

The Human Factor

Optimizing Trauma Team Performance in Dynamic Clinical Environments



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KEYWORDS

• Human factors • Patient safety • Resilience

KEY POINTS

- Equipping team members with a suite of psychological skills to manage stress, attention, and arousal
- Emphasizing specific team-based behaviors that facilitate the creation of accurate and flexible mental models, implicit communication, and adaptive coordination
- Improving awareness of environmental and equipment issues to close the gap between strategy and logistics
- Implementing systems-based initiatives aligned with Safety-II to improve system resilience in the absence of error, based on what went right

Trauma is easy; Trauma teams are hard

—Anon

Case 1. An urban emergency department receives a prehospital trauma alert: a young man with multiple gunshot wounds is en route. The team assembles beforehand, and the attending emergency physician assumes the leadership role. Team members quietly prepare for anticipated key tasks: airway, chest tube insertion, and vascular access. On arrival, the patient is unresponsive, with massive external hemorrhage from a midface gunshot wound plus 2 ballistic injuries within the cardiac box. Amid the chaos, only the recording nurse hears the paramedic's handover report: "unsuccessful intubation attempt, critical hypotension, signs of life in the field." In an attempt to optimize

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preintubation hemodynamics, the anesthesiologist pushes phenylephrine from a vial she carries in her emergency response kit, an intervention not communicated to either team leader or recording nurse. Airway management is further complicated by mechanical trismus from the ballistic injury. This observation is made by the paramedic team and shared during sign-over, but the team leader is fixated on the cardiac ultrasound. Various individuals offer suggestions regarding next steps, prompting confusion and exasperation with the nurses. A “can’t intubate, can’t oxygenate” airway is declared by the anesthesiologist, who then requests a surgical airway kit. An open surgical airway tray is brought to the bedside, which is not the percutaneous set-up that the anesthesiologist prefers. Further delays occur after disagreements between the surgeon, emergency physician, and anesthesiologist about the airway approach and who should make the final decision. It is at this point that the respiratory therapist assertively declares that he cannot feel a carotid pulse.

BACKGROUND: THE TROUBLE WITH TEAMS

Trauma is a team sport. Resuscitating a severely injured patient requires the coordination of cognitive, task, and systems-based resources in a dynamic and time-dependent fashion that rapidly exceeds what an individual can bring to bear. Equally challenging is the interaction between individuals within teams during periods of ambiguity, complexity, or high coordination overhead. Trauma resuscitation poses a particular challenge: diagnosis and management occur simultaneously, in step with the ordered execution of team-based tasks and procedural interventions. Trauma teams do not operate in a bubble—the extent to which teams can effectively operationalize a resuscitation strategy is moderated in part by the clinical environment. The decision to insert a tube thoracostomy may be straightforward, yet the ambient environment, crowding, noise, lighting, and functional set-up of key equipment have a significant effect on the ability to complete the procedure quickly, safely, and successfully. A gap between strategy (the plan) and logistics (how that plan is executed) often arises from a lack of consideration for and preparation of the operational environment.¹

At first glance, the demands of managing team-based challenges during trauma resuscitation seem daunting. Research from performance psychology, team dynamics, organizational theory and systems engineering suggest the opposite is true: the targeted integration of human factors theory can help manage complexity and improve performance in dynamic clinical environments. Standardized paradigms like crisis resource management represent a logical first step but do not help individuals and teams recognize the ambient and circumstantial factors in which implementing those skills might become problematic. For example, the team leader in case 1 was overly task focused during handover and missed important details that may have influenced management. Crisis resource management would identify this as a failure of situational awareness, but to effectively address the problem the analysis needs to go deeper. The team leader ignored task-relevant cues, a feature of hyperarousal that is known to constrain cognition and decision-making capacity.² The solution is not to “improve situation awareness” but to recognize the influence of acute stress on performance and apply specific strategies to moderate arousal during periods of high task load.³ The case can be dissected further to reveal process issues (lack of standardized handover), problems with clinical logistics (availability and accessibility of surgical airway equipment), and team leadership (problematic process of shared decision-making and conflict resolution). Each of these challenges requires a specific response—marginal gains that can sum to major improvements in team performance.⁴

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