When Routine Strategies Create Risk: Nontechnical Skill Vulnerabilities in High-Volume CCAT Operations

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Background

- Critical Care Air Transport (CCAT) teams are trained and assessed primarily in standard En Route Critical Care (ERCC) mission profiles involving two simultaneous patients.
- During Large Scale Combat Operations (LSCO), CCAT teams are expected to operate under high-demand conditions characterized by increased patient volume, prolonged transport times, degraded communications, and extreme cognitive load.
- Nontechnical skills (NTS) that support improved performance in routine missions may not scale to these conditions, creating predictable performance vulnerabilities.

Objective

Identify behaviors and strategies that effectively support usual CCAT operations but create risk during higher patient volumes.

Simulation Context

- Static C-130
- 6 CCAT teams, each with a different non-CCAT augmenting member
- Each team completes 2 x 30 minute, 5-patient scenarios
- Scenarios are audio and video recorded

Figure 1. Simulation Setting

Methods

- Raters (2) evaluating team NTS also generated notes pertaining to effective and ineffective behaviors for high patient volume scenarios.
- An expert reviewer additionally watched all recordings and maintained field notes.
- 2 experts in NTS assessment analyzed field notes using a grounded theory approach to identify ineffective behaviors that are considered part of CCAT training doctrine or usual practice.
- A secondary goal was identification of best practices for integration of a non-CCAT trained augmenting crew member.

Results

Table 1. Behavior Comparison by Patient Volume

	Low patient volume: typical behavior	High patient volume: recommended behavior
VITAL SIGN SWEEPS		
	Conduct team-wide vital-sign rounds.	Communicate only critical values.
COMMUNICATION EFFICIENCY		
	Provide detailed interval updates on interventions.	Use brief summary updates to reduce cognitive load.
PATIENT IDENTIFICATION		
	Use informal patient identifiers.	Use a structured patient-identification process to reduce misidentification risk.
ROLE FLEXIBILITY & AUTONOMY		
	Match tasks to each team member's assigned role.	Allow flexible task-sharing so any qualified team member can complete needed tasks.
USE OF AUGMENTERS		
	Minimize involvement of non-CCAT members.	Assign augmenting support staff to tasks that match their skill set.

Conclusions

- High-volume, LSCO-relevant simulated ERCC missions expose specific nontechnical behaviors that require modification for CCAT training and assessment doctrine.
- These conditions also define where human cognitive limits are reached, providing a principled foundation for future application and evaluation of human–machine teaming to support monitoring, prioritization, and communication.
- This work informs doctrinal refinement while clarifying where new capabilities may most effectively support CCAT teams in high-density transport environments.

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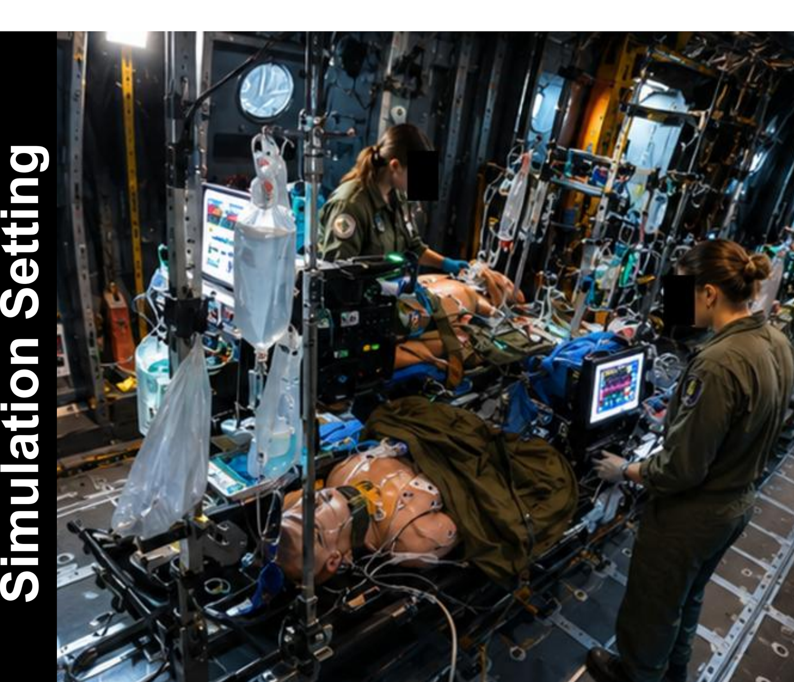

Figure 2. Simulation Setting

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