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CREW RESOURCE MANAGEMENT (CRM) AS A TOOL FOR PATIENT SAFETY IN HEALTH

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Abstract: The human factor and its performance limitations are the main points attributed to the magnitude of adverse events that we face in the health system today. This situation was experienced by aviation in past decades when, through the identification of the need to train professionals in non-technical skills, they began a successful trajectory towards safer aviation, then training in crew resource management (CRM) was born. In this article we aim to make an analogy between the two sectors (health and aviation), learn from points already achieved by aviation, understand what the literature in the sector brings us about the current scenario of CRM training in the health area and, from these reflections, to propose an agenda for the incorporation of CRM in the training of professionals directly or indirectly involved in the care of patients.
Keywords: Safety, crew resource management, training, error, adverse event

INTRODUCTION

The number of deaths resulting from errors in the health system in the United States is estimated at 98,000 per year(1), being more prevalent than deaths resulting from automobile accidents (43,458), breast cancer (42,297) and AIDS (16,516)(two). These deaths are equivalent to approximately 6 to 13% of adverse events, which occur in approximately 2.9 to 3.7% of hospital admissions(3).

In addition to the human impact of the aforementioned numbers, there is also a financial issue, an estimated cost with adverse events between 37 and 50 billion US dollars per year(4), another non-measurable cost is the impact of such errors on trust in the health system and the reduced satisfaction by both the user and the health professionals who work there.

Such data represent just the tip of an iceberg, since hospitalized patients represent a small portion of the population served by the health system, which also consists of clinics, outpatient clinics, day hospitals and home care.

The human factor has been recognized as one of the main sources of error since the publication, in 1999, of "To Err is Human"(5) by the Institute of Medicine (IOM), a publication that broke a cycle of silence on the subject. and sought to rescue Hippocrates' maxim "first do no harm"(6).

A human factor is understood as the individual's relationship with the environment, organization, technology and self-management, relationships that affect operational safety.

In this review, our focus is to show how crew resource management (CRM) training, initially designed for aviation, and then migrated to areas such as health, can help improve the scenario described above.

CRM HISTORY

The risk of dying in a domestic air accident between 1967 and 1976 was 1 in 2 million, around the 1990s, the risk dropped to 1 in 8 million(7), such an improvement is attributed, among other factors, to the creation of regulatory agencies with a focus on operational safety.

The emergence of CRM, in 1979, arises from one of these agencies, when the National Aeronautics and Space Administration (NASA) studied the root causes of the main air accidents, identifying communication, decision-making process and leadership as the main characteristics to be improved in events(8).

This finding by NASA breaks a paradigm, in force until then, that investment in technical skills and technology must be the main focus for reducing air accidents. The study culminated with the publication of an article

by John K. Lauber bringing the management of cockpit resources in flights as the target of training for airlines at the time, a role of CRM restricted to a small part of a complex operation that is transport people by air.

Salas et al define CRM as a set of strategies designed to improve teamwork through training, with the purpose of avoiding errors, identifying threats to the system and mitigating damages resulting from errors(9). Thus, the application of CRM began to make sense not only to pilots but to everyone involved in the operation described above, such as flight attendants, mechanics, maintenance personnel, ramp, operational dispatchers, top management and administrative personnel.

CRM, therefore, began as a tool to modulate the relationship between captain and co-pilot and was extended to a whole group of professionals involved in a mission that demands maximum attention to safety, affecting the entire routine of several areas of airlines, promoting greater understanding between different professional cultures and expanding the concept of crew resource management to corporate resource management. Regarding the safety issue, it is needless to say that this is also present in the health area.

PATIENT SAFETY AND THE HUMAN FACTOR

Patient safety is an essential part of the quality of care, being defined as "freedom from accidental damage". Achieving a safe environment depends on organizational commitment, processes, a culture of continuous learning and, often, a desire for change.

As explained in the introduction to this review, most harm or adverse events are due to errors, defined as "the failure of an action to go as planned or the use of a wrong plan to achieve an objective" (10), these errors. most of them are attributed to the so-called human factor, as demonstrated by Cooper et al through analysis of data in anesthesia, where 82% of preventable events were related to the human factor(11).

The human being, in any activity, is liable to make mistakes and deny this reality and not developing systems that mitigate this fact is to expect that damage to patients will continue to occur.

In view of the aforementioned fact, we know that human beings can make mistakes for a variety of reasons, such as fatigue, communication skills, leadership, degree of interaction with the environment, anxiety, fatigue, decision-making process, cultural background and professional training.

Some experts, such as Deming, believe that process improvement is the only way to improve quality(12), so the focus must shift from blaming the individual to developing safer systems.

The change in the aforementioned paradigm does not mean that individuals cannot be held responsible for their actions, in this topic knowing how to differentiate an error from a violation is imperative in building a fair culture, which is one of the pillars for building a culture of safety.

Within these precepts, it is clear that teamwork is a way to minimize the risks generated by human factors, teams make fewer mistakes than individuals, mainly when the individual, in addition to knowing his responsibilities, also knows those of the other individuals on his team(13).

Despite all the above, training in the health area, for the most part, continues to be applied on an individual basis and not in inter and multidisciplinary scenarios.

CRM IN HEALTHCARE

The first area to bring CRM concepts to health was anesthesia, with the idea of

managing crisis scenarios, in the early 1980s (14), since then scientific publications on the subject have been on the rise(15).

Despite the history described above, it still lacks, to date, a standardization of the training curriculum for health professionals, this standardization was achieved by aviation, which made the content, the frequency of training, the expansion of training the area also operational and annual contact with standardized topic training.

One of the few attempts at standardization in the health area was the so-called TeamSTEPPS program (Team Strategies and Tools to Enhance Performance and Patient Safety)(16), launched in November 2003, as a result of a collaboration with the Agency for Healthcare Research and Quality (AHRQ).) and the Department of Defense (DoD), which consists of training a set of knowledge, skills and attitudes (CHA) each with definition, examples and scientific evidence on the subject. These include leadership, mutual team monitoring, backup behavior if necessary, mutual trust, closed-loop communication, sharing the same mindset, and adaptability.

Two very interesting points of this initiative are the preparation of instructors (about 1,500 trained professionals) and the installation of the project in 3 phases(16), being they:

Phase I: preparation. In this phase, an organizational diagnosis is made, with opportunities for improvement that can be achieved with training.

Phase II: Planning, training and implementation. At this point, the training is actually carried out, typically consisting of 2 and a half days of activities, through scenarios, case studies, multimedia and simulations. At this moment, about 4 hours are dedicated for each participant to show how the concepts presented will affect their sector, meeting specific needs.

Phase III: Consolidation. The objective of this moment is to maintain and expand the performance of the team, clinical processes and outcomes. The idea is really to apply the concepts and experiences lived in the classroom on a daily basis, as well as to monitor and measure the effectiveness of the method.

There are also some initiatives to include TeamSTEPPS in the curriculum for training health professionals such as doctors and nurses. Duke University Medical Center in partnership with the University of North Carolina administered TeamSTEPPS to nearly 400 students and checked its effectiveness when placed in contact with patients. The Carilion Clinic plans to assess the relationship between TeamSTEPPS and infections related to patient care and experience(16).

Another initiative in the area is NOTSS (Non-technical skills for surgeons)(17), a program focused on the reality of the surgical center focused on the development of the team's non-technical skills, such skills divided into social (leadership, communication and work in team) and cognitive (situational awareness and decision making).

A very interesting point in the literature that addresses the NOTSS is the work of Lindegger et al with the application of the method, through a 1-day course, in hospitals in a low-income country (Rwanda), which is one of the tools to achieve the proposal published in 2015 by the Lancet Commission on Global Safety called "Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development"(18), which is to achieve a safer and more equitable surgical environment worldwide, the authors demonstrated the feasibility of a program of this magnitude even in a low-resource setting, including a plan to investigate the behavioral change of participants in the medium term(19).

The other non-technical skills training initiatives for health professionals consist of individual institutional projects with great variability among them.

Such variability was studied by Gross et al, who approached the topic through a systematic review of the literature, with about 19,500 participants, demonstrating that 62% of CRM training was carried out in a 1-day format with duration between 6-10 days. hours (38%) or < 6 hours (24%), only 25% occurred on multiple days. When compared to the aviation environment, the duration of the introductory course was 2 or 3 days(15).

The main target location for training was the operating room (21%), emergency department (20%), obstetrics and pediatrics department (16%), followed by intensive care unit (13%). In relation to the country of realization, 39% were allocated in the United States of America, about 62% in English-speaking countries (USA, United Kingdom, Canada, Australia and Ireland) and most of the countries with high ranking by the United Organizations in human development index (20).

The number of participants per training ranged, in most cases, from 5 to 15 people, and the maximum number of participants described was 35 students per training (21).

About 43% of the trainings were given in the classroom and 50% in a simulation environment. Holzman et al published their experience with the use of a mannequin as a patient and health professionals as actors in pre-established scenarios(22), such simulations took place in hospital ward environments or in environments conducive to simulation(23).

In addition to the training itself, a program that aims to keep professionals in touch with the concepts over time makes sense and is feasible, as demonstrated by Morey et al and Haerkens et al. (24, 25).

TRAINING RESULTS

An important tool in this aspect of evaluating the result of investment (RDI) in training is the concept of Kirkpatrick's four evaluation levels(26), which are divided into:

Level 1 "reaction": impact that the training had shortly after its completion, usually carried out through a post-course satisfaction questionnaire with self-questioning of the evolution of their knowledge, keeping a close temporal relationship to the content given

Level 2 "Learning": Neutral assessment of learning after training, observed or documented by examiners after training.

Level 3 "transfer": evaluation of the change in behavior that may have occurred within 3 months after training and that impacted the routine of the place. This level can be assessed using an attitude questionnaire or observationally.

Level 4 "result": impact on tangible outcomes, concrete data on improvement of institutional indicators. As an example: reduction of adverse events.

In the study by Gross et al, 56% of the studies brought level 1 data, 25% with level 2 data, 51% involving level 3 data and 33% with level 4, the latter based on reduction of adverse events or reduction of expenses associated with legal action(27).

Hansen et al published, through a telephone questionnaire after 6 months of training, 12 situations where the applied concepts of CRM helped to save lives(28).

One of the biggest references in the CRM result topic is the meta-analysis by O'Dea et al demonstrating a positive impact on the result of teamwork, with adequate response of participants to training (score 4.25 out of 5), impact on their knowledge post-course, attitude and behavior, but this publication also brought the need for greater assertiveness in the definition of results and greater

robustness of the research method design on the topic(29). On the contrary, Nielsen et al, showed results without significant difference in pre- and post-training in CABG between participants and the control group for surgical center professionals(30).

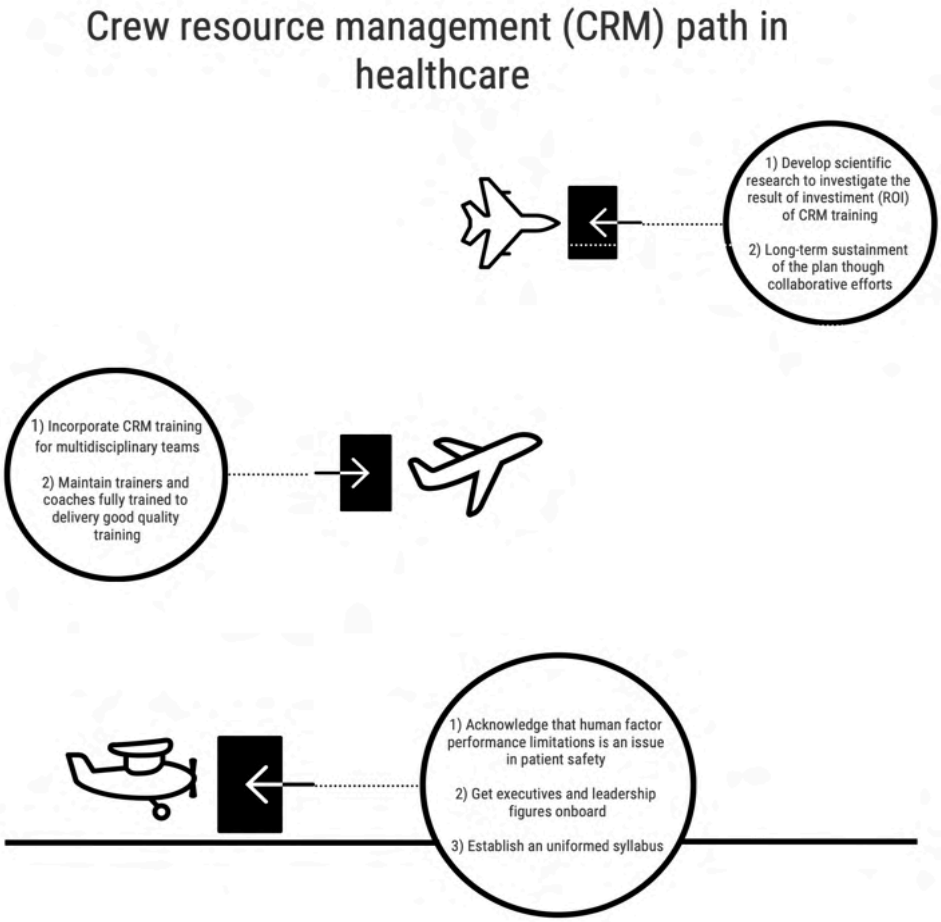
Therefore, the lack of standardization in the so-called CRM curriculum for health and the absence of works that aim to investigate the result (Kirkpatrick level 4) prevent, so far, from being assertive in the response to the positive impact on health institutions.

FUTURE DIRECTIONS

Despite the history described above, as already mentioned, there is still a lack of standardization of the training curriculum for health professionals, which is the starting point of a philosophy that wants to incorporate CRM in the health environment. The involvement of people in institutional decision-making positions, the so-called "non-educational" factor, is also essential. Molfatt et al involved executives and other managers during the initial stages of introducing the method to be part of a cultural transformation(31).

The investment in the preparation of instructors, which is very little studied, as demonstrated by the systematic review carried out by Gross et al, where only 30% of the studies addressed preparation issues, the others did not present any mention of the topic, although data such as simulation techniques and equipment used are well described in most articles(15).

We believe that the real incorporation of CRM training in healthcare organizations must be a trajectory like the one illustrated in the figure below.



Finally, another point of reflection is the inclusion of countries with lower human development indices or low-midle income countries (LMIC) in a patient safety agenda that addresses the performance limitations of the human factor.

CONCLUSION

CRM training in aviation presents a standardization of content, workload and frequency. The health environment still lacks such standardization, which makes the results of research on the institutional impact of training very heterogeneous. In order to move in the direction of demonstrating effectiveness, we must first work on a single agenda among the centers to standardize the method.

In addition to working on the training itself, a project that involves people in executive positions and that also has a focus on keeping the team in touch with the concepts applied in the training makes sense for the establishment of a culture that aims to identify threats, mitigate the of human performance and minimize the damage caused by errors.

Expanding the knowledge of the methodology for countries with lower human development and LMIC indexes is imperative to advance global patient safety equanimity in order to change the current reality of adverse events in the health area.

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