

MTQIP Trauma Tidbits: Epidemiology of Trauma Mortality and Undertriage

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Epidemiology

- Epidemiology is the science that studies the patterns, causes, and effects of health and disease conditions in defined populations.

AAST 2013 PLENARY PAPER

The epidemiology of trauma-related mortality in the United States from 2002 to 2010

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Thomas G. Weiser, MD, MPH, and Kristan L. Staudenmayer, MD, MS, Stanford, California

BACKGROUND: Epidemiologic trends in trauma-related mortality in the United States require updating and characterization. We hypothesized that during the past decade, there have been changing trends in mortality that are associated with multiple public health and health care-related factors.

METHODS: Multiple sources were queried for the period of 2002 to 2010: the National Trauma Data Bank, the National Centers for Disease Control, the National Highway Traffic Safety Administration, the Nationwide Emergency Department Sample, and the US Census Bureau. The incidence of injury and mortality for motor vehicle traffic (MVT) collisions, firearms, and falls were determined using National Centers for Disease Control data. National Highway Traffic Safety Administration data were used to determine motor vehicle collision information. Injury severity data were derived from the Nationwide Emergency Department Sample and National Trauma Data Bank. Analysis of mortality trends by year was performed using the Cochran-Armitage test for trend. Time-trend multivariable Poisson regression was used to determine risk-adjusted mortality over time.

RESULTS: From 2002 to 2010, the total trauma-related mortality decreased by 6% ($p < 0.01$). However, mortality trends differed by mechanism. There was a 27% decrease in the MVT death rate associated with a 26% decrease in motor vehicle collisions, 19% decrease in the number of occupant injuries per collision, lower injury severity, and improved outcomes at trauma centers. While firearm-related mortality remained relatively unchanged, mortality caused by firearm suicides increased, whereas homicide-associated mortality decreased ($p < 0.001$ for both). In contrast, fall-related mortality increased by 40% (3.95-8.70, $p < 0.01$).

CONCLUSION: MVT mortality rates have decreased during the last decade, owing in part to decreases in the number and severity of injuries. Conversely, fall-related mortality is increasing and is projected to exceed both MVT and firearm mortality rates should current trends continue. Trauma systems and injury prevention programs will need to take into account these changing trends to best accommodate the needs of the injured population. (*J Trauma Acute Care Surg*. 2014;76:913-920. Copyright © 2014 by Lippincott Williams & Wilkins)

LEVEL OF EVIDENCE: Epidemiologic study, level III

KEY WORDS: Trauma mortality; epidemiologic trends; motor vehicle traffic collisions; firearms; falls.


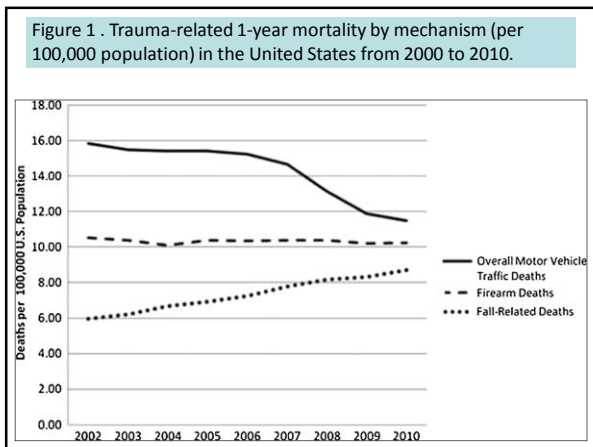
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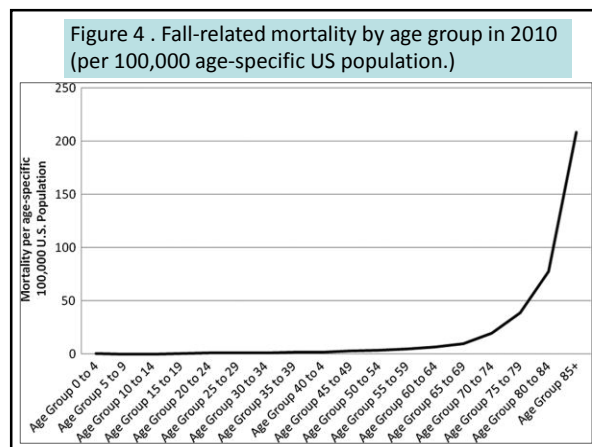
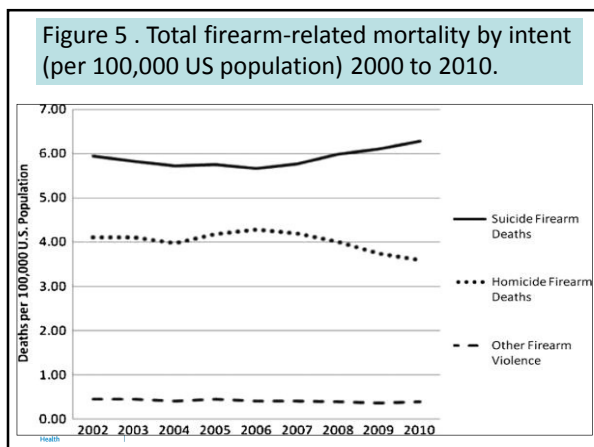
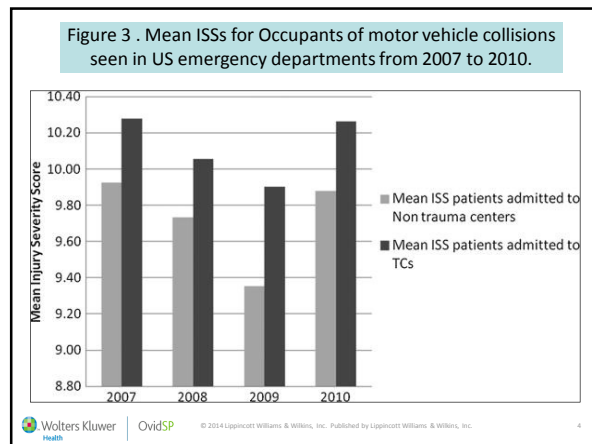
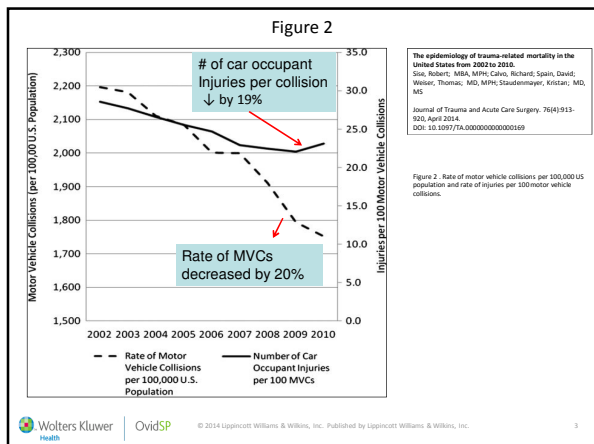
- Multiple sources:
 - National Trauma Data Bank
 - National Centers for Disease Control
 - National Highway Traffic Safety Administration
 - Nationwide Emergency Department Sample
 - US Census Bureau
- AIM:
 - Analyze trends in MVC, Falls and Firearm Mortality

MVC's= pedestrian, motorcycle, car crash

Injury Mortality in Total

- Over all in the US (2002-2010)
- Injury from MVC, Falls, Firearms as a Group
- Decreased from 32.2 to 30.5 deaths per 100,000 ($p < 0.001$)
- Individually they differed



Take Aways

- MVT mortality decreased 27%
- Fall mortality increased 46%
- If current trends continue, fall related deaths Will exceed MVC deaths As most common cause of trauma related Mortality by 2013-2014

ORIGINAL ARTICLE

Variability in California triage from 2005 to 2009: A population-based longitudinal study of severely injured patients

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BACKGROUND: Timely access to trauma care requires that severely injured patients are ultimately triaged to trauma centers. We sought to determine triage patterns for the injured population within the state of California to determine those factors associated with undertriage.

METHODS: We conducted a retrospective analysis of all hospital visits in California using the Office of Statewide Health Planning and Development Database from January 1, 2005, and December 31, 2009. All visits associated with injury were linked longitudinally. Sixty-day and one-year mortality was determined using vital statistics data. Primary field triage was defined as field triage to a Level III trauma center; retriage was defined as initial triage to a non-Level III center followed by transfer to a Level III. Regions were organized by local emergency medical services agencies. The primary outcomes were triage patterns and mortality.

RESULTS: The undertriage rate was 35% (n = 20,988) but was variable across regions (12-87%). Primary field triage ranged from 7% to 77%. Retriage rates not only were overall low (6% of all severely injured patients) but also varied by region (1-38%). In adjusted analysis, factors associated with a lower odds ratio (OR) of primary field triage included the following: age of 55 years or greater (OR, 0.78; p = 0.001), female sex (OR, 0.88; p = 0.014), greater number of comorbidities (OR, 0.92; p < 0.001), and fall mechanism versus motor vehicle collision (OR, 0.54; p < 0.001). One-year mortality was higher for undertriaged patients (25% vs. 18% and 18% for primary field and retriage, respectively, p < 0.001).

CONCLUSION: This is the first study to create a longitudinal database of all emergency department visits, hospitalizations, and long-term mortality for every severely injured patient within an entire state during a 5-year period. Undertriage varied substantially by region and was associated with multiple factors including access to care and patient factors. *J Trauma Acute Care Surg.* 2014;76: 1041-1047. Copyright © 2014 by Lippincott Williams & Wilkins

LEVEL OF EVIDENCE: Epidemiologic study, level III.

KEY WORDS: Trauma, injuries, triage, undertriage.

Undertriage

2005-2009

State of California

• 35%

Variable across
state regions

• Previous Studies:

• 1988 Maryland

– 34%

• 2003 California

– 1995-1997

– 44%

Reasons

- Access to trauma system
 - Related to areas without a trauma center -Yes
 - However, undertriage >20% in areas with trauma center
 - Highest rates of undertriage (>30%) occur in urban areas that have easy access to trauma centers

Patient Factors

• More than 70% of Undertriaged:

– > 55 years old

– 60% were falls

– **Undertriage largely driven by undertriage of severely injured elderly patients**

Secondary Re-Triage

- 2 stops to trauma center
- Severely injured patients who are initially transported to a nontrauma center and then transferred to a trauma center are infrequently re-triaged (14%)
- Non trauma hospitals are “sticky” in transferring severe injuries
- State systems often have limited influence over nontrauma hospitals

Opportunities...

- Geriatric trauma
 - Increased awareness
 - Examine your data for this cohort
 - Activation criteria
 - Tertiary screening
 - Time to admission
 - Treatment protocols
 - Geriatrician consults
 - Geriatric units