

Neuromusculoskeletal Injury Complications Following Serious Injury and Risks to Recovery Post-Injury Among Service Members

Rebecca N. Schulz^{1,2}, Stanley T. Zimmerman^{1,2}, Anne C. Enge^{1,2}, Kalyn C. Jannace^{1,2}

¹Center for Advanced Research for Military Optimization, Readiness, and Rehabilitation, Department of Physical Medicine & Rehabilitation, F. Edward Hébert School of Medicine, Uniformed Services University

²Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc.

INTRODUCTION

- Military service members (SMs) are at elevated risk for musculoskeletal injury (MSKI).
- Severe MSKI can result in complications and may delay recovery and return to duty (RTD).¹⁻⁵
- Escalating conflict underscores the need for optimizing recovery.

OBJECTIVE

To examine associations between MSKI severity, complications, rehabilitation, and recovery

METHODS

Design: Retrospective Cohort

Population: SMs ages 18 to 64 who experienced MSKI between 2017 and 2022

Independent variable: MSKI Severity, Complications

Dependent variables: Complications, Rehabilitation, Recovery, Reinjury

Analysis: Logistic Regression, Kaplan Meier Survival

DEFINITIONS

Severe MSKI: Inpatient admission on the injury date

Recovery: 60-day lapse between clinical encounters for the injured body region

Reinjury: A new encounter impacting the same incident secondary body region

RESULTS

Figure 1. Risk and Protective Factors for Severe MSKI and Complications (N=534,194).

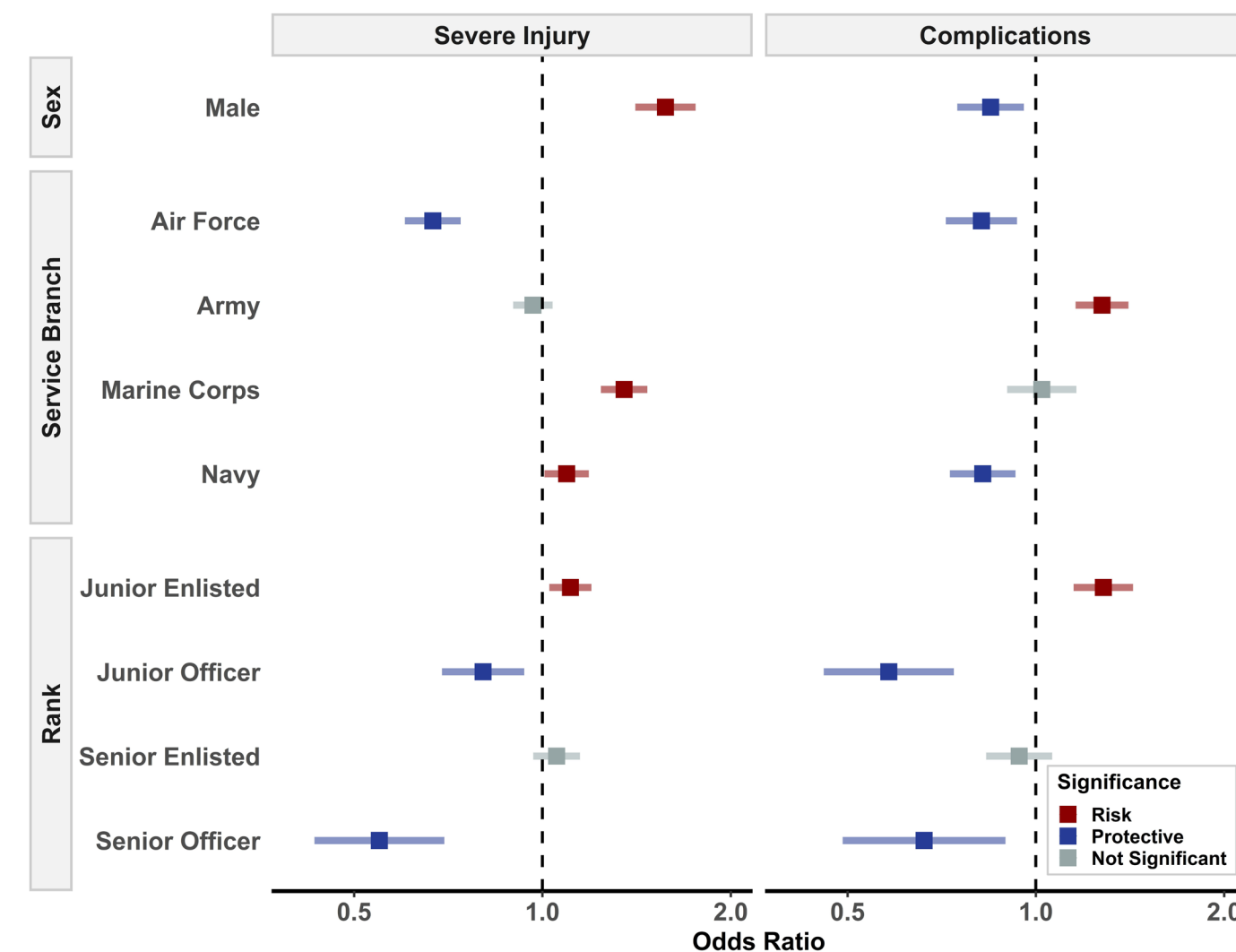


Figure 2. Complication Types by Injury Severity and Body Region (N=534,194).

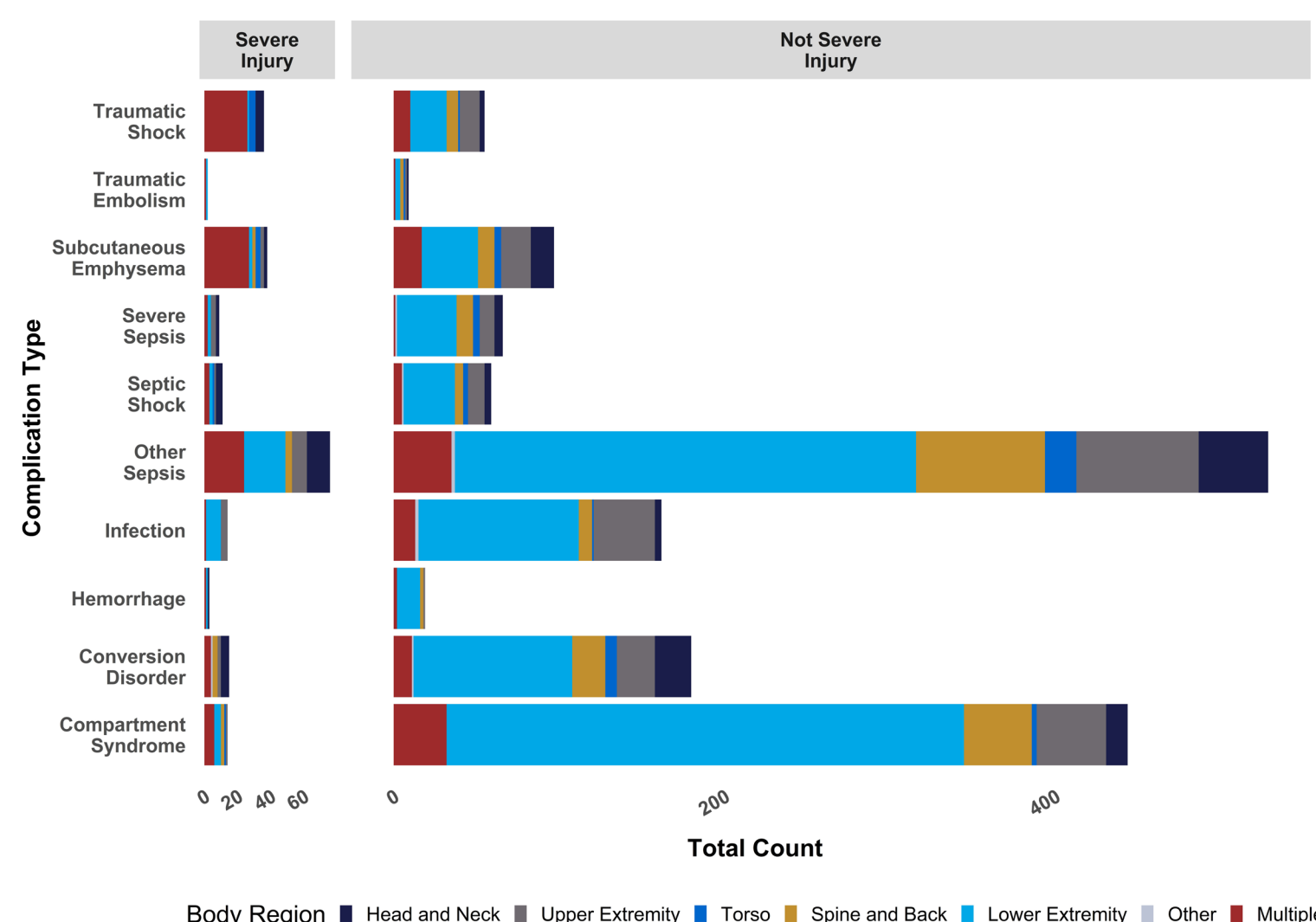
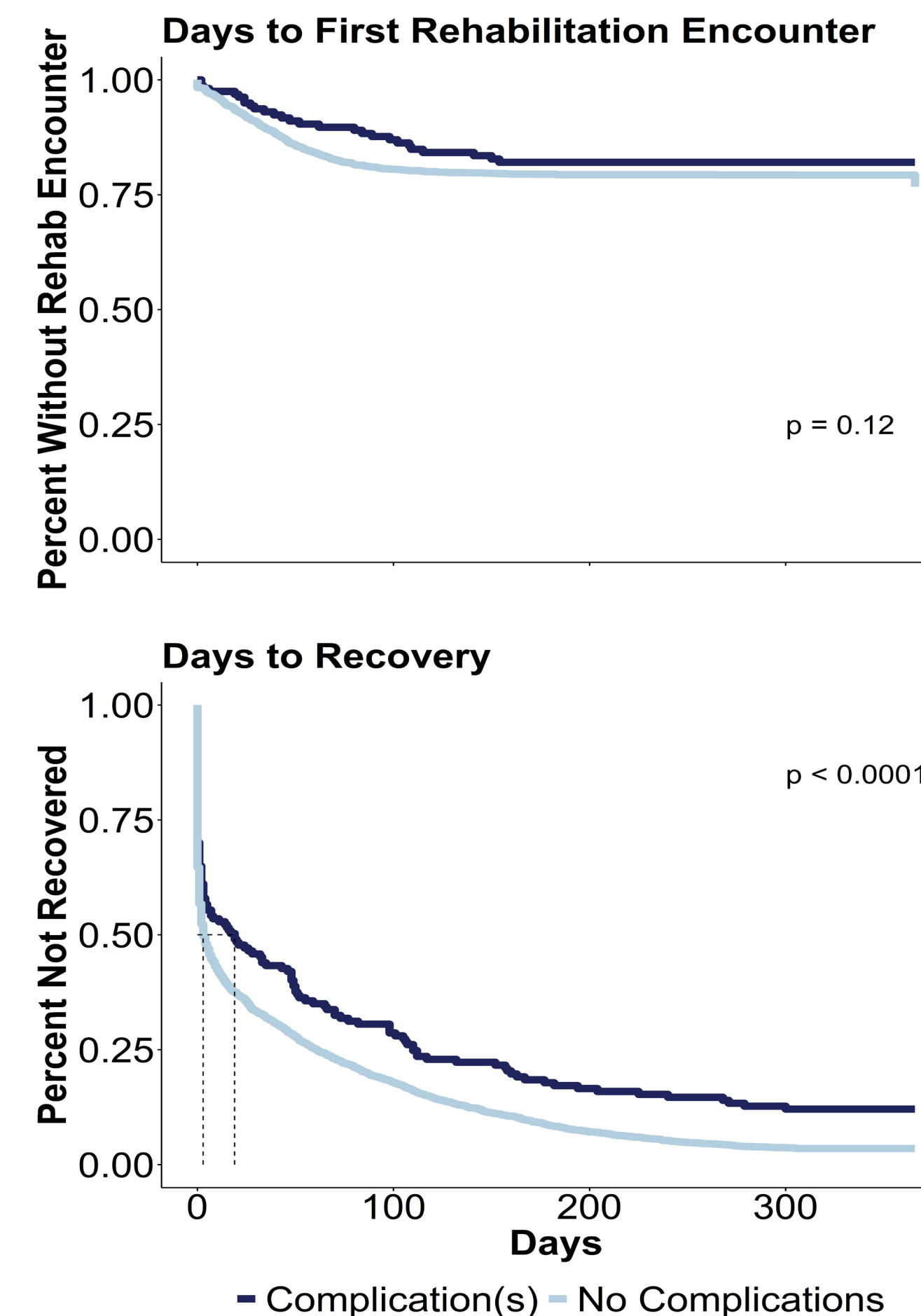


Figure 3. Time to Rehabilitation and Recovery by Complication Status in SMs with Severe MSKI (N=3,083).



DISCLAIMERS

The opinions and assertions expressed herein are those of the author(s) and do not reflect the official policy or position of the Uniformed Services University or the Department of War. The contents of this publication are the sole responsibility of the author(s) and do not necessarily reflect the views, opinions or policies of The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. Mention of trade names, commercial products, or organizations does not imply endorsement by the U.S. Government. The authors have no financial interests or relationships to disclose.

CONCLUSIONS

- SMs with severe MSKIs had longer time to first rehabilitation, regardless of complications, potentially due to injury severity.^{6,7}
- Complications increase the risk of reinjury following initial recovery, which deserves further investigation.
- Results underscore the need for further care investigation following severe MSKI to reduce injury recurrence following RTD.

FUNDING

Funding was provided by the Uniformed Services University Military Women's Health Research Program, Award#: HU00012420012

REFERENCES

- ¹Jacobs JM, Cameron KL, Bojeskul JA. Lower extremity stress fractures in the military. Clin Sports Med. Oct 2014;33(4):591-613. doi:10.1016/j.csm.2014.06.002
- ²Sansosti LE, Crowell A, Choi ET, Meyr AJ. Rate of and Factors Associated with Ambulation After Unilateral Major Lower-Limb Amputation at an Urban US Tertiary-Care Hospital with a Multidisciplinary Limb Salvage Team. Journal of the American Podiatric Medical Association. Sep 2017;107(5):355-364. doi:10.7547/16-073
- ³Pérez-Prieto D, Totlis T, Madjarevic T, et al. ESSKA and EBJIS recommendations for the management of infections after anterior cruciate ligament reconstruction (ACL-R): prevention, surgical treatment and rehabilitation. Knee Surg Sports Traumatol Arthrosc. Oct 2023;31(10):4204-4212. doi:10.1007/s00167-023-07463-3
- ⁴Lodhi MJ, Brismée JM, Shapiro R, LeClere L, Waltz RM. Impact of Functional Training on Injuries After Anterior Cruciate Ligament Reconstruction for Return-to-Duty Status in U.S. Naval Academy Midshipmen: A Retrospective Analysis. Military medicine. Jun 30 2025;190(7-8):e1595-e1600. doi:10.1093/milmed/usae572
- ⁵Garcia-Canas R, Navarro-Suay R. Combat-Related Orthopedic Trauma in the Russo-Ukrainian War: A Systematic Review. J Spec Oper Med. Mar 16 2026;doi:10.55460/J.Spec.Oper.Med.2026.7V8D-PA9N
- ⁶Rhon DI, Fraser JJ, Sorensen J, Greenlee TA, Jain T, Cook CE. Delayed Rehabilitation Is Associated With Recurrence and Higher Medical Care Use After Ankle Sprain Injuries in the United States Military Health System. J Orthop Sports Phys Ther. Dec 2021;51(12):619-627. doi:10.2519/jospt.2021.10730
- ⁷Alqahtani TA, Kardm SM, Alnakhli HH, Alyazedi FM, Kandakurti PK, Reddy RS. Impact of early vs. delayed physical therapy on functional recovery, proprioception, and return to sport after anterior cruciate ligament (ACL) reconstruction: a cross-sectional study. J Orthop Surg Res. Jul 12 2025;20(1):644. doi:10.1186/s13018-025-06054-x