



Injury Profile of TASER® Electrical Conducted Energy Weapons (CEWs)



William P. Bozeman, MD*; James E. Winslow, MD, MPH*; William E. Hauda II, MD†; Derrel Graham, MD‡; Brian P. Martin, MD, MS‡; Joseph J. Heck, DO‡
Departments of Emergency Medicine, *Wake Forest University, †Virginia Commonwealth University, ‡Louisiana State University, ‡University of Nevada Medical Center

Introduction

• Conducted Energy Weapons (CEWs) such as the TASER® are increasingly used by law enforcement agencies.

• These weapons have been associated with reduced overall injury rates among suspects and officers, but significant controversy remains about their safety. CEWs can cause injuries, and a number of in-custody deaths have occurred proximal to their use.

• Studies in animal models and healthy volunteers are important but cannot substitute for studies in the actual population at risk of Taser exposure.

• No population based injury epidemiology studies have been performed to date. The likelihood and severity of injuries after CEW use in real world conditions remains unreported.

Objectives

• We sought to perform the first large, independent study describing both the incidence of injuries associated with CEW use and their severity.

Methods

• A prospective, multicenter cohort study was performed at six law enforcement (LE) agencies of varying sizes across the United States. All criminal suspects that received a CEW electrical discharge during their apprehension over a two year period (7/2005 - 6/2007) were included.

• A tactical physician / site investigator at each agency reviewed police records and medical records for each case.

• Federal HIPPA privacy laws allow LE agencies to retrieve medical records as part of an administrative investigation of police use of force.

• Injuries were identified upon case review and classified as mild, moderate, or severe based on *a priori* definitions (Table 1). The relationship of injuries to the CEW was classified as direct, indirect, or uncertain.

• De-identified case reports were sent to the central study site. Descriptive analysis was performed including determination of observed proportions and 95% confidence intervals.

Table 1: Injury Severity (a priori definitions)

Injury Severity	MILD	MODERATE	SEVERE
Description	Outpatient treatment and Minimal or no long term disability expected	Inpatient treatment and / or Mild-Moderate long term disability expected	Inpatient treatment and Severe long term disability or threat to life
Examples	Abrasions, contusions, minor lacerations	Long bone fracture, Hemo-Pneumothorax, Hepatic / Splenic laceration	Severe head injury, Loss of limb or eye, Ventricular Dysrhythmias

Results

• 962 CEW uses occurred in participating agencies over a 2 year period. All cases were reviewed.

• 94% of subjects were male, with a mean age 32 yrs (range: 13 - 80 yrs) height 69 inches (range: 54 - 80 inches), and weight 184 lbs (range: 90 - 390 lbs).

• 96% of cases utilized the Taser® model X26, 4% utilized the model M26. 66% of cases utilized probe mode, 26% utilized drive stun mode, and 8% utilized both. The mean number of shocks delivered was 1.6 in probe mode and 1.8 in drive stun mode. CEW body impact areas are shown in Table 2.

• All suspects underwent pre-incarceration medical screening; 390 subjects (41%) were also evaluated by EMS; 205 subjects (21%) were evaluated at a hospital.

• Injuries after CEW use:

	Cases	%	(95% CI)
None	743	77.2%	(74 - 80%)
Mild*	216	22.5%	(20 - 25%)
Moderate	2	0.2%	(.03 - .75%)
Severe	1	0.1%	(.00 - .58%)

n = 959 (99.7%) (95% CI 99.1 - 99.9%)
n = 3 (0.3%) (95% CI .06 - .91%)

*Mild injury classifications are shown in Table 3.

• Three significant injuries (a composite of moderate and severe) requiring hospital admission were seen (0.3%, 95% CI 0.06 - 0.91%) including:

- Rhabdomyolysis, n=1 (mod severity, uncertain relationship to CEW).
- Cerebral contusion, n=1 (mod severity, indirectly related to CEW).
- Epidural hematoma, n=1 (severe, indirectly related to CEW).

• Two in-custody deaths occurred in the study cohort. Neither occurred immediately after CEW use. After investigation and autopsy, both were determined to be unrelated to CEW use.

Table 2: CEW Body Impact areas (n= 1760) Includes probe and drive stun.

	n	(%)
Back	678	(38.5%)
Chest	360	(20.5%)
Abdomen / Pelvis	294	(16.7%)
Lower Extremities	243	(13.8%)
Upper Extremities	146	(8.3%)
Head / Face / Neck	33	(1.9%)
Genitals	6	(0.6%)

Table 3: Mild Injuries After CEW Use (n= 408 injuries in 216 subjects)

	n	(%)
Puncture Wounds	337	(83%)
Contusions	40	(10%)
Lacerations	25	(6%)
Other Soft Tissue Inj	2	(0.5%)
Fractures	2	(0.5%)
Others*	2	(0.5%)

* Includes: 1 epistaxis and 1 broken tooth.

Conclusions / Discussion

• After CEW use, 99.7% of 962 subjects had no injuries or mild injuries only.

• The observed significant (moderate or severe) injury rate was 0.3%, and is unlikely to be greater than 1%.

• Skin punctures from CEW probes, contusions and lacerations account for 98.5% of mild injuries after CEW use.

• These data provide the first large, independent, multicenter assessment of the safety of CEW devices under real world conditions.

• These findings support the safety of CEW use by law enforcement agencies.

• It is important to recognize that CEWs are not risk free. Significant injuries, while rare, can be caused by these weapons. Steps should be taken to prevent these injuries when possible and to address them when they do occur.

Limitations

• This observational cohort study could not mandate specific assessments or interventions.

• The reported incidence of mild injuries likely underestimates the true incidence of minor abrasions, contusions, etc.

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