

The National Highway Traffic Safety Administration and Ground Ambulance Crashes

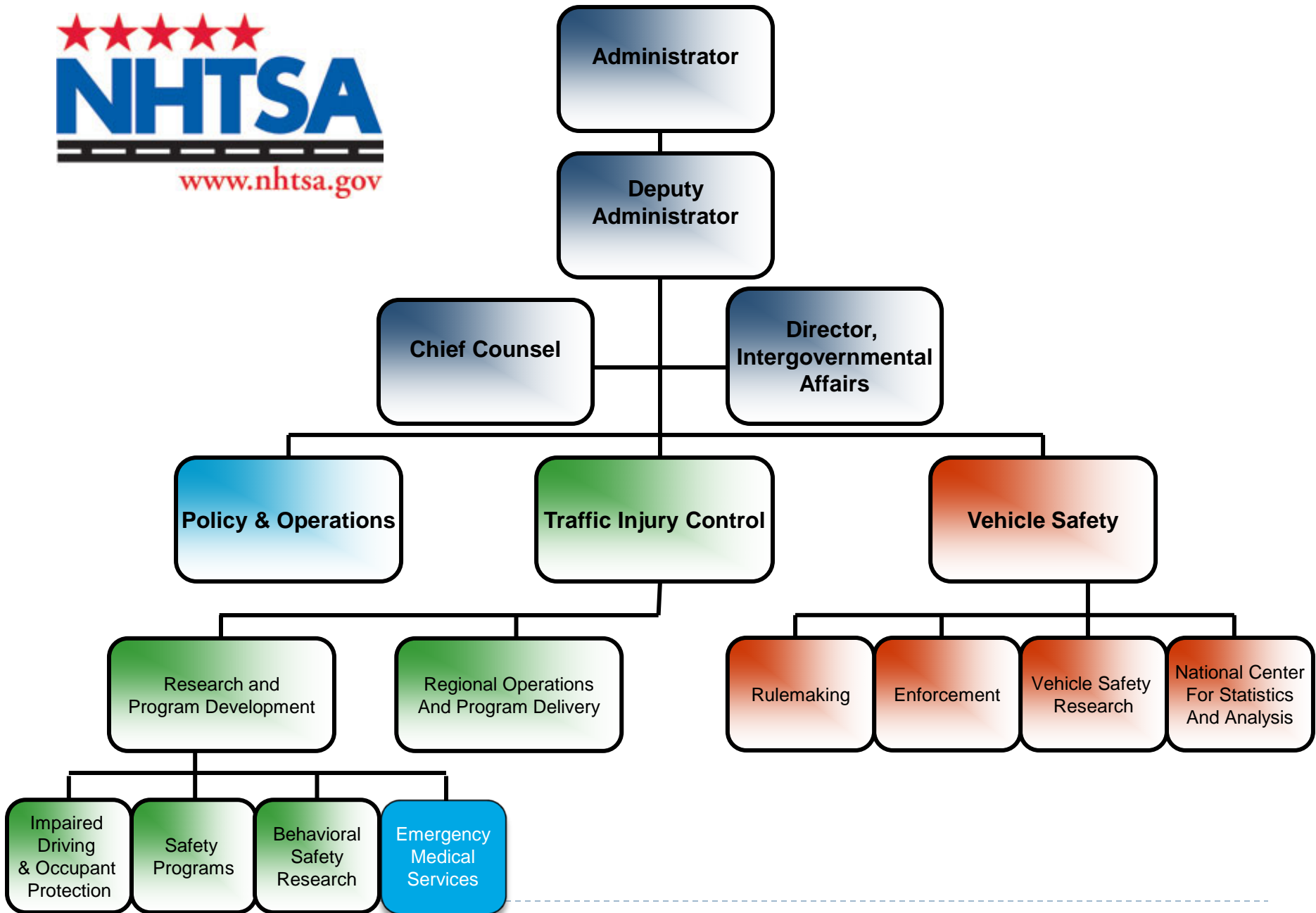
April 2014



Objectives

- ▶ The purpose of this presentation is to provide an overview of roadway ambulance crashes in the U.S. and show how the National Highway Traffic Safety Administration (NHTSA):
 - Uses databases to record/analyze Ambulance Crashes
 - Investigates Ambulance Crashes
 - Documents and Reports on Ambulance Crashes

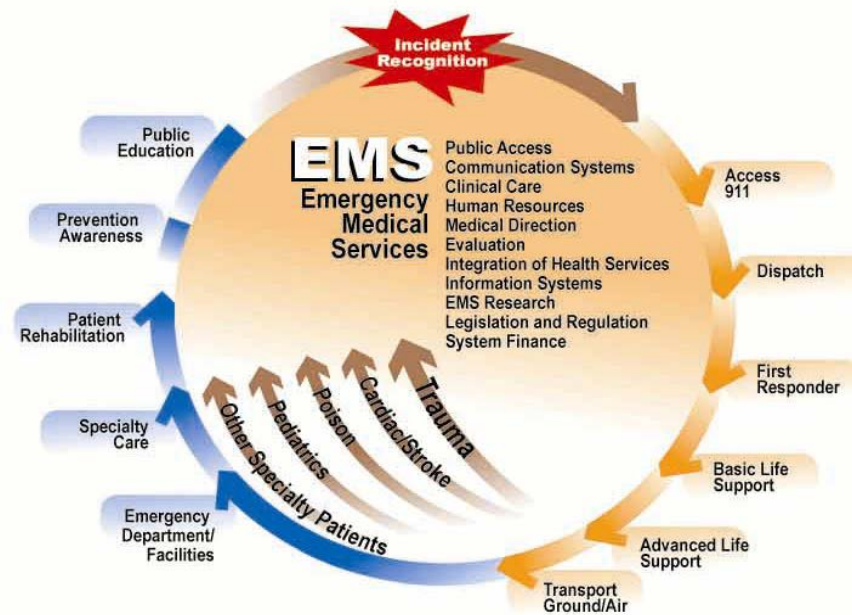




The Office of Emergency Medical Services (OEMS)

Mission Statement

To reduce death and disability by providing leadership and coordination to the EMS community in assessing, planning, developing, and promoting comprehensive, evidence-based emergency medical services and 9-1-1 systems.



The NHTSA Approach to Ground Ambulance Safety

- ▶ Collect comprehensive traffic crash data and conduct research
- ▶ Collaborate with national organizations & Federal partners to provide EMS leaders with the information they need to improve ground ambulance safety
- ▶ Foster consensus around strategies to promote safe EMS systems
- ▶ Support projects of national significance to accelerate improvements in ground ambulance safety



Comprehensive Traffic Crash Data

Fatality Analysis Reporting System (FARS)

- ▶ FARS is a nationwide **census** of fatal traffic crashes within the 50 states and DC and Puerto Rico*

National Automotive Sampling System General Estimates System (NASS GES)

- ▶ NASS GES data are obtained from a nationally representative probability sample selected from police-reported crashes

Data collected can be used to:

- ▶ Identify highway safety problem areas
- ▶ Provide a basis for regulatory and consumer information initiatives
- ▶ Evaluate cost and benefit analyses of highway safety initiatives
- ▶ Identify behaviors involved in crashes and develop countermeasures to deter unsafe behaviors

*Data from Puerto Rico are not included in this presentation



NHTSA and Ground Ambulance Crashes

- ▶ Analyzing
 - ▶ Fatality Analysis Reporting System (FARS)
 - ▶ National Automotive Sampling System General Estimates System (NASS GES)
- ▶ Investigating
 - ▶ Special Crash Investigations (SCI)
 - ▶ Supports an EMS worker nonfatal injury survey conducted by the National Institute for Occupational Safety and Health using the National Electronic Injury Surveillance System work supplement (NEISS-Work).
- ▶ Documenting and National Reporting
 - ▶ Model Minimum Uniform Crash Criteria (MMUCC)
 - ▶ Annual NHTSA Traffic Safety Facts



An Overview of Ground Ambulance Crashes in the US

Between 1992-2011 (20 years), there were an annual estimated mean of **4,500** motor vehicle traffic crashes involving an ambulance.

Of these crashes:

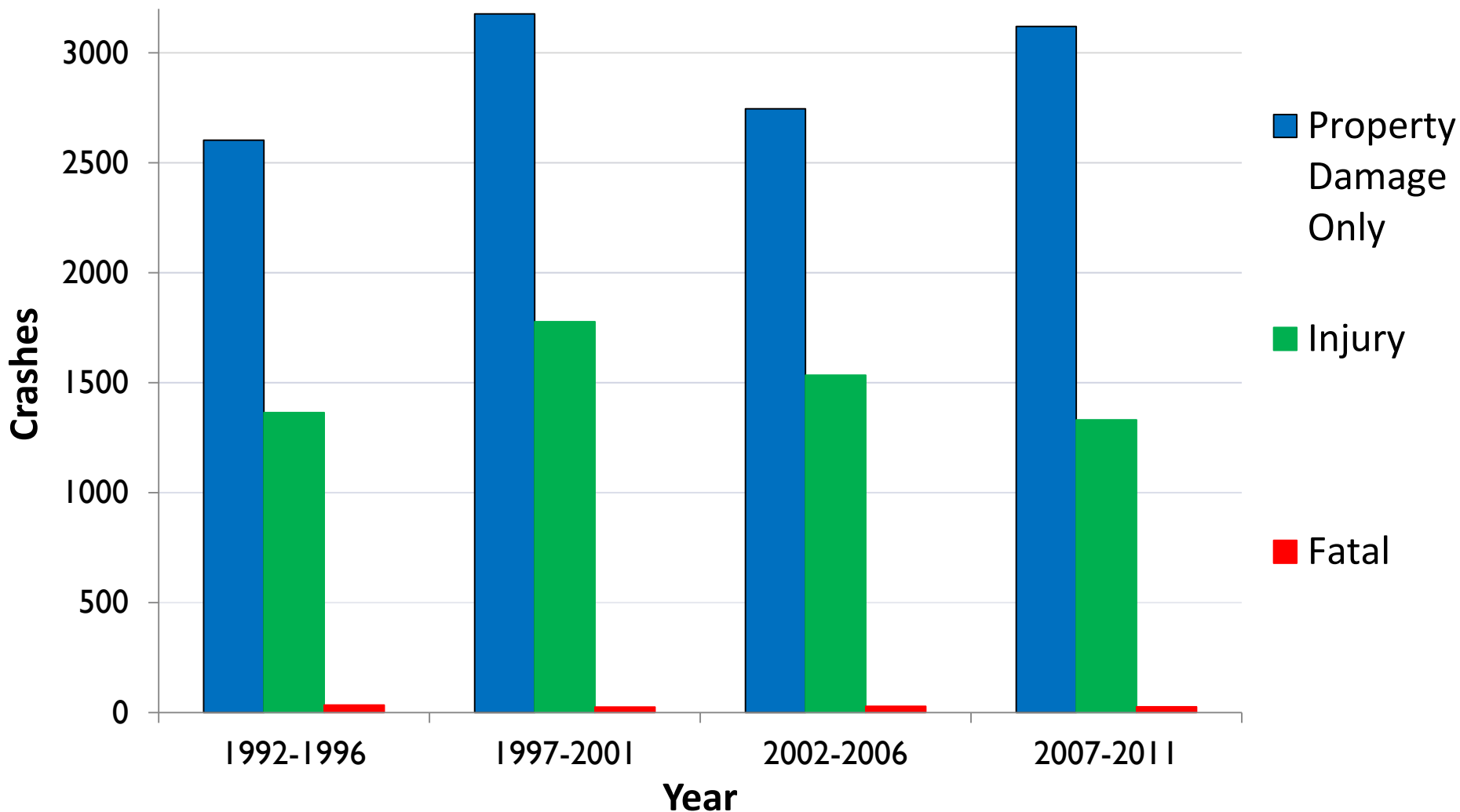
- ▶ **65%** resulted in property damage (only)
- ▶ **34%** resulted in an injury/injuries
- ▶ **<1%** resulted in a fatality/fatalities

*Injuries and fatalities include occupants in all cars involved in a traffic crash involving an ambulance

Sources: NHTSA's Fatality Analysis Reporting System (FARS) 1992-2010 Final and 2011 Annual Report File (ARF) and National Automotive Sampling System (NASS) General Estimates System (GES), 1992-2011



Estimated Annual Traffic Crashes involving an Ambulance 1992-2011



Analyzing Ambulance Crashes

- ▶ Fatality Analysis Reporting System (FARS)
- ▶ National Automotive Sampling System General Estimates System (NASS GES)



Fatality Analysis Reporting System (FARS)

Provides the data required to support the development, implementation, and assessment of highway safety programs.

Obtained from many documents including:

- ▶ Police Crash Reports
- ▶ Medical Examiner Reports
- ▶ State highway Department Data
- ▶ Other Records



Fatality Analysis Reporting System (FARS)

Crashes involving ground ambulances can be analyzed by elements such as crash severity, person type, and emergency use.

Below is an example of how ground ambulance crashes are represented in the 2011 NHTSA publication *Traffic Safety Facts*

Persons Killed in Crashes involving an Ambulance by Person Type and Crash Type, 2011

Person Type	Crash Type				Total	
	Single Vehicle		Multiple Vehicle			
	Total	In Emergency Use*	Total	In Emergency Use*	Total	In Emergency Use*
Ambulance Driver	0	0	0	0	0	0
Ambulance Passenger	2	1	2	1	4	2
Occupant of Other Vehicle	0	0	13	6	13	6
Pedestrian	2	1	2	0	4	1
Pedalcyclist	0	0	0	0	0	0
Total	4	2	17	7	21	9

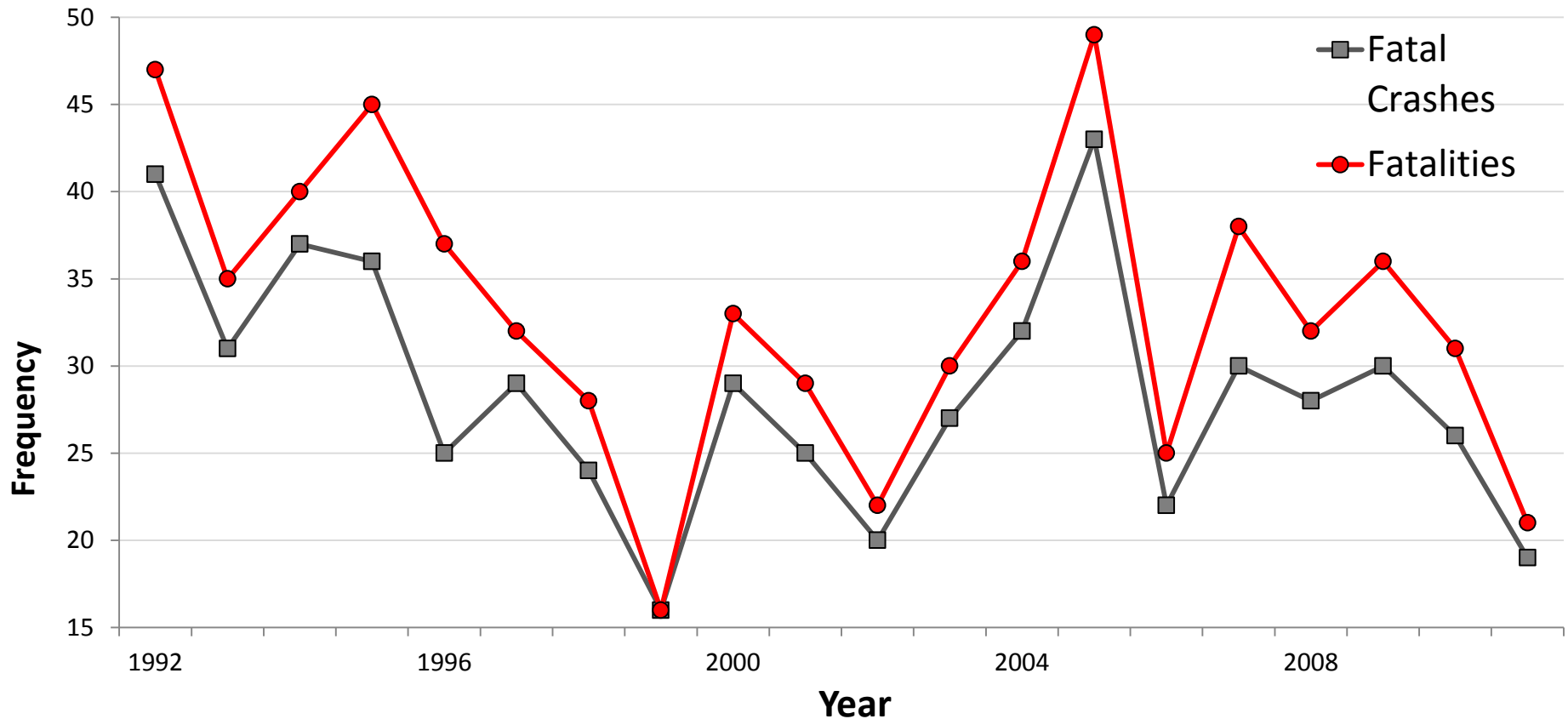


*Refers to a vehicle traveling with physical emergency signals in use (red lights blinking, sirens sounding, etc.)
Source: FARS 2011 (ARF)



Fatal Crashes involving an Ambulance 1992-2011

Between 1992-2011 there were an annual mean of **29** fatal ambulance crashes and **33** fatalities (includes occupants and non-occupants of all vehicles involved)



National Automotive Sampling System General Estimates System (NASS GES)

Used to estimate how many motor vehicle crashes of different kinds take place, and what happens when they occur.

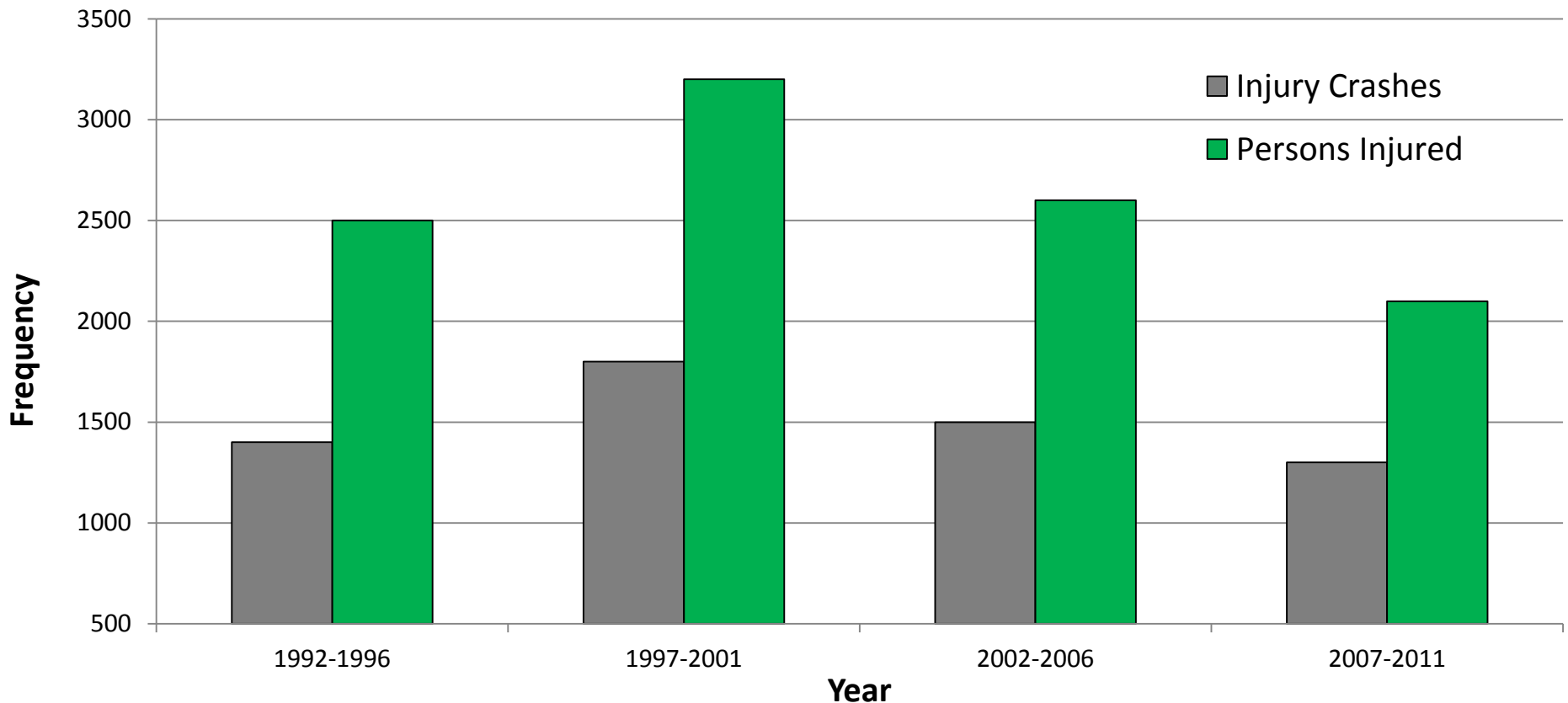
Data are obtained from police reported crashes only.

- ▶ Collected from more than 400 police jurisdictions in 60 sites around the US
- ▶ Randomly sample about 57,000 police crash reports per year
 - ▶ Estimates from NASS GES can be based on fewer than 50 crashes per year.



Estimated Ambulance Crashes resulting in Injured Persons 1992 - 2011

Between 1992-2011 there were an estimated annual mean of **1500** injury crashes involving an ambulance and **2600** injured persons* (includes ambulance occupants and occupants of all other vehicles involved)**.



People in Ambulance Crashes

Ambulance Driver

- Person driving Ambulance

Ambulance Passenger

- Includes all occupants in the Ambulance – EMS personnel, patients, and passengers

Occupant of Other Vehicle

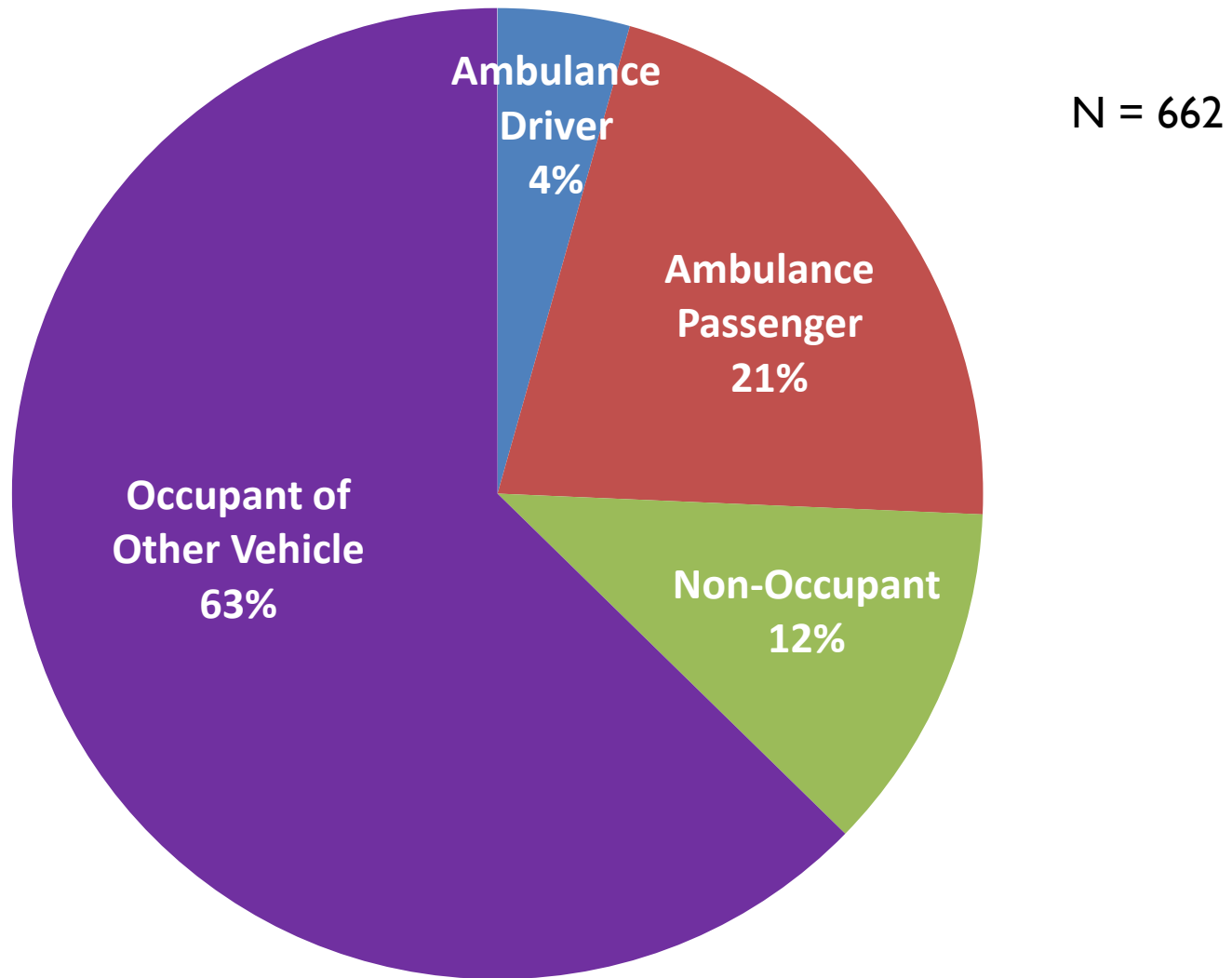
- All occupants of vehicles involved in the crash – driver and passengers

Non-Occupant

- Includes all non-car occupants, such as pedestrians and pedalcyclists

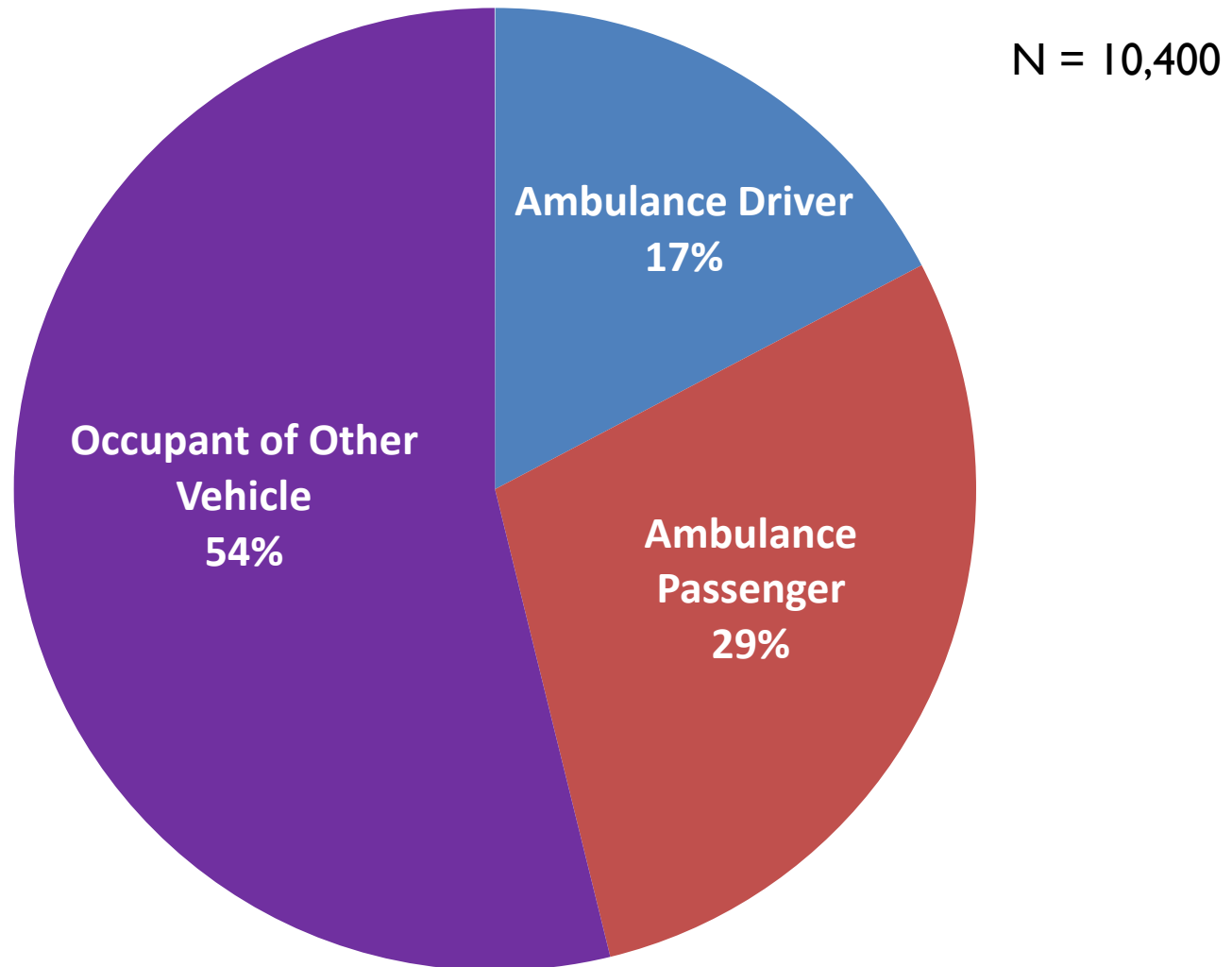


Persons Killed in Crashes Involving an Ambulance: 1992-2011



Sources: NHTSA's Fatality Analysis Reporting System (FARS) 1992-2010 Final and 2011 Annual Report File (ARF)

Estimated* Injured Persons** in Crashes Involving an Ambulance: 1992-2011



*data represent mean number of crashes and injuries over 5 years

**does not include data on non-occupants of a vehicle (pedestrians and pedalcyclists) in injured persons

Sources: National Automotive Sampling System (NASS) General Estimates System (GES), 1992-2011

Emergency Use in Crashes involving a Ground Ambulance 1992-2011

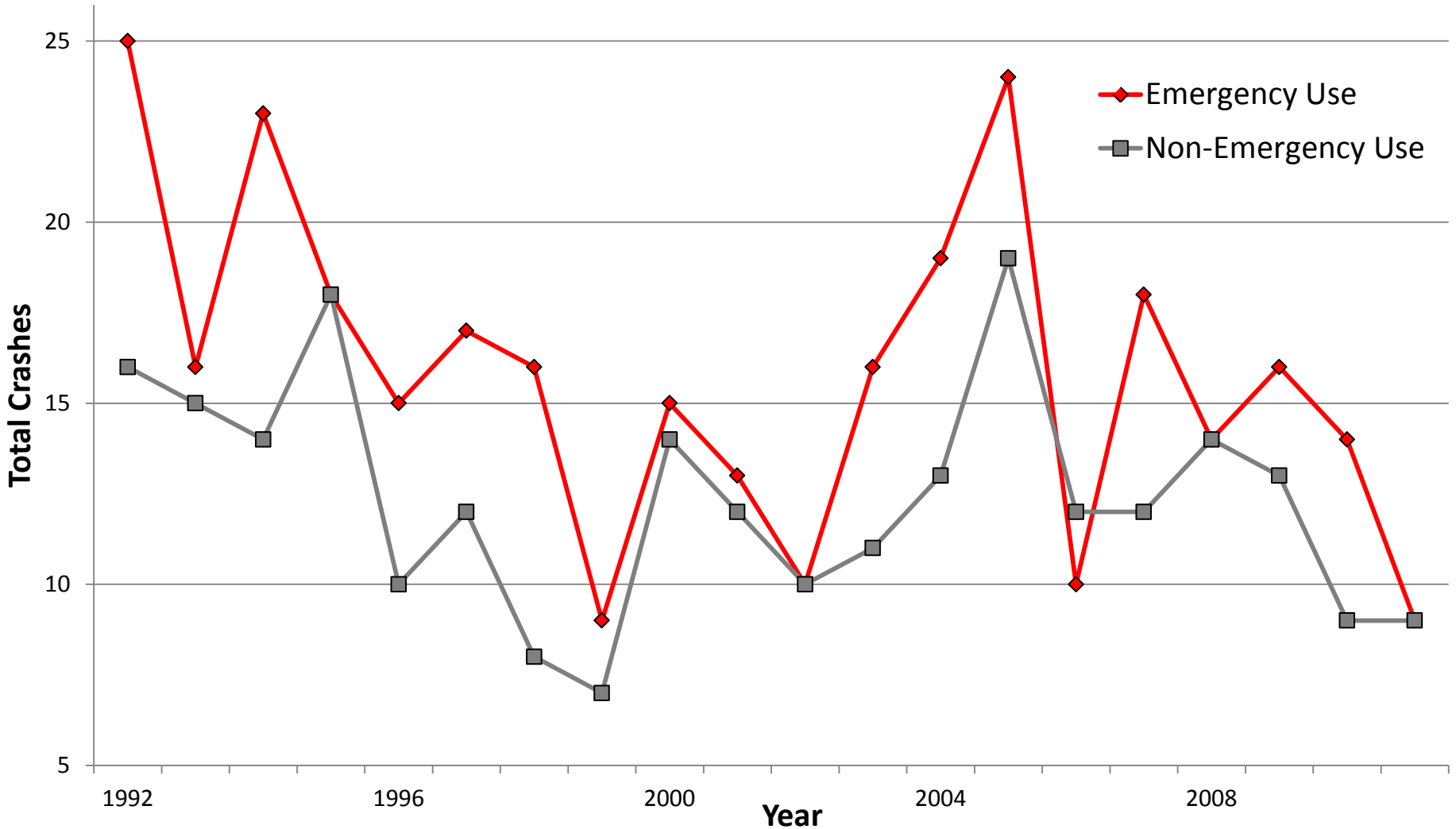
- ▶ Of the annual mean 29 fatal crashes involving an ambulance:
 - ▶ 58% while in emergency use
 - ▶ 42% while in non-emergency use
- ▶ Of the estimated annual mean 1,500 injury crashes*:
 - ▶ 59% while in emergency use
 - ▶ 34% while in non-emergency use
- ▶ *These percentages do not account for proportion of time ambulances spent in emergency vs. non-emergency mode.*

*7% unknown if in emergency use/non-emergency use

Sources: NHTSA's Fatality Analysis Reporting System (FARS) 1992-2010 Final and 2011 Annual Report File (ARF) and National Automotive Sampling System (NASS) General Estimates System (GES), 1992-2011



Emergency Use in Fatal Ambulance Crashes* 1992 - 2011



Limitations of the Analysis

- ▶ Only includes crashes that occur on a road way customarily open to the public
- ▶ Not all vehicle crashes in the country are reported to the police
- ▶ Police may not record ambulances accurately on crash report
- ▶ Does not distinguish between ambulance types
- ▶ Does not determine when the crash occurred (en route to scene, en route to hospital)
- ▶ Does not collect data showing the proportion of time an ambulance is on the road
- ▶ Does not currently differentiate ambulance occupants in the passenger seat or patient compartment of the ambulance



Analyzing Ambulance Crashes: Summary

Between 1992 – 2011 (20 Years)

- ▶ Annual estimated mean of 4,500 crashes involving a ground ambulance

29 Fatal Crashes*

1,500 Injury Crashes**

33 Fatalities

2600 Injured Persons

- 4% Ambulance Driver
- 21% Ambulance Passenger
- 63% Occupant of Other Vehicle
- 12% Non-Occupant

- 17% Ambulance Driver
- 29% Ambulance Passenger
- 54% Occupant of Other Vehicle

58% Emergency Use
42% Non-Emergency Use

59% Emergency Use
34% Non-Emergency Use

*all fatal column data are annual means

**all injury column data are annual estimated means

*** injured persons data does not include non-occupants

Sources: NHTSA's Fatality Analysis Reporting System (FARS) 1992-2010 Final and 2011 Annual Report File (ARF) and National Automotive Sampling System (NASS) General Estimates System (GES), 1992-2011



Investigating Ambulance Crashes

- ▶ Special Crash Investigations (SCI)
- ▶ EMS Injury and Illness Surveillance-National Electronic Injury Surveillance System Work Component (NEISS-Work)



NHTSA Special Crash Investigations (SCI) Program

NHTSA Special Crash Investigations (SCI) investigate many roadway ambulance crashes that result in significant or fatal injury to occupants inside the ambulance

- ▶ The SCI investigates:
 - ▶ Pre-crash activities of the persons involved
 - ▶ Contributing factors to serious/fatal injuries sustained in crash
 - ▶ Environmental/Roadway factors
 - ▶ Vehicle/Equipment factors



NHTSA Special Crash Investigations (SCI) Program

- ▶ Since 2001 the SCI has investigated 38 ambulance crashes and published 32 reports from 20 different states.
- ▶ Data provided in the Ambulance SCI final reports is currently being analyzed to identify areas of concern for ambulance safety.
 - ▶ Analysis Report due in Spring 2014



Photo from SCI Report CA12034



EMS Injury and Illness Surveillance (NEISS-Work)

NEISS-Work collects data on work-related nonfatal injuries and illnesses treated in emergency departments (ED).

- ▶ Records data on EMS workers treated in a national sample of hospital EDs for an occupational injury or illness
- ▶ >95% of patients treated and released from emergency department

NEISS-Work characterizes the events associated with job injury/illness to EMS personnel

- ▶ 2011 NEISS-Work data indicates Transportation Incidents were associated with 9% of non-fatal, ED treated EMS worker injuries/illnesses



EMS Injury and Illness Surveillance System (NEISS-Work)

EMS Worker Injury and Illness Data is available at:

<http://www.cdc.gov/niosh/topics/ems/data.html>

EMERGENCY MEDICAL SERVICES WORKERS

Injury and Illness Data

To collect data on nonfatal injuries and illnesses among EMS workers NIOSH uses the occupational supplement to the National Electronic Injury Surveillance System (NEISS-Work)—a national probability based sample of US hospital emergency departments. EMS worker injuries and illnesses treated in the participating hospitals are identified from admissions information and emergency department chart review by a records abstractor in each hospital. A workers' compensation claim is not required for inclusion. National injury and illness estimates are extrapolated from the statistical weights assigned to each case treated in one of the NEISS-Work hospitals.



EMS Workers Injury and Illness Data

[2011 Data](#)

[2010 Data](#)

[2009 Data](#)

[2008 Data](#)

Accessed 7/23/2013. <http://www.cdc.gov/niosh/topics/ems/data.html>



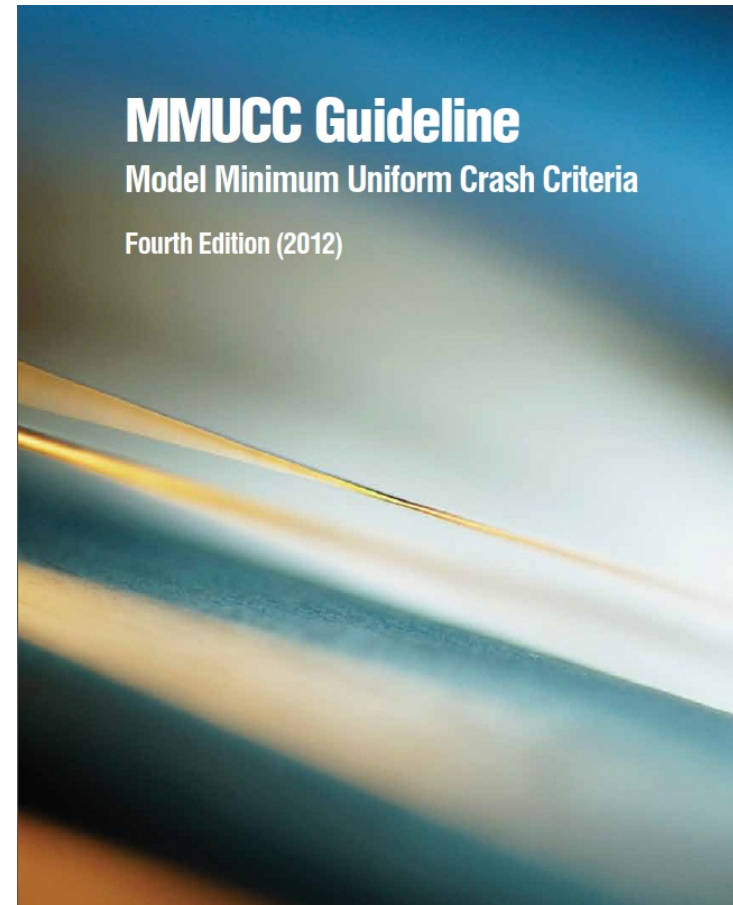
Documenting and National Reporting on Ambulance Crashes

- ▶ Model Minimum Uniform Crash Criteria (MMUCC)
- ▶ Annual NHTSA Traffic Safety Facts

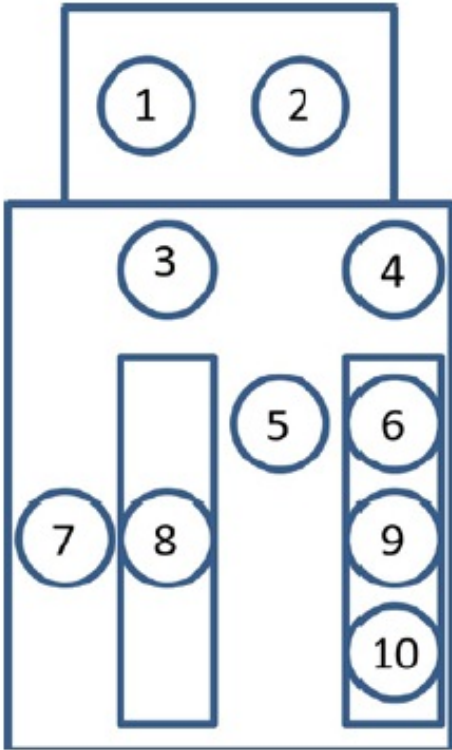


Model Minimum Uniform Crash Criteria

- ▶ The Model Minimum Uniform Crash Criteria (MMUCC) developed to help states improve and standardize motor vehicle crash data
- ▶ Guidelines suggest voluntary minimum criteria that police use for crash reports
- ▶ Data elements expanded in 2012 to include ambulance attributes:
 - ▶ Emergency/Non-Emergency Transport
 - ▶ Emergency Operation/Warning Equipment in Use/Not in Use
 - ▶ Ambulance Seating/Positioning



Example of Conventional Ambulance, MMUCC Seating Position Translation



- 1 Front seat row, left (driver)
- 2 Front, right (passenger)
- 3 Second, middle (EMT seat at head of patient)
- 4 Second, right (patient reclining on bench seat)
- 5 Third, middle (Standing, unseated)
- 6 Third, right (Seated in forward most position on bench seat)
- 7 Fourth, left (EMT seat at side of patient)
- 8 Fourth, middle (Patient on stretcher/cot)
- 9 Fourth, right (Seated in center position on bench seat)
- 10 Other, right (Seated in rear most position on bench seat)

Governor's Highway Safety Association. Model Minimum Uniform Crash Criteria (MMUCC) Forth Edition (2012). Department of Transportation. 8718-070212 <http://www-nrd.nhtsa.dot.gov/Pubs/811631.pdf>

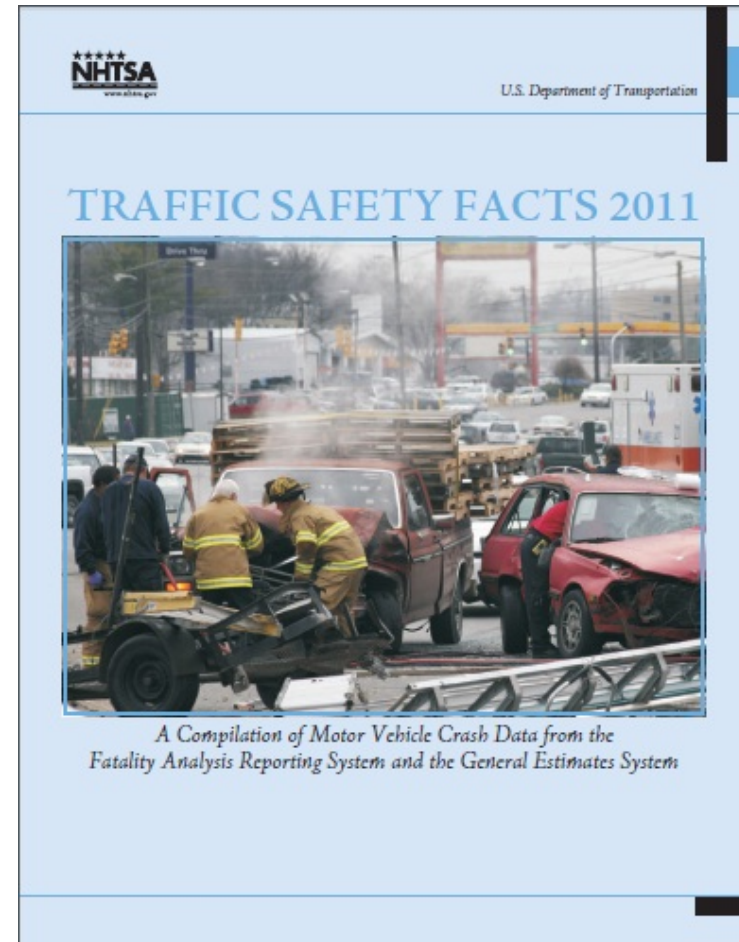


Annual NHTSA Traffic Safety Facts

Fatal crash data from FARS and nonfatal crash data from NASS GES.

Additional information can be found by contacting the National Center for Statistical Analysis.

To access the published FARS and GES files: <ftp://ftp.nhtsa.dot.gov/GES>
<ftp://ftp.nhtsa.dot.gov/FARS>



What is NHTSA doing to Increase Ground Ambulance Safety?

- ▶ Ground Ambulance Safety Activities



NHTSA's Ground Ambulance Safety Activities

- ▶ **NHTSA Office of Special Crash Investigations**
 - ▶ Ongoing investigations of ground ambulance crashes
- ▶ **NHTSA Office of Defect Investigations**
 - ▶ Track ground ambulance safety issues
- ▶ **NHTSA Office of Emergency Medical Services**
 - ▶ Collaborating with NIOSH in a 4-year effort to improve existing ground ambulance standards
 - ▶ Implementing the National Strategy for an EMS Culture of Safety
 - ▶ Distributing Safely Transporting Children in Ambulances
 - ▶ Participating as a non-voting ex-officio committee member on National Fire Protection Agency (NFPA 1917: Standard for Automotive Ambulances)
- ▶ **NHTSA Office of Behavioral Safety Research**
 - ▶ Analysis of special crash investigations involving ground ambulances



Resources

- ▶ Model Minimum Uniform Crash Criteria (MMUCC) Fourth Edition (2012)
<http://www-nrd.nhtsa.dot.gov/Pubs/811631.pdf>
- ▶ NHTSA Traffic Safety Fact Sheets <http://www-nrd.nhtsa.dot.gov/cats/listpublications.aspx?Id=A&ShowBy=DocType>
- ▶ Bureau of Labor Statistics. 2012, BLS Handbook of Methods - Chapter 9: Occupational Safety and Health Statistics.
<http://www.bls.gov/opub/hom/pdf/homch9.pdf>
- ▶ NHTSA Traffic Safety Facts 2011: A compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System
- ▶ NHTSA Special Crash Investigations <http://www-nass.nhtsa.dot.gov/BIN/logon.exe/airmislogon>
- ▶ National Institute for Occupational Health and Safety EMS Workers Injury and Illness Data (2011 Data)
<http://www.cdc.gov/niosh/topics/ems/data2011.html>
- ▶ Working Group Best-Practice Recommendations for the Safe Transportation of Children in Emergency Ground Ambulances
<http://www.ems.gov/BestPracticeRecomendations.htm>



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