Lessons from Combat Medicine for Future Space Missions: Vascular Trauma and Damage Control in Extreme Environments

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Objective

To examine the evolution of military medical support systems across multiple domains—including land, sea, air and space—to identify how military trauma principles can be adapted for deep-space missions.

Methods

- Cutting-edge review of 50 relevant papers
- PubMed, Springer, Google Scholar, Wiley and NASA Technical Reports for articles published within the last decade (2016-2026)
- NASA GAPs: CV-101: CV-102, CV-103, CV-202, CV-203, CV-301, CV4, EIHSO-201, EIHSO-301, EIHSO-501, EIHSO-701, EIHSO-8801, ExMC 4.07, ExMC 4.10:, Fracture 1, Med07, Med12, Medical-101, Sleep-101

Results

Figure 1. Translating Military Advancements to Deep-Space Trauma Systems

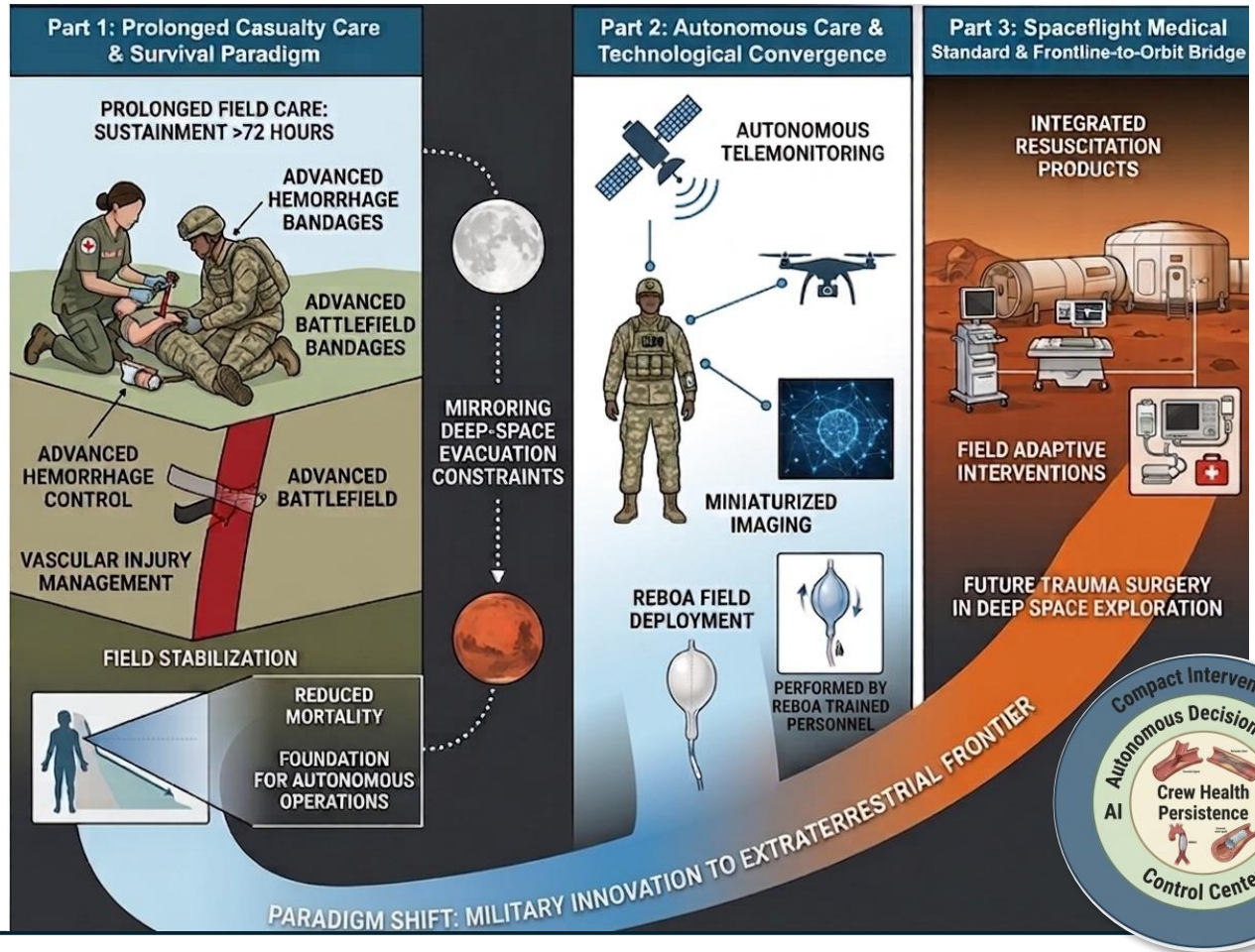
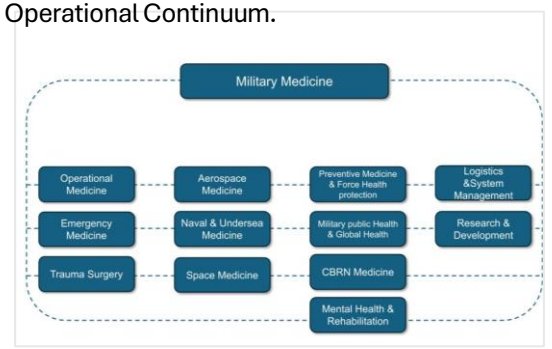


Figure 2. Domains of Military Medicine and the Operational Continuum.



Conclusion

Paradigm Shift: Deep-space missions require total medical autonomy, closing the evacuation gap through military trauma and prolonged care principles.

Cross-Sector Synergies: Mission success relies on strategic military, NASA, and industry partnerships to advance translational research.

Tech Miniaturization: Developing compact, versatile medical technologies is essential to sustain life across all operational domains.