

Factors Associated with Elevated Mortality Following Severe Traumatic Extremity Injuries among Previously Deployed Active Duty Service Members

John Shero¹, Emily A. Schmied^{2,3}, Jessamyn Boltz^{4,5}, Jordan A. Levine^{4,5}, Hannah Koenig⁶, Nketi Forbang^{1,4}, Christopher Dearth¹, Cynthia J. Thomsen⁴

¹Departments of Defense and Veterans Affairs Extremity Trauma and Amputation Center of Excellence, Joint Base San Antonio, Texas; ²School of Public Health, San Diego State University, San Diego, CA; ³Institute for Behavioral and Community Health, San Diego, CA; ⁴Naval Health Research Center, San Diego, CA ⁵Leidos, Inc., San Diego, CA; ⁶Research and Academics, Virginia Mason Franciscan Health, Seattle, WA

Abstract

Extremity injuries are a leading cause of medical visits and one of the greatest morbidity burdens within the U.S. military. However, little research has examined association between traumatic extremity injury and longer term mortality. The objectives of this study were: 1) to determine the association between traumatic extremity injury and long-term risk of death among service members (SM); and 2) to compare risk of all-cause and cause-specific mortality among two groups of SM with a traumatic extremity injury (those whose injuries did versus did not result in amputation) to mortality risk in the total study population of SM. Department of Defense personnel, deployment, medical, and death records for SM who deployed in support of the Global War on Terror between 2001 and 2016 were analyzed ($N = 1,875,206$). Standardized mortality ratios (SMR) and associated 95% confidence intervals directly compared all-cause and cause-specific mortality rates within each injury group to rates in the total study population, adjusting for sex, age, and race/ethnicity. Additional

analyses examined the role of traumatic brain injury (TBI) and mental health conditions in predicting group differences in mortality. Only 0.8% of SM in the study population sustained a serious extremity injury not requiring amputation and 0.1% sustained an injury requiring amputation. Most (69.1%) of the 23,176 SM who died during the observation period died of external causes. Overall and for deaths due to both internal and external causes, members of both injury groups were significantly more likely to die than the total study population ($p < 0.05$). Additional analyses examined the role of TBI and mental health conditions in explaining group mortality differences. The results of this novel study suggest SM who sustain traumatic extremity injuries may face heightened mortality risks, indicating a critical need for more research into causal mechanisms and tailored long-term post-injury support services.

Disclaimer: John Shero, Christopher Dearth, and Cynthia Thomsen are employees of the U.S. Government. This work was prepared as part of their official duties. Title 17, U.S.C. §105 provides that copyright protection under this title is not available for any work of the U.S. Government. Title 17, U.S.C. §101 defines a U.S. Government work as work prepared by a military service member or employee of the U.S. Government as part of that person's official duties. This work was supported by the Departments of Defense and Veterans Affairs Extremity Trauma and Amputation Center of Excellence under work unit no. N1718. The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government. The study protocol was approved by the Naval Health Research Center Institutional Review Board in compliance with all applicable Federal regulations governing the protection of human subjects. Research data were derived from an approved Naval Health Research Center Institutional Review Board protocol, number NHRC.2018.0001.

