medical transport systems and related services. In Chapter 22, "Organizational Challenges within Medical Transport Services," Eileen Frazer examines "the challenges to provide quality care at a reasonable cost." She discusses the most compelling challenges faced by medical transport personnel. Many of the topics noted in earlier chapters such as medical errors, a non-judgmental culture, fatigue, financial and human resources needs are effectively integrated in this chapter and serves to illustrate the complexities of the medical transport business.

Chapter 23, "The Role of Associations in Safety and Quality" by David M. Mancuso looks at an organization- an association- that does not operate a single aircraft, nor provide any medical care. He presents a historical overview of the role of safety associations that evolved based on mutual concerns during the industrial revolution to establish product quality and safety standards. In addition, such associations were instrumental in research, consensus building systems and processes, education, and the certification and accreditation of various programs. Eventually, the Association of Air Medical Services (AAMS) was established in 1980 to advance safety and quality in air medical and critical care transportation. An important resource that an association provides its members is a network of individuals who have similar interests and challenges to share.

An example of operational safety and culture outside of the medical transport system is instructive and is provided in Chapter 24. "Safety and War-fighting: Taking Action to Shape the Safety Culture of Naval Aviation" by Kenneth P. Neubauer. Issues associated with the changing of naval aviation culture apply to air medical transport as well. Change begins with formal mandatory safety education given by certified Operational Risk Management Instructors. Naval aviation is a high-risk activity, and thus, continuous improvements to shape safety culture are made to reduce the frequency of accidents. Examples of highly effective programs are "the Culture Workshops, Operational Risk Management (ORM), and the Command Safety Climate Assessment Surveys," and the

establishment of the Navy's "superior performance" criteria based on "process auditing, rewards systems, quality assurance, risk management, and command and control." These components are integrated into the educational structure to effectively shape naval safety culture.

The final chapter of this section, "Ethical Challenges" by David P. Thomson, focuses on the ethical challenges of medical transport and illustrates how ethics intersect with quality, safety, and culture. As argued by Thomson, "without an ethical framework the culture cannot produce a quality product. Ethics is also a necessary ingredient in deciding whether a given situation is safe. If there is no ethical structure it is impossible to determine the risks and benefits that define safety." He discusses six principles that frame an ethical structure: autonomy, beneficence, non-maleficence, justice, dignity, and truthfulness. Thomson's elaboration on ethics and quality, ethics and just culture, and ethics and the management of errors provides a forceful analysis and a powerful reminder of the overall integrative framework that this text/reference book succeeds in presenting. The authors of this book and the expert insights of each chapter make a very significant contribution to our understanding of safety and culture in medical transport systems. It is highly recommended as a required text in transportation and related courses.