Quality Control in the Development and Implementation of a Trauma Registry for War-Related Injuries in Ukraine

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Background

Military medical care during large-scale combat operations (LSCO), such as the Russo-Ukrainian War, presents unique challenges compared to low-intensity, counter-insurgency conflicts (COIN). The Ukraine healthcare system has been learning and adjusting to the changing battlespace in real-time. In a joint US-Ukraine effort we have developed and implemented a trauma registry, modeled after the US DoD Trauma Registry, called the AREVA Trauma Registry (AREVATR).

RESEARCH AIM

We aimed to develop a high-quality and rigorous data collection system, which is imperative for military medical readiness in the context of future LSCO.

Methods

- **Data:** The AREVATR was implemented in 7 centers across Ukraine. Each center has at least two abstractors who enter data from paper-based case histories for each patient for each level of care.
- **Quality Control:** The AREVATR system has a built-in computerized module for assessing data entry inconsistencies to ensure quality control (QC). When inconsistencies are identified, the two abstractors were tasked with resolving the discrepancy with ties broken by local site PI.
- **Variables:** 98 variables are collected, including demographics, injury characteristics, injury severity, ICD coding for surveillance, amputations, blood use, tourniquet use, hospital course, procedures, bacteremia and vital signs.
- **Statistical Analysis:** To measure inter-rater agreement between two abstractors, we used intraclass correlation coefficients (ICC) for continuous variables and Cohen's Kappa for categorical variables, presented as forest plots. All analyses performed in R version 4.5.3.

Results

Figure 1. System Overview

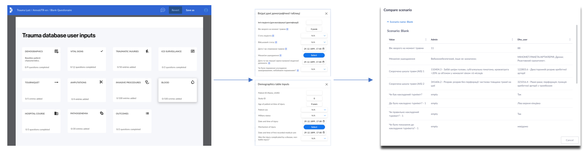


Figure 2. Data Entry Protocol

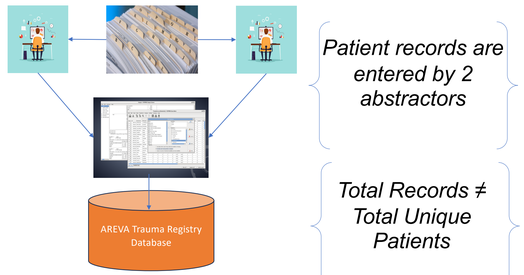


Figure 3. Data Flow

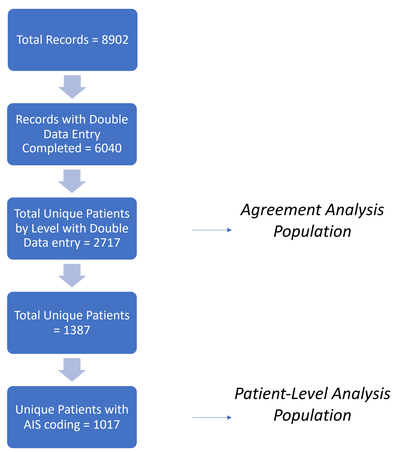


Figure 4. Inter-rater Agreement for Key Variables (N=2717)

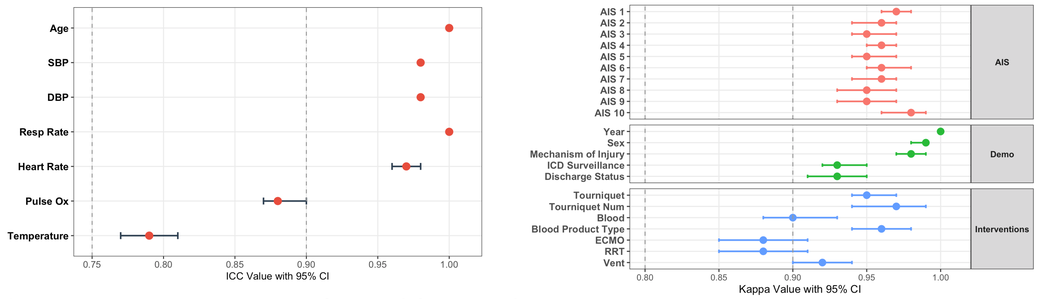
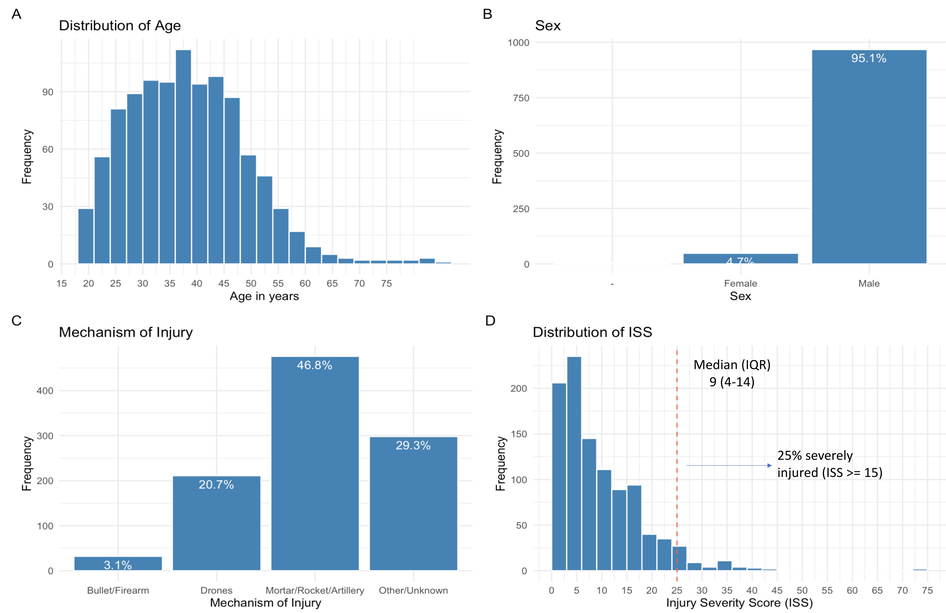


Figure 5. Key Patient-Level Variable Distributions (N=1017)



Discussion

- Robust QC process was implemented in which we can directly assess data entry consistency on all records with double data entry
- Results show a high degree of consistency in data entry (most variables exceed inter-rater agreement of 0.90)
- Injured patients tend to be in their late 30s (median=38, IQR: 30-46) and predominately male (95%)
- Injuries were most commonly the result of Mortar/Rocket/Artillery (47%)
- Injury severity is skewed toward minor injuries (median ISS=9), although 25% are classified as severe (ISS >= 15)

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