Prof. Dr Stefan Schröder, Dr Tillmann Speer, Dr Helga Unger, Prof. Thomas Mühlbradt

Rethinking leadership in healthcare: Crew Resource Management for system resilience

The healthcare sector is undergoing profound change. This is characterised by demographic shifts, a shortage of skilled workers, digitalisation and economic pressure. Clinical situations are marked by uncertainty, high workloads and interprofessional collaboration. Expectations regarding quality, efficiency and patient and staff safety are constantly rising. Complexity is evident not only in increasing workloads but also in the simultaneous presence of conflicting demands, non-linear causal relationships and the need to make situational decisions under uncertainty. These dynamics are increasingly overwhelming traditional leadership models. Under these conditions, leadership must create a reliable framework for guidance whilst enabling situational adaptability. Against this backdrop, patient safety research has undergone a fundamental shift in perspective in recent years. The focus is no longer solely on error prevention, as enshrined in the Safety I paradigm, but also on strengthening adaptive performance, as described in the Safety II approach [1]. Independently of this, Crew Resource Management (CRM), which originated in aviation, had already been transferred to the healthcare sector and has established itself as a tool for improving non-technical skills [2]. Whilst Safety II describes the systemic prerequisites for successful care, CRM operationalises this perspective through concrete tools and collective behavioural standards for teamwork in everyday clinical practice.

Safety-I and Safety-II: a changed understanding of safety

>> In Safety-I, safety is defined as the absence of errors, and the focus is on identifying and eliminating deviations. This model has undoubtedly enabled important advances, but it reaches its limits when care is characterised by non-linear interactions, conflicting goals and situational variability. In such contexts, safety cannot be achieved solely by avoiding errors and incidents.

The Safety II approach defines safety as a system's ability to function successfully even under variable and often unpredictable conditions. In contrast to the traditional Safety I approach, which is primarily concerned with the prevention and control of errors, Safety II focuses on day-to-day success. Variability is viewed not as a disruptive factor, but as an inevitable component of complex systems. This requires professionals to respond flexibly to situational demands in order to maintain the functionality of the overall system. In this understanding, safety arises less through standardisation than through the conscious promotion of adaptive action and decision-making processes.

Managers are therefore called upon to create conditions that support this flexibility and capacity for learning, for example through an open culture of communication, trust and the continuous reflection on work processes.

The concept of Resilient Health Care ties in directly with these considerations and applies the Safety II perspective to healthcare organisations. Accordingly, resilience is the systemic ability of teams and organisationsto remain capable of acting andperforming under changing conditions and pressures. This ability is based on four interlinked dimensions: anticipation (the early identification and planning of potential developments), monitoring (the continuous observation of relevant system states), response (flexible and situation-appropriate action in the event of changes or disruptions) and learning (the systematic reflection on and further development of organisational solutions and routines). Whilst Safety II provides the theoretical basis for understanding safety as an emergent system property, the concept of Resilient Health Care describes how these principles can be implemented in practice with regard to teams – particularly within a highly complex and dynamic healthcare system [3].

Crew Resource Management in clinical practice

Crew Resource Management (CRM) was developed to optimise human performance in critical situations by improving non-technical skills. Key elements include situational awareness (the continuous perception and assessment of the current situation) as well as communication standards such as closed-loop (a feedback technique in which information is repeated and confirmed to avoid misunderstandings) and decision-making models such as FOR-DEC (Facts–Options–Risks & Benefits–Decision–Execution–Check). The latter is a systematic framework for decision-making under uncertainty. Other key elements include team coordination,

stress and workload management, as well as structured briefings and debriefings. All these elements can be adapted to many

areas of healthcare.

CRM provides established behavioural patterns for situational awareness, teamwork, task management, decision-making and communication in dynamic and critical situations. However, these behaviours are only effective if the organisational environment allows for them, i.e. if there are clear responsibilities, a culture in which questions and dissent are expected, and structures that systematically embed learning from day-to-day work. What is therefore crucial is not so much the application of individual behaviours as the question of how leadership shapes the framework conditions so that teams can act reliably even in the face of uncertainty. Against this backdrop, CRM tools take on new significance: they structure communication and

decision-making processes at team level and make adaptive performance in everyday clinical practice practically manageable. In this context, adaptability is not left to chance, but is understood as a deliberately designed leadership task. Leadership thus aims less at controlling individual deviations than at systematically promoting collective capacity for action in dynamic and uncertain situations.

An integrative leadership model for resilient healthcare systems

Key design elements for an integrative leadership model can be derived from the combination of Safety II and CRM. A shared situational awareness forms the cognitive basis for adaptive action: only when teams develop a common understanding of the clinical situation, the options for

action and the associated risks can they coordinate decisions, delegate responsibility as the situation demands and deviate from standard procedures where necessary. Within the framework of a Safety II-oriented approach to leadership, the CRM principles support this shared situational awareness by creating transparency, promoting closed communication loops and structuring information flows. Equally central is the design of structured decision-making processes under uncertainty (FOR-DEC). A learning-oriented culture reinforces this capability. Structured debriefings and the analysis of successful processes promote

Metaphor of a motor vessel "MS Resilience"

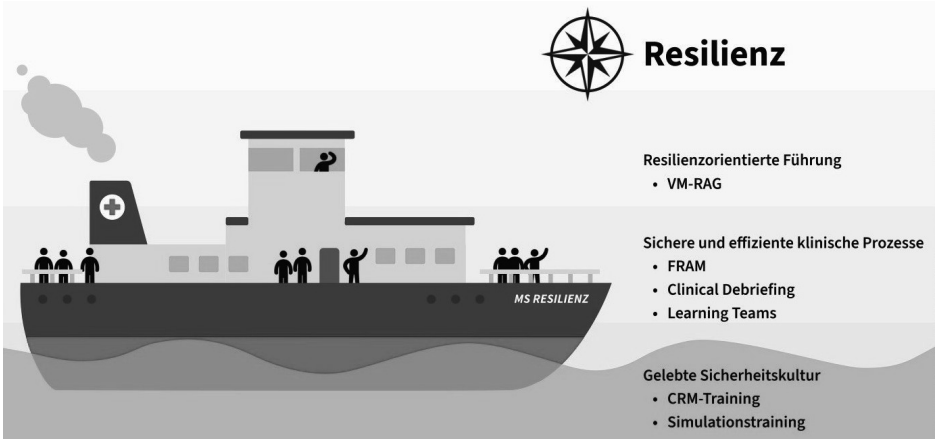


Fig. 1: The illustration uses the metaphor of a motor vessel ("MS Resilience") to depict key levels of resilient healthcare systems. The vessel represents a hospital or organisational unit with its staff, navigating the dynamics of everyday clinical life. Below the waterline lies the lived safety culture. This level is not immediately visible, but it has a significant influence on the organisation's stability and adaptability. It includes, amongst other things, CRM training and simulation training. The middle level consists of safe and efficient clinical processes. These include structured process analyses (e.g. FRAM), clinical debriefings and learning teams. These tools structure workflows and enable the systematic reflection on and further development of clinical processes. Above these processes lies resilience-oriented leadership. It shapes the framework for adaptive performance and encompasses staff leadership, acting as a role model, and the leadership of the organisational unit. Tools such as the Resilience Assessment Grid (VM-RAG) support the structured assessment of systemic capabilities. The diagram illustrates the interplay between leadership, processes and safety culture as the foundation of organisational resilience. Key: VM-RAG = Behavioural Marker Resilience Assessment Grid; FRAM = Functional Resonance Analysis Method; CRM = Crew Resource Management. Source/Copyright: Figure from Mühlbradt T, Schröder S, Speer T. Safety-II: New Approaches to Patient Safety. Strategies, Methods and Practical Experience. Springer Gabler, Wiesbaden, 2024. Springer Verlag: Permission to reprint. Licence number: 625 134 076 147 7

organisational learning processes. Psychological safety is a key influencing factor here, as it increases the likelihood that uncertainties will be addressed, risks discussed and alternative perspectives introduced. Managers are called upon to actively support this openness through

transparent decision-making processes and consistent communication practices.

Practical implementation: an example of application

In practice, implementation requires training programmes that combine CRM methods with Safety II elements and systematically promote adaptive performance. The combination of Safety II and CRM provides a conceptual framework for the further development of leadership in the healthcare sector.

An early example of this is the training programme offered by the Artemed Academy [4]. In interactive workshops, leaders from the fields of medicine, nursing and management are introduced to the fundamentals of CRM. Using realistic case studies, they practise how to succeed in communication, decision-making and team coordination under pressure. A particular focus is placed on the application of CRM principles in everyday clinical practice. In doing so, communication, decision-making processes and team coordination are deliberately structured to promote systemic resilience. Through interprofessional exchange, practical exercises and the integration of Safety II perspectives, a structured framework for reflection and training is created, within which leaders can further develop both their individual confidence in taking action and the collective performance of their teams. The CRM tools are not trained in isolation, but are explicitly reflected upon in the context of adaptive performance and systemic resilience. Initial qualitative feedback from participating managers points to the format's high practical relevance and applicability. The example illustrates how theoretical safety concepts can be translated into concrete leadership formats. A systematic scientific evaluation is currently being prepared.

Standardisation and adaptivity: leadership as a balancing act

A key area of tension in resilient healthcare systems lies in the relationship between standardisation and adaptive action. Standardisation reduces variability in predictable situations and creates reliable frameworks for action. However, it reaches its limits when clinical reality is characterised by conflicting objectives, unexpected events or context-specific peculiarities. In such situations, adaptability is required in order to utilise the scope for action responsibly.

What is crucial, therefore, is not the juxtaposition of these two principles, but their situational balance. Safety-II focuses attention on variability as a necessary condition for systemic performance, whilst CRM provides structural communication and decision-making frameworks to manage variability at the team level. In this context, leadership consists of providing stable frameworks for orientation whilst simultaneously keeping channels open for justified deviations.

Psychological safety supports this balance by enabling uncertainties to be addressed and alternative perspectives to be introduced. Interprofessional collaboration expands collective expertise and thus increases the likelihood of appropriate adjustments under complex conditions. Leaders are called upon to systematically promote these structural and cultural prerequisites.

Measuring resilience: from theory to observable behaviour

However, the implementation of a Safety II-oriented CRM is fraught with challenges. Cultural barriers, resource constraints, hierarchical structures, a lack of measurement tools and fragmented responsibilities complicate implementation. A central task of healthcare research is to make resilience measurable and to empirically test the effectiveness of leadership interventions.

According to Mühlbradt et al. [5], resilience in medical treatment teams can be made measurable above all when it is understood not as an abstract concept but as observable team behaviour. The basis for measurability lies in clearly defined behavioural markers, i.e. observable actions and communication patterns that allow conclusions to be drawn about a team's resilience. The underlying items are based on the CRM behavioural markers described by Rall and Gaba, but have been linguistically adapted and operationalised for the context of standardised surveys.

In the 'MS Resilience' model, the authors ultimately combine the various elements into a structured framework that takes into account both team and process factors as well as leadership (see Fig. 1). This results in a conceptually sound instrument that makes visible the ability of treatment teams to act safely, flexibly and adaptively under variable conditions.

The conceptual embedding of this instrument follows a multi-level logic: the Safety II leadership principles form the strategic foundation. They view variability as an inevitable component of complex systems and strengthen adaptive performance as well as learning from everyday successes. Organisational work processes, which structure the framework for action, are built upon this strategic level. At the team level, this logic is put into practice through Crew Resource Management. This provides concrete tools in the form of communication standards such as closed-loop, decision-making models such as FOR-DEC, team coordination through role flexibility and speaking up, as well as work organisation through briefings and debriefings. Resilient behaviour is evident where the four systemic capabilities of anticipation, monitoring, response and learning are well-developed. The result is teams that remain capable of acting under variable conditions and are characterised by a shared perception of the situation, psychological safety and interprofessional collaboration.

Authors' declaration

The authors declare that there are no conflicts of interest.

Citation

Schröder et al.: "Rethinking leadership in healthcare: Crew Resource Management for system resilience" (MVF 03/26), pp. 71–74.
http://doi.org/10.24945/MVF.03.26.1866-0533.2837

Implications for leadership and healthcare research

Effective leadership shapes the conditions under which teams remain capable of acting even in the face of uncertainty. Complex healthcare systems require an understanding of leadership that enables both stability and adaptability. The combination of Safety II and CRM offers a promising approach to this end. Managers who promote adaptive performance, create psychological safety and strengthen collective capacity for action can make a significant contribution. This presents healthcare research with the task of further developing these approaches and establishing an empirical basis for

them. <<

Prof. Dr. med. Stefan Schröder

ORCID: 0000-0001-7634-166X is a specialist in anaesthesiology and Chief Physician at Artemed Hospital Düren. He is also a member of the board of the Action Alliance for Patient Safety. His focus is on national strategies to improve the quality and safety of care through crew resource management and interdisciplinary simulation training, which sustainably strengthen team performance and confidence in clinical practice. Contact: Stefan.Schroeder@artemed.de



Dr Tillmann Speer

ORCID: 0000-0002-6579-2470 is a specialist in anaesthesiology and an emergency physician at Itzehoe Hospital. He focuses on patient safety and systemic approaches to clinical risk management, particularly in the context of Safety II and simulation training to improve teamwork in acute care. Contact: T.Speer@kh-itzehoe.de



Dr. rer. nat. Helga Unger

ORCID: 0000-0001-8922-6003 is a consultant and trainer in the field of human resources and organisational development. In addition to her private practice, she works as a lecturer and research fellow at FOM University of Applied Sciences in Aachen. She supports interdisciplinary teams in complex change processes, incorporating approaches from occupational and organisational psychology. Contact: Helga.Unger@fom.de



Prof. Dr. rer. pol. Thomas Mühlbradt

ORCID: 0000-0002-6612-7210 is Professor of Occupational and Engineering Psychology at FOM University of Applied Sciences in Aachen. In addition to his teaching duties, he works on externally funded research projects focusing on learning support and systemic resilience in complex systems such as acute care. He is co-author of the book “Safety-II: New Approaches to Patient Safety”. Contact: Thomas.Muehlbradt@fom.de



Rethinking leadership in healthcare: Crew Resource Management for system resilience

Introduction: Today's healthcare system is characterised by increasing complexity, a shortage of skilled personnel, economic pressures, and growing interprofessional collaboration. Under these conditions, traditional leadership models are reaching their limits. Furthermore, a shift in perspective has taken place in patient safety research: away from the error-focused Safety I approach and towards the adaptability-focused Safety II approach. The latter understands safety as a system's ability to function successfully under variable conditions. Crew Resource Management (CRM) offers practical tools for this purpose to promote non-technical competencies such as communication, situational awareness, and team decision-making. The aim of this article is to conceptually link Safety II and CRM in order to develop an integrative leadership approach for resilient healthcare systems.

Methods: This is a conceptual analysis of key approaches in patient safety research and organisational development in healthcare. The Safety II and Crew Resource Management approaches are theoretically integrated and discussed in terms of their significance for leadership, teamwork, and organisational learning processes.

Results: Safety II provides the strategic framework for an adaptive approach to safety. CRM complements this approach with specific behavioural standards for communication, decision-making processes, and team coordination. The combination of both approaches enables a leadership model that combines a clear orientation framework with situational adaptability. Key elements include shared situational awareness, structured decision-making models, psychological safety, as well as briefings and debriefings. Initial training experiences demonstrate high practical relevance.

Discussion: The integration of both approaches opens up new perspectives for leadership in complex healthcare systems. Key tasks include fostering collective capacity for action, designing learning processes in everyday work, and promoting open communication. Future health services research should systematically evaluate corresponding leadership and training concepts.

Keywords

Safety-II; Crew Resource Management; Leadership in Healthcare; Resilient Healthcare; Interprofessional Collaboration; Adaptability