

Surveillance of Causes of Fatal Non-Battle Injuries among Army Soldiers Deployed for Operations Enduring Freedom (Afghanistan) and Iraqi Freedom/New Dawn (Iraq), 2001-2012

Geeta Kersellius, MPH,MBS; Bonnie Taylor, PhD; Keith Hauret, MSPH,MPT; Bruce Jones, MD,MPH
U.S. Army Institute of Public Health, Aberdeen Proving Ground, MD



ABSTRACT

Introduction: Non-battle injuries (NBIs) have been an important cause of death in the on-going Army deployments for Operation Enduring Freedom (OEF) in Afghanistan and Operation Iraqi Freedom/New Dawn (OIF/OND) in Iraq. During 2001 to 2009, fatal NBIs accounted for 21 percent of all deaths. The overall fatal NBI rate was 74.1/100,000 deployed soldier-years.

Purpose: The objective of this investigation was to utilize routine casualty and safety surveillance data to provide an update for the incidence and causes of fatal NBIs among Army soldiers deployed in support of OEF (2001-2012) and OIF/OND (2003-2012).

Methods: Three electronic data sources were used to identify soldiers who sustained an NBI from 2001-2012: the Defense Casualty Information Processing System, the Army Safety Management Information System and the Armed Forces Medical Examiner System. Descriptive statistics (frequencies and percentages) were used to report the casualty type and cause of injury for soldiers with fatal NBIs.

Results: Overall, there were 4,876 fatalities among soldiers in OEF and OIF/OND (2001-2012). Among these fatalities, 79% (n=3,839) were battle injuries, 18% (n=902) were NBIs, and 3% (n=125) were due to illness/disease. Leading causes of fatal NBIs included: motor vehicle accidents (OIF/OND: 34%; OEF: 18%; p<.001); air transport accidents (OIF/OND: 12%; OEF: 27%; p<.001); unintentional, handling weapons/explosives (OIF/OND: 5%; OEF: 10%; p=.02) and intentional, self-inflicted (OIF/OND: 30%; OEF: 27%; p=.29).

Conclusion: Surveillance data show that NBIs are an important and under-recognized cause of mortality during military deployments. These findings illustrate how valuable surveillance data can be for focusing prevention efforts on the leading causes of fatal NBIs among soldiers deployed to a combat theater.

INTRODUCTION

Injuries are the most significant health problem for the U.S. Army.¹⁻³ They are the leading cause of death, hospital admissions, and outpatient visits in recent deployments.¹ In particular, NBIs have been an important cause of death in the on-going Army deployments in Operations Enduring Freedom, Afghanistan (OEF) and Iraqi Freedom/New Dawn (OIF/OND).⁴

During 2001 to 2009, fatal NBIs accounted for 21 percent of all deaths among deployed soldiers. During this timeframe, the overall fatal NBI rate was 74.1/100,000 deployed soldier-years. In addition, the leading causes of fatal NBIs for OIF/OND and OEF were motor vehicle accidents (35 percent), self-inflicted injuries (23 percent), and air transport accidents (18 percent).

PURPOSE

The objective of this investigation was to describe the incidence and leading causes of fatal NBIs among soldiers deployed in support of Operations Enduring Freedom in Afghanistan (2001-2012) and Iraqi Freedom/New Dawn in Iraq (2003-2012).

METHODS

• Analysis included all U.S. Army soldiers (Active Army, Reserve, and National Guard) who died from NBIs while deployed for OEF (Afghanistan, starting October 2001) or OIF/OND (Iraq, starting March 2003) through December 2012.

• Three data sources were used to identify soldiers who died from NBIs: Defense Casualty Information Processing System (DCIPS), Army Safety Management Information System (ASMIS) and Armed Forces Medical Examiner System (AFMES).

• Trained injury coders reviewed the DCIPS, ASMIS and AFMES records for all fatalities among deployed soldiers to classify each case according to casualty type (that is, BI, NBI, or illness-related).

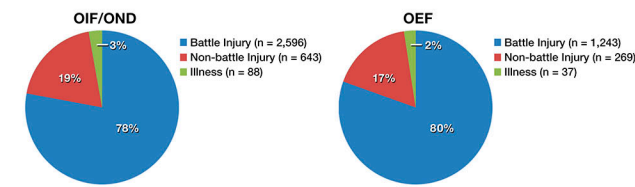
• Causes of fatal NBI cases were coded using the coding scheme from the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) No. 2050, 5th Edition. The STANAG injury cause codes are four-digit codes that describe the intent/situation of the injury incident, injury cause, and where the injury occurred.

• Descriptive statistics (frequencies and percentages) for demographics, casualty types and cause of injuries were obtained using the Statistical Package for the Social Sciences (SPSS, Inc.), Version 19.

• Annual rates for fatal NBIs were calculated as the number of fatal NBIs divided by the deployed soldier-years multiplied by 100,000 (i.e. fatal NBIs per 100,000 deployed soldier-years).

RESULTS

► From 2001-2012, there were 4,876 fatalities among Army soldiers deployed for OIF/OND and OEF (figure 1). The distribution of BI (p=.07), NBI (p=.05), and illness (p=.59) do not significantly differ between OIF/OND and OEF. Overall, for both OIF/OND and OEF combined, 79 percent of fatalities resulted from BIs, 18 percent from NBIs and 3 percent from illness.



*The cause of injury could not be determined for 4 OIF/OND cases (0.1%) and 6 OEF cases (0.4%).
Figure 1. Distribution of Fatalities among Deployed Soldiers by Casualty Type and Operation, US Army, 2001-2012

► The demographic characteristics of soldiers who died from an NBI are presented in table 1. Distributions for gender, rank and component were similar for OIF/OND and OEF but differed for the 30-39 year age group (OIF/OND: 18 percent; OEF: 25 percent; p=.02). Additionally, for both OIF/OND and OEF combined, enlisted soldiers sustained 86% of fatal NBIs.

Table 1. Age, Gender, and Military Rank, and Component Distributions for Fatal Non-battle Injuries from OIF/OND and OEF, US Army, 2001-2012

Characteristic and Category	Overall		OIF/OND (n=643)		OEF (n=269)		p-value*
	N	%	N	%	N	%	
Age group (years)							
17-19	76	8.3	55	8.6	21	7.8	.70
20-29	570	62.5	412	64.1	158	58.7	.13
30-39	183	20.1	116	18.0	67	24.9	.02
40-59	78	8.6	56	8.7	22	8.2	.79
Unknown	5	0.5	4	0.6	1	0.4	-
Gender							
Female	43	4.7	37	5.8	6	2.2	-
Male	869	95.3	606	94.2	263	97.8	.98
Military Rank							
Enlisted							
E1 - E4	511	56.0	369	57.4	142	52.8	.20
E5 - E6	234	25.7	166	25.8	68	25.3	.86
E7 - E9	43	4.7	27	4.2	16	5.9	-
Officers							
O1 - O3	47	5.2	35	5.4	12	4.5	-
O4 - O7	23	2.5	14	2.2	9	3.3	-
W-2 - W-5	53	5.8	31	4.8	22	8.2	.07
WO1 - WO5	1	0.1	1	0.2	0	0.0	-
Component							
Regular	677	74.2	468	72.8	209	77.7	.11
Reserve	84	9.2	63	9.8	21	7.8	.32
National Guard	151	16.6	112	17.4	39	14.5	.26

*Comparison of rates based on fewer than 20 cases are considered statistically unreliable and not shown here.
*p-value comparing OEF and OIF/OND proportions at a 95 percent confidence level.

► The annual rates for OIF/OND and OEF are graphically presented in figure 2. Rates are calculated as the number of fatalities per 100,000 deployed soldier-years. Overall, soldiers deployed to OIF/OND were 8 percent less likely to sustain a fatal NBI as compared to soldiers deployed to OEF (OIF/OND: 65 per 100,000 soldier-years; OEF: 76 per 100,000 soldier-years; p=.03). For both operations, there was a downward trend in the rates over time. After 2007, OEF rates approached OIF/OND rates more closely than in previous years.

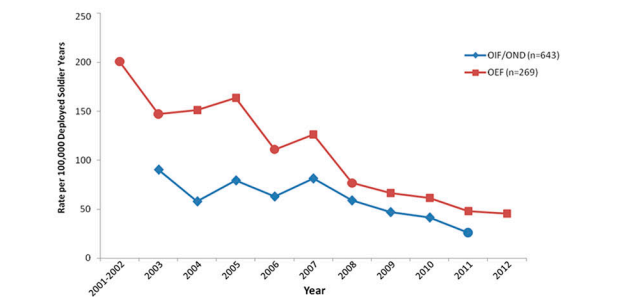


Figure 2. Annual Rate of All Fatal Non-battle Injuries by Operation, US Army, 2001-2012
*Annual rates derived from fatality counts less than 20 are considered unstable and therefore should be used with caution.

► Figure 3 displays the primary intent for fatal NBIs. For OIF/OND and OEF combined, 66 percent of NBI fatalities were unintentional.

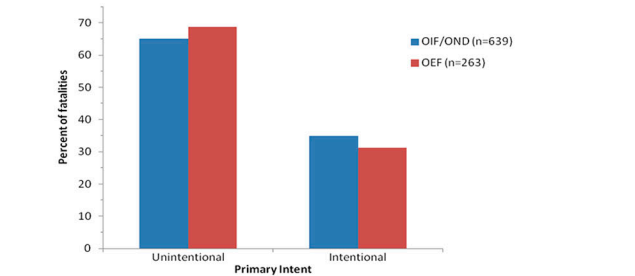


Figure 3. Distribution of Fatal Non-battle Injuries by Primary Intent, US Army, 2001-2012
*The intent of injury could not be determined for 4 OIF/OND cases (0.1%) and 6 OEF cases (0.4%).

► Causes of fatal NBIs are shown graphically in figure 4. The distribution of the leading causes differed between the two operations. There were significant differences in proportions between OIF/OND and OEF for motor vehicle accidents (p<.001), air transport accidents (p<.001) and handling weapons/explosives (p=.02).

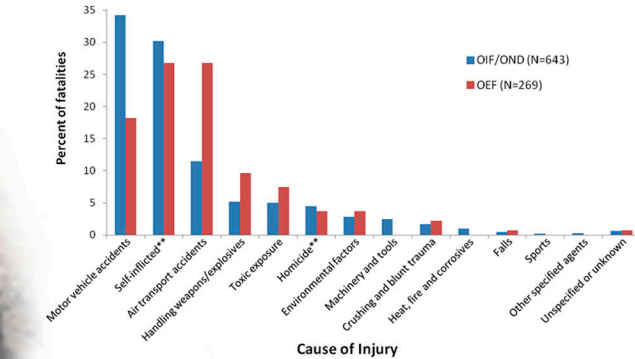
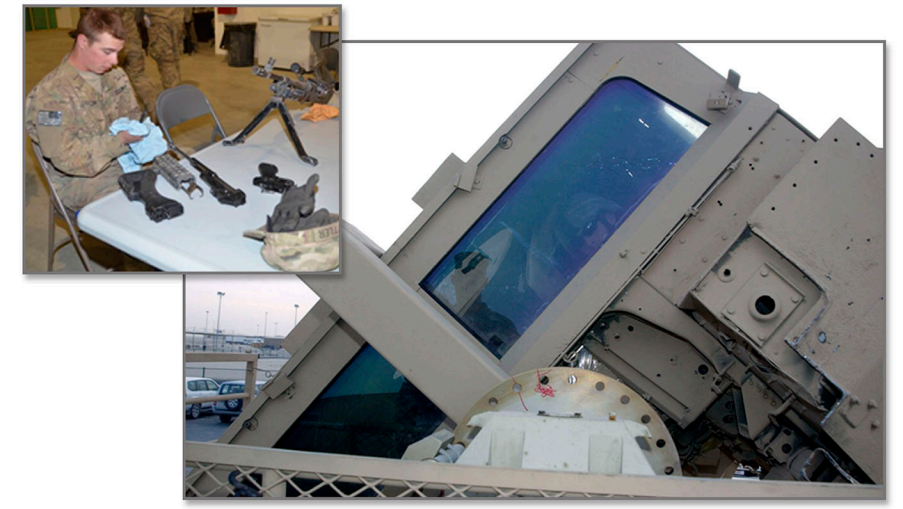


Figure 4. Causes of Fatal Non-battle Injuries for OIF/OND and OEF, US Army, 2001-2012
*Causes of injury are ordered highest to lowest based on OIF/OND.
**Intentional injuries.

CONCLUSION

- Non-battle injuries were a significant cause of mortality among troops deployed in support of OIF/OND and OEF between 2001 and 2012.
- Significant differences between operations were seen for the percent of non-battle fatalities caused by motor vehicle accidents, air transport accidents and handling weapons/explosives.
- Differences in the leading causes of fatalities between the two operations may be due to dissimilar terrain, environment, and military operations in Iraq (OIF/OND) compared to Afghanistan (OEF).⁴⁻⁶
- Non-battle injuries, both fatal and non-fatal, decrease the operational readiness of military units.^{3,7-8}
- Importantly, many of these injuries are potentially preventable and could be targeted for intervention.
- Additional research is needed to better understand the factors contributing to fatal non-battle injuries and the differences between operations.



REFERENCES

1. Jones, B., Canham-Chervak, M., & Sleet, D. (2010). An evidence-based public health approach to injury priorities and prevention: recommendations for the U.S. military. *American Journal of Preventive Medicine*, 35(1), S1-S10.
2. Jones, B., Canham-Chervak, M., et al. (2010). Medical surveillance of injuries in the U.S. military: descriptive epidemiology and recommendations for improvement. *American Journal of Preventive Medicine*, 38(1, Supplement):S42-S60.
3. Peik, S., Pollack, K., et al. (2012). Injuries to deployed U.S. army soldiers involved in HMMWV crashes, 2002-2006. *Military Medicine*, 177(8), 983-989.
4. Shuja Dawadi, Keith Hauret, Bonnie Taylor, Bruce Jones. (2012). Deployment injury surveillance report: distribution and causes of fatal non-battle injuries during operations Enduring Freedom and Iraqi Freedom, 2001-2009. Injury prevention technical report No. 12-HF-07D-2009. Aberdeen Proving Ground, MD.
5. MacGregor, A., Mayo, J., et al. (2011). Injuries sustained in noncombat motor vehicle accidents during operation Iraqi Freedom. *Injury*, 42(10), 1551-1555.
6. Belmont, P., Goodman, G., et al. (2010). Disease and nonbattle injuries sustained by a U.S. army brigade combat team during operation Iraqi Freedom. *Military Medicine*, 175(7), 469-476.
7. Sanders, J., Putnam, S., Frankart, C., & Frenck, R. (2005). Impact of illness and non-combat injury during operations Iraqi Freedom and Enduring Freedom (Afghanistan). *American Journal of Tropical Medicine and Hygiene*, 73(4), 713-719.
8. Skeehan, C., Tribble, D., et al. (2009). Nonbattle injury among deployed troops: an epidemiologic study. *Military Medicine*, 174(12), 1266-1262.