Supplementary Online Content

Le TD, Gurney JM, Nnamani NS, et al. A 12-year analysis of nonbattle injury among US service members deployed to Iraq and Afghanistan. *JAMA Surg.* Published online May 30, 2018. doi:10.1001/jamasurg.2018.1166

This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Cumulative Incidence Rate of Battle Injury and Nonbattle Injury

Variable	**Battle injury**	**Non-battle injury**	***P* Value**
Number of patients, No. (%)	19755 (65.9)	10203 (34.1)	
Gender, No. (%)			<.001
Male	19404 (66.9)	9599 (33.1)	
Female	351 (36.8)	604 (63.2)	
Age at injury, median (IQR), Yr.	24 (21-28)	25 (21-31)	<.001
Race, No. (%)[a]	10402 (63.0)	6110 (37.0)	<.001
White	7645 (65.8)	3980 (34.2)	
Black	826 (47.9)	899 (52.1)	
Hispanic	557 (63.4)	321 (36.6)	
Other	1374 (60.2)	910 (39.8)	
Theater of operation, No. (%)			<.001
OEF	7954 (71.0)	3250 (29.0)	
OIF	11679 (63.7)	6655 (36.3)	
OND	122 (29.1)	298 (70.9)	
Branch of service, No. (%)[b]			<.001
U.S. Army	14474 (65.3)	7680 (34.7)	
U.S. Air Force	273 (33.7)	537 (66.3)	
U.S. Marine Corps	4585 (74.3)	1584 (25.7)	
U.S. Navy	421 (51.7)	394 (48.3)	
Primary mechanism of injury, No. (%)			<.001
Explosion	15178 (98.5)	236 (1.5)	
Gunshot wounds (GSW)	3719 (83.6)	728 (16.4)	
Motor vehicle crash (MVC)	275 (12.5)	728 (87.5)	
Helicopter/plane crash	98 (36.7)	169 (63.3)	
Other/Unknown	485 (6.4)	7149 (93.6)	
Primary type of injury, No. (%)			<.001
Penetrating	10010 (83.7)	1948 (16.3)	
Blunt	9186 (56.5)	7080 (43.5)	
Burn	479 (48.2)	515 (51.8)	
Other/Unknown	80 (10.8)	660 (89.2)	
Dominant body region (BR), No. (%)[c]			
Head/Neck (BR1)	8412 (76.7)	2553 (23.3)	<.001
Face (BR2)	4727 (81.0)	1109 (19.0)	<.001
Thorax (BR3)	2838 (76.7)	865 (23.3)	<.001
Abdomen (BR4)	3607 (81.5)	820 (18.5)	<.001
Extremities (BR5)	9271 (62.6)	5527 (37.4)	<.001
External (BR6)	15531 (76.1)	4866 (23.9)	<.001

Abbreviations: U.S., United States; BR, body region; IQR, interquartile range.
P-values calculated using chi-square, t-test, or Wilcoxon-Mann-Whitney test as appropriate.
[a] 13,446 patients (44.9%) had no race/ethnicity data available.
[b] 10 patients missing branch of service data.
[c] Each patient had 1 to 6 injured body regions. For BI and NBI, dominant body region categories were tested as mutually exclusive categorical variables.

eTable 2. Top 10 Possible Causes of NBI by Theater of Operation

Variable	Overall		OEF		OIF		OND	
	Ranking	No. (%)	Ranking	No. (%)	Ranking	No. (%)	Ranking	No. (%)
Fall	1	2178 (21.3)	1	778 (23.9)	2	1326 (19.9)	1	74 (24.8)
Motor vehicle crash	2	1921 (18.8)	2	472 (14.5)	1	1423 (21.4)	4	26 (8.7)
Machinery/ Equipment	3	1283 (12.6)	3	349 (10.7)	3	923 (13.9)	7	11 (3.7)
Blunt Objects	4	1107 (10.8)	4	294 (9.0)	4	790 (11.9)	5	23 (7.7)
Bullet/ Gunshot wound/Firearm	5	728 (7.1)	6	217 (6.7)	5	505 (7.6)	18	6 (2.0)
Sport	6	697 (6.8)	5	285 (8.8)	7	379 (5.7)	2	63 (21.1)
Knife/Cut/Other sharp object	7	563 (5.5)	7	168 (5.2)	6	384 (5.8)	7	11 (3.7)
Crush	8	322 (3.2)	8	157 (4.8)	9	123 (1.8)	3	42 (14.1)
Fire/Flame	9	252 (2.5)	10	58 (1.8)	8	189 (2.8)	9	5 (1.7)
Alter ROM	10	205 (2.0)	9	102 (3.1)	10	91 (1.4)	6	12 (4.0)
Total of NBI patients	–	10203	–	3250	–	6655	–	298

Abbreviations: OEF, Operation Enduring Freedom; OIF, Operation Iraqi Freedom; OND, Operation New Dawn; Alter ROM (range of motion), Any non-sports related sprain/strain/dislocation

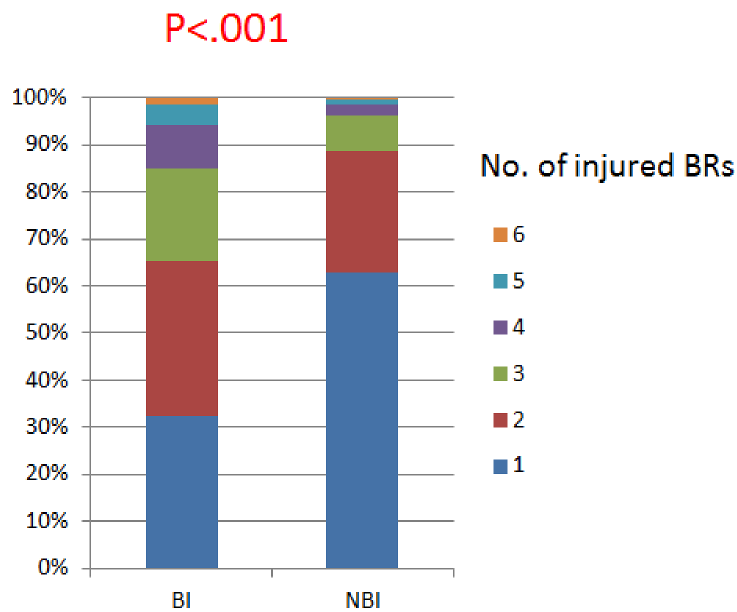
Overall, the majority of non-battle related injuries were caused by falls, motor vehicle crashes, machinery/equipment, blunt objects, gunshot wounds, sports, knife/sharp objects, crush, fire/flame, and Altered ROM. The ranking of these causes were relatively consistent in OEF and OIF; however, they differed in OND.

e**Table 3.** ARIMA Model Fit

	ARIMA (1,0,1)	ARIMA (2,0,1)
Model estimates		
Constant estimate	13.46	14.31
Variance estimate	96.99	99.12
Model Parameters		
AIC	359.45	361.43
SBC	365.07	368.91

To identify the best model for forecasting the proportion of non-battle injury (%NBI) through 2022 (a later cut-off year can also be chosen), the two ARIMA models were compared using the model AIC (359.45 vs. 361.43) and SBC (365.07 vs. 368.91) (eTable 3). The ARIMA (1, 0, 1) model was determined to be the most appropriate model for prediction of NBI (Figure 4).

eFigure 1. Number of Injured Body Regions per Patient by Injury Classification

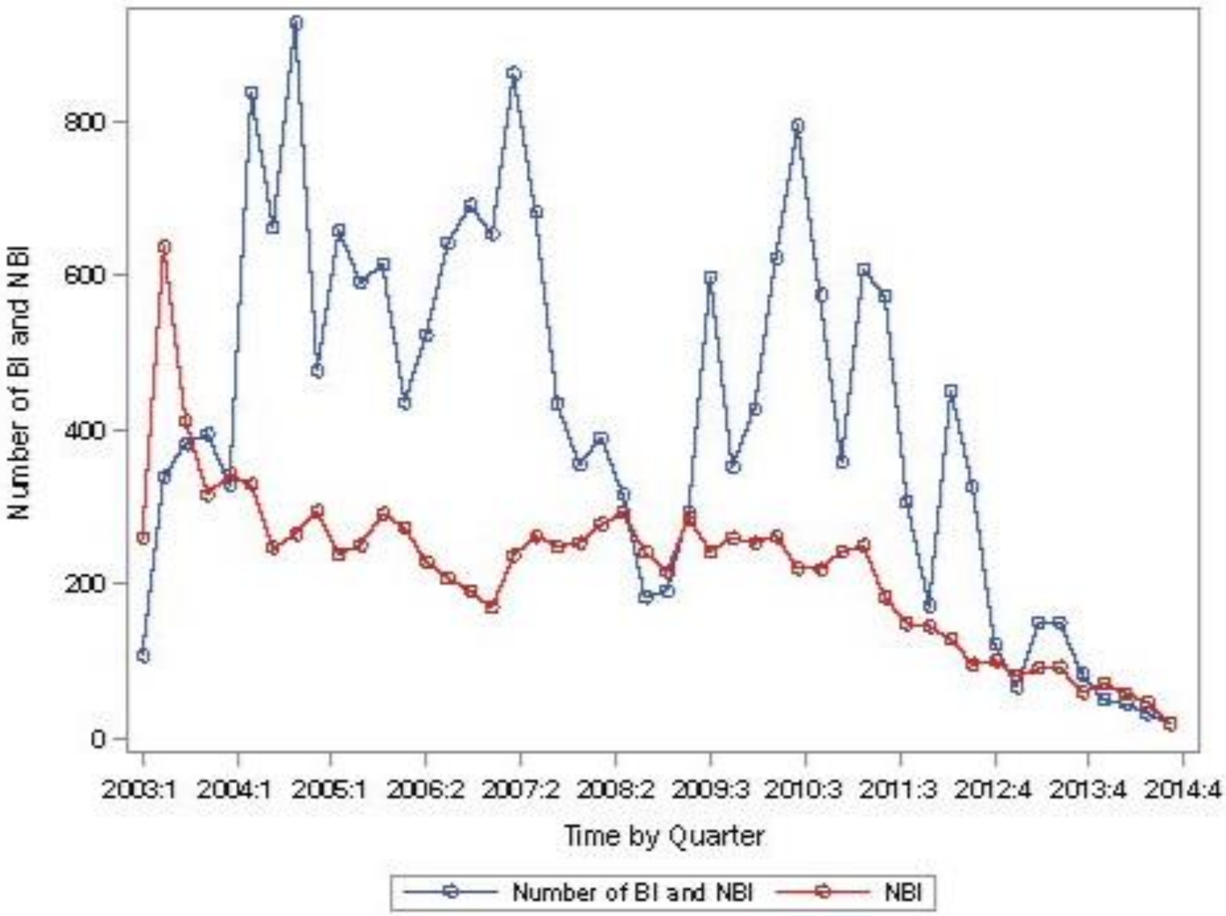


Abbreviations: BI, Battle injury; NBI, Non-battle injury

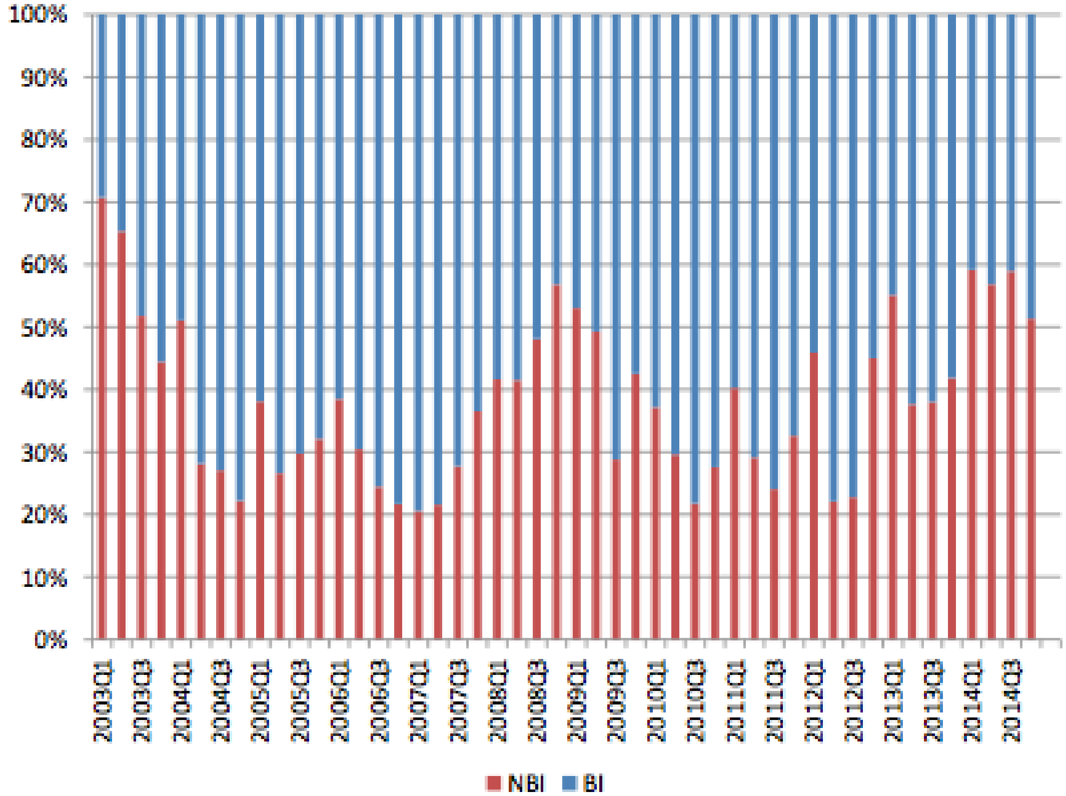
As shown in eFigure 1, Non-battle injury (NBI) was less likely to produce polytrauma compared to battle injury (BI). For example, 11.4% of NBI patients sustained injury to 3 or more body regions compared to 34.7% BI patients (*P*<.001).

eFigure 2. Trends in Nonbattle Injury (NBI) Over Time

A

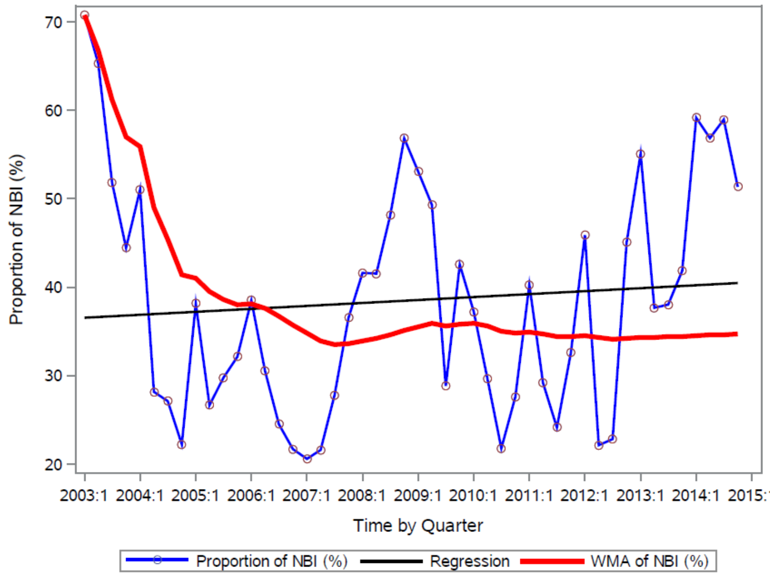


B



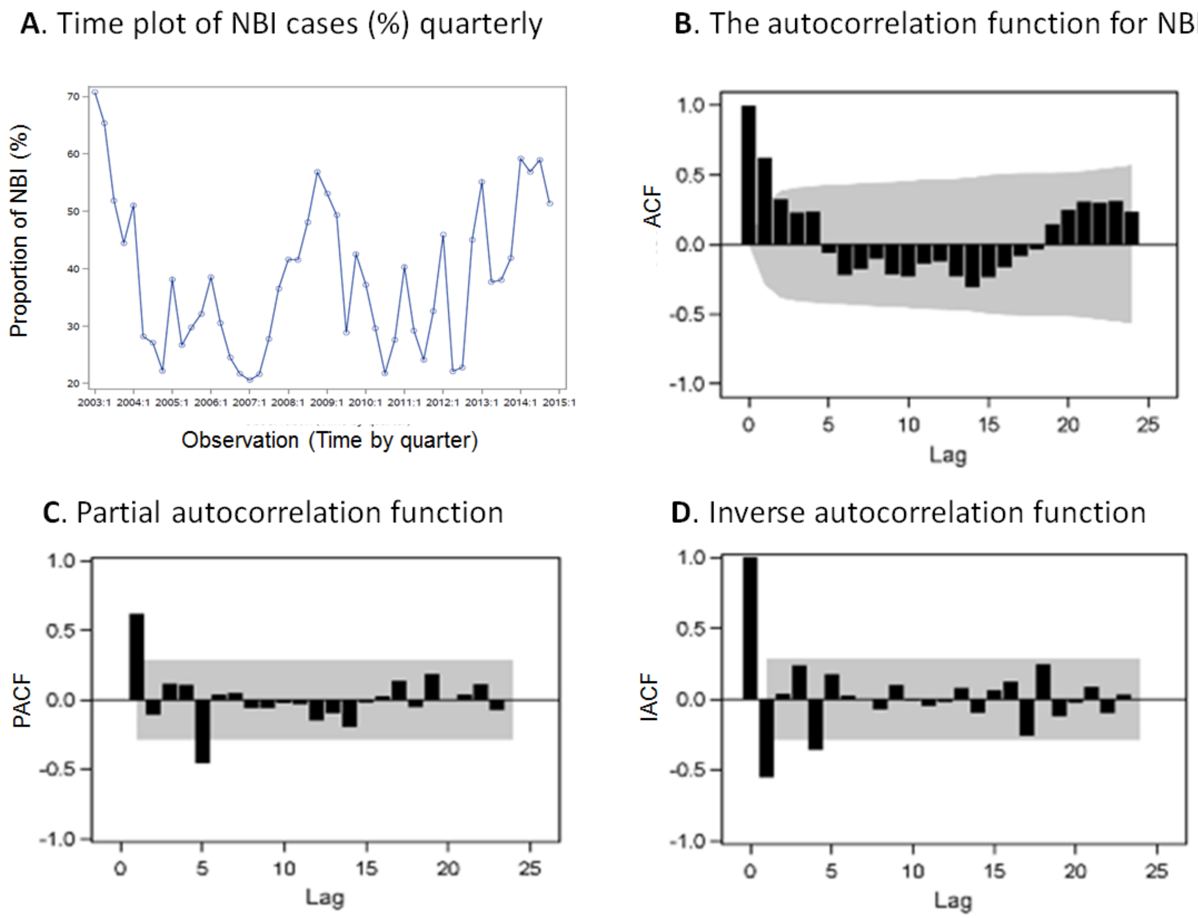
A, Frequency of battle injury (BI) and NBI that have declined over time. B, Proportion of BI and NBI.

eFigure 3. Regression and Weighted Moving Average



eFigure 3 depicts proportion of non-battle injury (%NBI) between 2003 and 2014 (blue line) and the associated regression fitted line (black line); the red line illustrates the weighted moving average of %NBI. The mean %NBI was 38.8±8.8% and the trend in %NBI decreased from 70% in 2003 to approximately 35% in 2006, then stabilized at approximately 35% thereafter. However, there was no statistically significant declining trend in %NBI (*P*=.76).

eFigure 4. Trend and Correlation Analysis for Cumulative Proportion of NBI

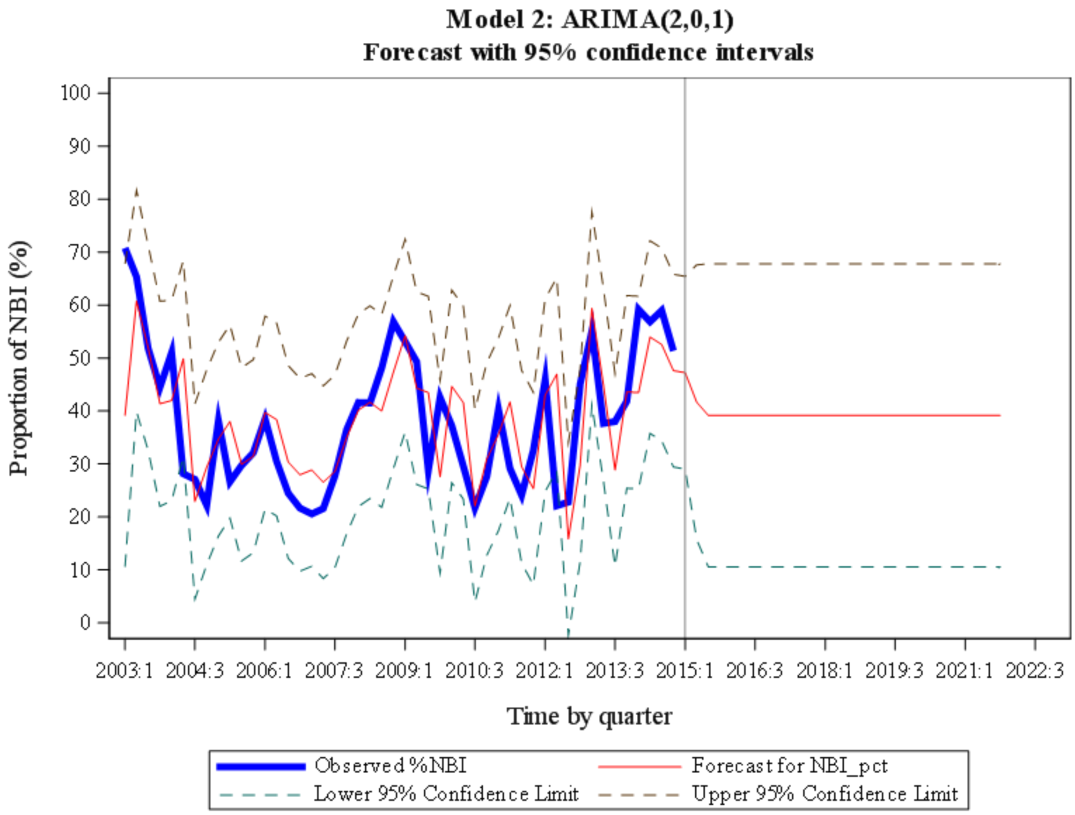


eFigure 4 illustrates the data exploration process used to determine the applicability of using time series analysis. The plot of the time series original data of cumulative %NBI without differencing (d=0) indicated the data was not “white noise” (*P*<.05). This suggests that the original data were stationary (eFigure 3 A-B).

The plot of the autocorrelation function (ACF) shows a rapid decay and cut-off at the lag 1 or lag 2 (eFigure 4B), suggesting the change in cumulative NBI incidence is a stationary time series correlating with either one or two previous values of the quarterly NBI cumulative incidence (lag 1 or 2). The test for “white noise” indicated that the change in NBI is highly autocorrelated (AR), with lag 1 or lag 2 (p=1or p=2) models potentially being good models to describe this process. The partial autocorrelation function plots (PACF) show a sharp decay with a cut-off at lag 1 (eFigure 4C), suggesting the best model for the moving average (MA) utilizes lag 1 (q=1). Therefore, for the model fitting, two ARIMA models were found suitable for prediction: ARIMA (1, 0, 1) Model (Figure 4) and ARIMA (2, 0, 1) Model (eFigure 5).

To identify the best model for forecasting the cumulative NBI incidence onward to year 2022 (a later cut-off year can also be chosen), the two ARIMA models were compared based on the values of AIC (359.45 vs. 361.43) and SBC (365.07 vs. 368.91) (eTable 3). The ARIMA (1, 0, 1) model was chosen as the most appropriate model for prediction of NBI (Figure 4). The ARIMA (1,0,1) model predicts that, assuming stable conditions with respect to battlefield injury risk, the cumulative incidence of NBI from 2015 to 2022 would be approximately 41.0% (95% CI: 37.8% to 44.3%).

eFigure 5. ARIMA (2,0,1) Model



Results from the ARIMA (2, 0, 1) model were similar to the ARIMA (1,0,1) model (Figure 4)