



Review

Systematic review of the prevalence and characteristics of battle casualties from NATO coalition forces in Iraq and Afghanistan



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ABSTRACT

Background: The North Atlantic Treaty Organization (NATO) coalition forces remain heavily committed on combat operations overseas. Understanding the prevalence and characteristics of battlefield injury of coalition partners is vital to combat casualty care performance improvement. The aim of this systematic review was to evaluate the prevalence and characteristics of battle casualties from NATO coalition partners in Iraq and Afghanistan. The primary outcome was mechanism of injury and the secondary outcome anatomical distribution of wounds.

Methods: This systematic review was performed based on all cohort studies concerning prevalence and characteristics of battlefield injury of coalition forces from Iraq and Afghanistan up to December 20th 2013. Studies were rated on the level of evidence provided according to criteria by the Centre for Evidence Based Medicine in Oxford. The methodological quality of observational comparative studies was assessed by the modified Newcastle-Ottawa Scale.

Results: Eight published articles, encompassing a total of $n = 19,750$ battle casualties, were systematically analyzed to achieve a summated outcome. There was heterogeneity among the included studies and there were major differences in inclusion and exclusion criteria regarding the target population among the included trials, introducing bias. The overall distribution in mechanism of injury was 18% gunshot wounds, 72% explosions and other 10%. The overall anatomical distribution of wounds was head and neck 31%, truncal 27%, extremity 39% and other 3%.

Conclusions: The mechanism of injury and anatomical distribution of wounds observed in the published articles by NATO coalition partners regarding Iraq and Afghanistan differ from previous campaigns. There was a significant increase in the use of explosive mechanisms and a significant increase in the head and neck region compared with previous wars.

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Background

The Global War on Terror (GWOT) is the largest scale armed conflict for the North Atlantic Treaty Organization (NATO) in its existence. This operation, with the evolution of the conflict from traditional warfare to a counter-insurgency operation, has been confronted with many battle casualties (BC) on the side of the allied forces, where the mechanism of injury and anatomical distribution of battle injuries (BI) is changing [1]. The conflict is characterized by heavy use of improvised explosive devices (IED) causing a typical casualty pattern [2]. The study of BI and their causes is important for improving care on the battlefield and the field assistance, for developing protective measures, identifying risk factors and populations at risk and efficiency of care. In addition, due to the insurgents in the Iraq and Afghanistan wars relying extensively on irregular means of warfare, findings from the study of injured military personnel may also have implications for disaster preparedness and mass-casualty events that result from terrorism in the civilian sector [2]. It is of interest to search for published data on this subject to consider improvements in care for BC.

A systematic review of scientific reports on BC in NATO coalition partners has not yet been performed. From an initial read of studies in this domain it was evident that the registry before 2004 was very fragmentary and not well structured. A Joint Theatre Trauma Registry (JTTR) was established in 2004 and is a prospective standardized system of data collection, designed to encompass all the aforementioned roles of combat casualty care for United States of America (US) and Canadian troops [3]. Population of the JTTR is dependent on initial entry of casualty data into each individual medical record. The JTTR has greatly enhanced the organization of trauma care in trauma zones. Understanding the prevalence and characteristics of battlefield injury of coalition partners is vital to combat casualty care performance improvement [3].

The aim of this systematic review is to evaluate the prevalence and characteristics of BC in NATO coalition partners. The primary outcome was mechanism of injury (MOI) and the secondary outcome anatomical distribution of wounds (AD).

Methods

The protocol for objectives, literature search strategies, inclusion and exclusion criteria, outcome measurements, and methods of statistical analysis was prepared a priori, according to the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement [4,5] and is described in this section.

Literature search strategy

This systematic review was performed based on all cohort studies concerning prevalence and characteristics of battlefield injury of coalition forces from Iraq and Afghanistan. An electronic database search of Pubmed, Medline, Embase Science Citation

Index Expanded, the Web of Science and World Wide Web search (keywords “battle, combat, casualties, wounded, war and military”) was performed up to December 20th 2013. All electronic databases were searched for articles published using the medical subject headings (MeSH) or entry terms (Supplementary Material) “military personnel” and “military casualties”. Equivalent free-text search terms, such as “military casualty”, “battle casualties”, “armed forces”, “military medicine” and “wounds and injuries” were used in combination with “JTTR”, “trauma registry” and “statistics”. The reference lists from the included studies were searched to identify additional studies.

Inclusion and exclusion criteria, data extraction and outcomes of interest

Two authors (RH, ET) independently identified the studies for inclusion and exclusion, and extracted the data. The accuracy of the extracted data was further confirmed by a third author (EV). The inclusion criteria were as follows: 1. Battle (combat) casualties, 2. NATO forces, 3. cohort studies, 4. Iraq or Afghanistan. Defining the population studied reaching a medical treatment facility (MTF) is necessary to perform valid comparisons between wars and draw meaningful conclusions. The inclusion of killed in action (KIA), died of wounds (DOW), Return to duty within 72-h (RTD) and non battle injury (NBI) in any cohort analyzed will affect the distribution of wounds and mechanism of injury [6]. A schematic flowchart of military casualty definitions and classifications is presented in Fig. 1. The risk of population bias in this systematic review is inevitable, due to different inclusion criteria, therefore no power analysis was performed. However, a narrative description of prevalence and characteristics of battlefield injury of coalition force was performed, to minimize possible effects of heterogeneity and cohort overlap. Clinical outcome (including Afghanistan Army and Police) would ideally be part of a comparative evaluation in this qualitative synthesis, but due to lack of follow up and clear end points in the included studies, this was not included in this systematic review.

Quality assessment

Studies were rated on the level of evidence provided according to criteria by the Centre for Evidence Based Medicine in Oxford. The methodological quality of observational comparative studies was assessed by the modified Newcastle–Ottawa Scale [7]. A score of 0–9 was assigned to each study. It was agreed that the lack of adequate population description or clear prevalence and characteristics of NATO coalition forces would result in the studies being classified as having a high risk of bias. The mechanism of injury and, more likely, the anatomical distribution of wounds could be different comparing the coalition forces with the Afghan National Security Forces. The major difference was usage of any kind of body protection. These cohort studies [6,8–28] are the best evidence for epidemiology and demographics of BC of NATO coalition partners published up to December 20th 2013.

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