

WG 5 (Combat Casualty Care)

Next-Gen Command Platforms for Effective Combat Casualty Care and Evacuation

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Background and Purpose:

Medical documentation in battlefield conditions remains challenging for military medical teams. Past conflicts, including U.S. Army operations in Afghanistan and Iraq, saw prehospital documentation rates at only 18-25%, while the IDF's 2014 Gaza operation recorded rates as low as 11%. During the Swords of Iron War, the IDF Medical Corps implemented a new digital documentation system, which has been significantly refined and continues to evolve. This study examines the system's achievements and its upcoming next-generation platform.

Methods:

This registry-based study analyzes data from the IDF Trauma Registry between October 2023 and October 2024. Data include casualty demographics, event characteristics, medical treatments, and evacuation details. Prehospital documentation was categorized into digital vs. non-digital.

Results:

In one year of intense warfare, the IDF recorded 5,058 casualties, with 1,627 (32%) having pre-hospital digital records. Of these, 1,175 were cross-referenced with the IDF Trauma Registry. Most (99.3%) were male soldiers from conscript (48.4%), reserve (42.3%), and career (9.3%) units. Injury patterns reflected broader casualty trends, with explosions (60%) as the leading cause and injuries mainly to the extremities (37% upper, 35% lower), face (27%), and torso (24%). For those with digital records, 15% involved three or more body regions, and 58% were urgent. Digital documentation correlated with higher battlefield interventions, like tourniquet application (15% vs. 13%), blood product administration (11.3% vs. 8%), and air evacuation (55% vs. 32%) compared to non-digital cases.

Conclusion:

The Swords of Iron War marked a significant advancement in battlefield medical documentation, leading to improved continuity of care, enhanced medical handoffs, and better post-event analysis. While digitally documented casualties closely resemble the general injured population, they are more likely to receive treatment on the battlefield and undergo air evacuation. The next-generation digital documentation system will integrate continuous vital sign monitoring and real-time data transmission, transforming battlefield medical decision-making and evacuation triage.

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Battlefield Integration of Wearable Sensors for Trauma Monitoring: Operational Feasibility and Performance Evaluation

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Introduction:

Rapid and accurate physiological monitoring is critical for battlefield trauma care, yet current systems rely on intermittent assessments rather than continuous real-time data. Wearable sensor technologies offer a potential solution, but their adaptation to field conditions remains challenging. This study evaluates a novel sensor system initially designed for telemedicine, focusing on its adaptability, usability, and real-world performance in military trauma scenarios.

Materials and Methods:

Military medical teams received structured training on the sensor system and prospectively evaluated it during simulated and real-world casualty evacuations. A comparative analysis was conducted against standard monitoring devices, measuring key physiological parameters like blood pressure, heart rate, and oxygen saturation. Usability and operational feasibility were assessed using quantitative performance metrics and structured feedback from field personnel. Key failure points, including connectivity, stability, and interface usability, were scrutinized to identify barriers to deployment.

Results:

The wearable sensor was used by nine medical teams, in various simulated (80%) and real-world operational (20%) scenarios, yielding over 70 cases with confirmed physiological readings. Continuous monitoring in field environments was achieved in 44.7% of the cases, whereas single reads were achieved in 82.9% of the cases. The sensor's blood pressure, heart rate, and oxygen saturation measurements were consistent with standard monitoring devices. However, operational challenges included signal disconnections in high-motion settings and discrepancies in user interface expectations between telemedicine and battlefield medical workflows. Field personnel identified three main areas for improvement: signal robustness, hands-free operation, and integration with existing combat medic workflows.

Conclusions:

This study shows that wearable sensor technology is feasible for trauma monitoring in military settings, but modifications are needed to ensure seamless data accessibility and integration. Future efforts should emphasize enhancing real-time data transmission, improving ruggedness for extreme conditions, and incorporating artificial intelligence-driven early warning systems to optimize decision-making in battlefield trauma care.