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FORUM

# The New Paradigm of Crew Resource Management: Just What Is Needed to Reengage the Stalled Collaborative Movement?

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*“What happens to a dream deferred? Does it just dry up, like a raisin in the sun? . . . Does it grow old? . . . Or does it explode?”—Langston Hughes, 1951*

This extract from a Langston Hughes poem reflects his frustration with the stalled Civil Rights Movement. The metaphor of a raisin drying slowing in the sun became the theme of many plays and short stories. The prediction of an explosion was prescient.

Historically, effective medical practice was dependent on a small number of health care providers, which made communication requirements simple. Today the health care system is composed of and dependent on many persons, each with unique knowledge and skill sets, which makes routine communication increasingly complex. With the emergence of patient safety, the importance of collaboration and a team approach to patient care has become paramount. Collaboration in providing patient care is more important than preserving an individual provider's professional boundaries or roles.<sup>1</sup> All members of the health care team must communicate effectively to

coordinate care and meet the patient's needs.<sup>2</sup> According to the Institute of Medicine's landmark report, *Crossing the Quality Chasm*, “The current system shows too little cooperation and teamwork.”<sup>1(p.83)</sup> In response, the report recommended that “Clinicians and institutions should actively collaborate and communicate to ensure an appropriate exchange of information and coordination of care.”<sup>1(p.9)</sup>

After briefly introducing the crew resource management (CRM) model and collaboration, this article provides a historical perspective on the nurse-physician relationship, reviews the literature to discuss why the “collaborative movement” lost momentum, and proposes that implementing the CRM model may promote team-based improvement and thereby reignite the collaborative movement.

## CRM and Health Care

CRM is a communication methodology focusing on team-centered decision-making systems which was developed by the aviation industry in 1979 in response to a NASA workshop that examined the role

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of human error in air crashes.<sup>3</sup> When CRM is applied to health care, the communication space of health care practitioners caring for critically ill patients can be viewed as resembling that of an aircrew engaged in complex flight operations.<sup>4</sup> Use of team-centered decision-making systems enables teams to perform more efficiently.

Use of the CRM model does not presuppose that adequate communication is enough but instead supports a combination of communication, technology, and process change. CRM's primary building blocks include the use of backup systems, team communication and coordination, adequate briefings, availability and use of resources, leadership and adequate supervision, system knowledge, personal readiness, planning, correction of known problems, and issues and management support.<sup>5</sup>

The segment, "Medical Mistakes," which aired on the *NewsHour with Jim Lehrer* telecast March 26, 2001, explored how the lessons from CRM can be applied to health care. The segment used the off-Broadway show *Charlie Victor Romeo* and the Overlook Hospital (Summit, NJ) Safety Lab Team to create a link between medical mistakes and airplane crashes. *Charlie Victor Romeo* uses transcripts of recordings by the pneumatic cockpit voice recorder (CVR) to include vignettes of reenactments of actual cockpit conversations before plane crashes.

In the segment, Dr Donald Berwick, president and CEO of the Institute for Healthcare Improvement (Boston) stated:

When I saw *Charlie Victor Romeo*, I recognized in the stress, the patterns of interaction, and the kinds of difficulties that arise in the airplane cockpit exact replicas of what happens under not just intense environments, all environments in health care—operating rooms, emergency rooms. And they lead to the same kinds of problems that we saw in the play.<sup>6</sup>

As portrayed in the telecast, the Overlook Hospital team reenacted actual events in health care related to scenes in CVR to try to learn what went wrong, using the same methodology. The team found that health care mistakes were the result of similar issues: lack of cooperation, disputes over who was in control, confusion about technology, and failure to keep watch over the patient. This experiment showed that there needed to be changes in culture, communication, feelings, teamwork, and interactions to improve safety.<sup>6</sup> IHI now plans to use both *Charlie*

*Victor Romeo* and the Overlook Hospital reenactments to help spur changes at other health care systems nationwide.

## A Snapshot of Collaboration

The term *collaboration* began to appear in the health care literature in the 1950s. The term was used to define the quality of the relationship between nurses and physicians. Collaboration was thought to entail coordination of planning, decision making, problem solving, goal setting, and mutually assumed responsibility for patient care through communication and cooperation<sup>7</sup> and was identified as being the cornerstone to optimizing patient outcomes.<sup>8</sup> From the 1960s through the early 1990s, a plethora of articles and studies appeared in the health care literature, resulting in what one could call a collaborative movement in health care—a movement that seemed to stall by the late 1990s.

*Collaboration* comes from the Latin words *co* or *com*, meaning "with" or "together," and *laborare*, meaning "work."<sup>9</sup> Researchers proposed the dimensions of assertiveness (meeting one's own needs) and cooperation (meeting the other's needs) and defined the combination of the two as collaboration.<sup>7</sup> Collaboration requires at least three concepts: coordination, cooperation, and sharing, which together result in joint formulation of plans. It is not only working side by side; it is the nurturing of a relationship that thrives on mutual interactions. These mutual interactions create a synergy whose results are frequently far beyond expectation.<sup>9</sup>

Three areas relevant to collaboration can be identified in the literature. A cluster of articles reviewed the literature concerning interdisciplinary health care teams; a second group of articles focused on nurse-physician interactions; and the third group described collaborative practice models. These will be discussed in turn.

## Interdisciplinary Health Care Teams

Interdisciplinary health care teams are made up of individuals with different expertise who work collectively and cooperatively to direct patient care.<sup>9,10</sup> CRM is dependent on the process of teamwork and roles of team members. In traditional nurse-physician relationships, physicians expect nurses to act as physician extenders, while nurses expect to use their own

knowledge to direct patient care.<sup>7</sup> A number of studies in the early 1980s documented little administrative or physician support for teamwork.<sup>11,12</sup> Yet in 1990 an interdisciplinary team found that "by focusing on the patient and on total quality outcomes, turf issues were removed and collaboration encouraged."<sup>13(p 11)</sup>

### Nurse-Physician Interactions

In the collaboration literature focusing on nurse-physician interactions, interprofessional communication problems were shown to be barriers to effective collaboration. A focus on communication alone resulted in nurses still being regarded as physician extenders by the public.<sup>14</sup> Components integral to collaborative interactions centered around the use of power, identification of common goals and concerns, observational and intellectual skills, and perceived scope of practice.<sup>15,16</sup>

### Collaborative Practice Model

The third area of collaboration identified in the literature was the collaborative practice model between nurses and physicians in caregiving. Collaborative practice between nurses and physicians was formulated by the National Joint Practice Commission,<sup>17</sup> which proposed five essential factors to collaborative practice—communication, competence, accountability, trust, and administrative support. This model has consistently resulted in improved patient outcomes.<sup>7,18</sup> It is interesting to note that physicians involved in a collaborative practice model involving nurse practitioners may view the nurse practitioner as a business competitor.<sup>19</sup>

### Barriers to Collaboration Between Nurses and Physicians

From a historical perspective, the term *collaboration* was a popular term in France in the 19th century and described a relationship of working together in some literary, artistic, or scientific endeavor. Yet during World War II, French citizens who willingly sided with the Nazis were called *collaborateurs*. Collaboration came to take on the meaning of cooperating with the enemy and therefore acquired a profoundly negative connotation.<sup>9</sup>

In the 13th century, with the opening of the first medical schools, the Catholic Church explicitly legitimized (male) physicians' professionalism, while it

regarded the work of (female) healers as heresy. Physicians were the first category of health care providers to gain licensure. With licensure, physicians actively attempted to limit the scope of nursing practice.<sup>20</sup> Barriers to collaboration continued to mount as the position of the physician grew in status and power. The nurse was viewed as a subsidiary worker whose behavior should be docile, passive, accommodating, and inferior. Although nurses have for centuries assessed and diagnosed patients, recommended care, and identified inappropriate diagnoses or errors, the role of the nurse as an equal partner in the assessment and evaluation process had not been acknowledged. For example, around 1861 Dorothea Dix was appointed by the Surgeon General to supervise nursing during the Civil War. The advertised recruitment criteria were for "females 35-50 years of age of strong, healthy, matronly appearance, who must display good conduct and serious disposition, maintain habits of neatness, order, sobriety and industry, ability and willingness to follow orders."<sup>21(p 16)</sup> Dix did not require anything in the way of medical or nursing experience or training.

Physician educational programs have generally been more focused on developing skills in the use of drugs and therapeutic technology than in promoting interpersonal communication skills.<sup>22</sup> The role definitions and educational programs of nursing are more focused on treating the whole person,<sup>22</sup> with a more psychosocial orientation. Neither role should be considered exclusive.<sup>22,23</sup> Traditionally, physicians have seen themselves as soloists,<sup>24</sup> which is understandable, given the fact that they have unique knowledge and responsibility with respect to the individual patient. The soloist position is reflected in the stereotypical nurse-physician relationship of "nurse as handmaiden and physician as deity, with the nurse viewed as dependent and unwilling to rebel against the physician's authority."<sup>25(p 13)</sup> Historically, nursing has emphasized obedience and granted few rewards for innovation. Furthermore, nurses are usually women, so that the patterns of male dominance continue to prevail, although the profession has seen a significant influx of female physicians.<sup>22</sup> Neither nursing nor medical education programs have designed curricula for academic or hospital settings to teach collaborative behaviors.

In light of the traditional nurse-physician relationship, it is no surprise that nurses and physicians developed less than optimal patterns of communica-

tion, which Stein describes as “the doctor–nurse game.”<sup>26</sup> This game is an intricate behavior pattern that maintains the appearance of physician dominance and nurse deference. In these interactions the nurse may make suggestions or imply decision making, but always with a careful eye to appear passive and to protect the traditional hierarchy. In fact, these suggestions and ideas are best received if they appear to have been initiated by the physician. Unfortunately, the doctor–nurse game pattern of communication is still evident in modern health care. Nurses and physicians work in parallel fashion at best, and at worst, in opposition.<sup>9</sup> These hierarchical, power-gradient relationships, whether in health care, aviation, or other fields, are fraught with serious consequences, resulting in barriers to creating safe care or improving patient outcomes.<sup>4</sup>

With the advent of and identified need for advanced nurse practitioners (ANPs), a collaborative practice dilemma has arisen. Physicians have argued that the authority needed for advanced practice for nursing can only be derived by physicians delegating medical practice or “giving up” of practice.<sup>27</sup>

Through the advanced practice model, nurses and physicians have come to understand the importance of overlapping scopes, practices, and patient care to patient outcomes.<sup>19,26</sup> The role of the nurse practitioner has allowed the physician to focus on the complex patient for which he or she is uniquely trained.

Nurses have practiced collaboratively with other health care professionals, such as dietitians, physical therapists, and pharmacists, resulting in improved patient outcomes, which is compelling evidence to support collaboration between nurses and physicians.<sup>20</sup>

If physicians are threatened by discussions of collaboration,<sup>7</sup> it may be because they see it as invasion of their territory. Nurses may also feel threatened by the increased responsibility and accountability crucial to collaboration. In addition, collaboration consumes more time for communication and coordination.<sup>9</sup>

Independent accountability has provided for the development of independent nursing practice but not necessarily collaboration toward common patient care goals. Each professional role must be viewed as exhibiting different areas of professional competence, with no profession claiming total authority over the other. The combination of these professions together as a collaborative team can provide a continuum of care that will best serve the patient.<sup>9</sup>

## The Case for Collaboration

Modern health care has evolved beyond acceptance of collaboration. New times require new perspectives. It is time to identify our communication goals and seek new solutions. Many successful organizational models outside health care could be the answer to our collaborative dilemma.

Today most health care involves many people with specialized knowledge and skills. Optimal patient care is dependent on developing care strategies across disciplines, time, space, and cultures. Typically, health care providers gather information and make decisions based on one-to-one exchanges. This results in inefficiencies, rework, interruptions, misunderstandings, and frequently changing patient care plans because of the inability to clarify roles and responsibilities.<sup>28</sup> It is necessary to seek a common ground in conversation.

People traditionally turn to others—usually their peers—for information and decision support. Communication is easier with others of similar occupation and educational background, since they have similar experiences, beliefs, and knowledge.<sup>28</sup>

## Successful Models of Collaboration

In one study,<sup>8</sup> the concept of collaboration among clinical staff consistently surfaced as an essential function in the delivery of optimum patient care. The project identified nine essential categories of “consultants” who were involved in the general care population—physicians, cardiopulmonary, chaplain, dietary, infection control, patient education, rehab services, social services, pharmacy—and other. For a 2-year period, as lengths of stay decreased and patient acuity increased, collaboration among all disciplines was imperative to ensuring positive patient outcomes.

In 1989 Beth Israel Hospital opened a patient care unit called the 7 Gryzmish Project,<sup>9</sup> which was based on a patient care model specifically designed to support nurse–physician collaboration. In a 3-year study, health care providers showed a better understanding of collaboration as a conscious, learned behavior, and functional assessment improved, as the unit cooperated to form joint care plans. A foundation of mutual trust, caring, support, and respect was necessary to achieve collaboration and that job satisfaction increased for all providers. Although

awareness and understanding of each profession's unique perspectives toward patient care increased, it was also noted that positive and progressive collaborative relationships were not easily forged.

### CRM and Error Prevention

Human error has been implicated in 70%–80% of all civil and military aviation accidents.<sup>5</sup> In a retrospective review of 14,000 in-hospital deaths, communication errors were found to be the leading cause, twice as frequent as errors caused by inadequate clinical skill; in anesthesiology, 65%–70% of errors were attributed to human factors.<sup>3</sup> Fifty percent of all adverse events detected in a study of primary care physicians were associated with communication difficulties.<sup>28</sup> The literature suggests that it may be beneficial to adapt methodologies from aviation psychology and human factors research to collaboratively reshape patterns of interaction and communication in health care settings.<sup>3</sup>

The CRM model not only calls for adequate communication but also supports a combination of communication, technology, and process change. CRM's primary building blocks include the use of backup systems, team communication and coordination, adequate briefings, availability and use of resources, leadership and adequate supervision, system knowledge, personal readiness, planning, correction of known problems and issues, and management support.<sup>5</sup> A CRM training program focuses on management of human factors to achieve error reduction. Trainees learn to identify and mitigate the limitations associated with human performance.<sup>29</sup> Cognitive errors are managed by assessing personal and peer behaviors and how these behaviors are affected by workplace stressors such as fatigue, demand-capacity overload, noise, and emergencies.<sup>3</sup> The CRM team then plans operational interventions such as improved communication, conflict resolution, environmental adjustments, support services involvement, and deferred decision making.<sup>30</sup>

### The Partnership Between CRM and Technology

Use of technology for communication offers the health care provider the opportunity to decrease the percentage of errors resulting from human factors, particularly one-to-one exchanges of information.

Furthermore, it decreases the reliance on preferred patterns of communication, such as physician-to-physician communication, and supports a broader band of communication to multiple disciplines and team members.<sup>28</sup> The need for technology to obtain access to information has been widely heard across the health care network. Such technology can include pagers, mobile phones, faxes, and e-mails. Other communication channels such as complex calling services and computer-based notification systems can connect individuals who are often difficult to contact<sup>28</sup>; "virtual" teams may be dispersed across space and time, and "few opportunities exist for regular synchronous interaction."<sup>31(p 243)</sup>

CRM promotes the integration of technology (as decision support tools) into the system to meet the information-seeking behaviors and relationships among crew (team) members. Team members need real-time access to the information necessary to achieve the identified team goals. For example, a patient care team requires up-to-date laboratory and test results, as well as information regarding potential medication interactions, to achieve optimum patient outcomes. Yet complete reliance on technology may instill a false sense of safety in the team, so automation must be applied cautiously. For example, although telephone and pager systems may be able to bridge some of the spatial gaps for a virtual team, such technologies can also increase the frequency of interruptions.<sup>28,31</sup>

### CRM and Team Decision Making

In the CRM model, team building progresses in an open communication environment, with all team members, including leadership.<sup>4</sup> All team members are able to speak freely, with equal acceptance of ideas. Conflict resolution is achieved through a democratic process. Decisions on workload assignments and contingency planning for technology failure or emergency preparedness are made with input from all team members. Execution is a complex matrix of team monitoring, cross-checks, workload management, vigilance, and automation management.

The concept alignment process in the CRM model provides a measurable process to affect human factors issues. For example, one person states an idea or a concept, which is either affirmed or challenged by someone else. If there is a difference in opinion, it is

then the team's responsibility to seek a third opinion. If one point of view can be validated and the other cannot, the validated point of view must be accepted by all. If both points of view can be validated, the senior technician must choose one. If neither can be validated, the most conservative approach should be chosen. Often the team will research the discrepancies before making a decision.<sup>4</sup>

If consistently used, the CRM model facilitates the voicing of innovative ideas, holds all team members accountable, helps the team develop a sense of organizational attachment, and supports the development of positive team behaviors.<sup>32</sup> But can CRM bring the results promised by the collaborative model? CRM applications have been found to result in such defined behavioral change as team-building skills, awareness of personal limitations, and diminished decision-making requirements during emergencies.<sup>32</sup> Yet the CRM approach will be successful only if we align collaboration with corporate mission and goals, provide strong and positive management support, and have an associated incentive program to develop concept leaders.<sup>5</sup>

## Moving Forward

The application of CRM to health care began in 1994—in the operating room at the University Hospital in Basel, Switzerland. The use of CRM reenactments resulted in a high level of perceived importance of communication and interface issues. Briefing and debriefing received high scores in terms of building team behaviors.<sup>33</sup>

The MedTeams behavior-based teamwork system, developed by the Dynamics Research Corporation (Andover, Mass) and sponsored by the U.S. Army Research Laboratory (Adelphi, Md), used CRM methods to improve performance in emergency medicine practice.<sup>34</sup> Training addressed team culture, problem solving, team communication, team-building skills, and workload management tools. The system was dependent on peer monitoring, system checks, third-party arbitration, and identification and debriefing of near misses. The MedTeams approach uses CRM methodology to avoid errors, identify errors as they occur, and mitigate the consequences of errors that get through the system.

There is an urgent need in our health care systems to improve communication because it should

result in improved organization efficiency and effectiveness—as well as optimal patient outcomes.<sup>28</sup> The lack of access to real-time clinical data is a major barrier to the successful implementation of the CRM model in health care. Research is needed to develop a basic understanding of the role of informatics in health care and even of the way that information is communicated among aviation crews or health care teams.<sup>35</sup>

New tools need to be developed and tested to measure collaboration between health care providers and teams. Some of the components to consider would be notions of caring, trust, respect, synergy, openness of communication, coordination, cooperation, administrative support, conflict resolution, shared planning, and implementation of care in support of collaboration and such models as CRM. Additional research is needed to measure the impact of CRM and other collaborative models on patient and provider outcomes. In the meantime, health care organizations can start applying CRM thinking to improvement initiatives by

- sending staff to CRM training to develop effective teams;
- using examples from aviation and health care for team development;
- purchasing video equipment to have the capacity to reenact examples of medical errors and near misses; and
- forming teams to analyze each reenactment, focusing on problem solving, improving communication, and improving safety.

## Summary and Conclusion

The literature is replete with examples of collaborative studies and research from 1960 to about 1995, after which the movement seems to have lost momentum. With the emergence and focus on patient safety issues, the importance of collaboration and a team approach to patient care has become paramount. CRM is a communication methodology developed by the aviation industry, based on team-centered decision making systems. Once we have identified the key components of a successful collaborative model, it is imperative that we incorporate them into the health care providers' educational curriculum, both in training as well as in the practice setting. Effective communication must be identified as a necessary skill, and

collaboration as a conscious, learned behavior. The dream of collaboration has been deferred long

enough, and CRM shows promise for reigniting the collaborative movement. ■

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