



# CHARACTERISTICS OF COMBAT CASUALTY MORTALITY AT LEVEL IV MILITARY TREATMENT FACILITY



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## BACKGROUND:

Landstuhl Regional Medical Center (LRMC) is the initial US military casualty evacuation facility outside the combat zones of Iraq and Afghanistan. Casualties are rapidly evacuated from the combat theaters to this American College of Surgeons-verified Level II trauma center. This performance improvement review describes the war-related incidence, complications and preventability associated with mortality at LRMC over the three most recent calendar years.

## METHODS:

The Joint Theater Trauma Registry (JTTRv3) was queried for deaths that occurred at LRMC during calendar years 2006, 2007 and 2008. Injury Severity Scale (ISS) Score, New Injury Severity Scale (NISS) Score, % battle injury admissions, timing of death, mechanisms of injury, cause of death, complications and preventability were abstracted for this analysis.

TABLE 1: ADMISSION CHARACTERISTICS

	2006	2007	2008
LRMC admissions	2,024	2,305	1,230
LRMC Battle injuries	1555 (77%)	1770 (77%)	748 (61%)
LRMC ICU admits	605 (30%)	589 (26%)	360 (29%)
Mean ICU ISS	12.4	18.8	19.3
Mean ICU LOS	2.4	2.4	2.8

TABLE 2: MORTALITY SPECIFIC DATA

Characteristics	2006	2007	2008
Total deaths/mortality rate	16 (0.79%)	7 (0.30%)	3 (0.24%)
ICU mortality rate: % ICU admits	2.6%	1.2%	0.83%
Mean ISS Score mortality	35.6	34.6	22.7
Mean NISS Score mortality	43.5	46.8	29.7
% battle injuries	87%	80%	66%
Time from injury (days)	5.3	3.6	3.3
<b>Mechanism of injury:</b>			
blast	63%	43%	33%
penetrating	25%	28%	33%
blunt	6%	14%	33%
<b>Cause of death:</b>			
brain injury	38%	71%	100%
burn injury	25%	14%	0%
hemorrhage	19%	0%	0%
<b>Complications:</b>			
renal failure	4	1	1
compartment syndrome	13	1	0
sepsis/bacteremia	5	1	0
ARDS	3	0	0
<b>Preventability:</b>			
non preventable mortality	63%	88%	100%
potentially preventable	31%	12%	0
preventable	6%	0	0

## RESULTS:

The LRMC mortality rate of <1% was lower than the frequently published civilian trauma center rate of 5%. Deaths were increasingly non-preventable at this level of care despite an increased mean ISS Score for ICU admissions (12.4 to 19.3). All deaths occurred in patients evacuated from deployed medical facilities in the combat theater directly to the intensive care unit at LRMC. Unsalvageable traumatic brain injury remained the primary cause of death at this echelon of care.

## CONCLUSIONS:

Combat casualty mortality at the echelon IV military treatment facility supporting wartime operations in Iraq and Afghanistan decreased as the global casualty care continuum matured. This may reflect increased capabilities at deployed medical treatment facilities and the implementation of clinical practice guidelines based upon "lessons learned." It is likely that American College of Surgeons Level II trauma center verification at LRMC in 2007 also contributed to system-wide improvements in care. With the collaboration of trauma registries and performance improvement programs across the combat casualty care system, identified factors influencing mortality and morbidity in combat can be characterized and addressed.

