The Association of Transportation Safety Information Professionals (ATSIP) • National Safety Council (NSC) • United States Department of Transportation (DOT- NHTSA, FHWA, FMCSA)

34th International Forum on Traffic Records & Highway Safety Information Systems

Orlando, FL, July 28th, 2008

EMS to your rescue? Research, Technology and Reality….

Nadine Levick, MD MPH
Research Director, EMS Safety Foundation
CEO, Objective Safety
New York, NY

Emergency Medical Services (EMS) Transport Safety

This morning's scope

- Key Issues
  - Where is the state of the art
  - What are the questions we need to ask
  - What data needs to be captured to answer them
- Future
  - Goals
  - New technologies
  - Futuristic vehicles
  - New policies
  - New practices
  - New Standards

EMS Safety Crisis

"The Chinese word for 'crisis' (危機) is made up of the words 'danger' (危) and 'opportunity' (機)"

Firstly, the DANGER…

- The state of EMS transport safety research is an EMBARRASSMENT
- Lags at least 30 years behind general automotive and transportation safety research
- Global EMS vehicle safety research is sparse
- EMS Safety research is NOT EVEN ON THE PLAYING FIELD of state of the art automotive safety research
- 'Reinventing the wheel' – should be avoided at all costs

Then, The OPPORTUNITY

- This is vehicles, and this is transportation safety
- Vehicle and transportation safety technology and infrastructure exists
- Ditto drivers, and driver safety technology
- Collaboration, and the multidisciplinary model
- Optimal use of very scarce resource

Firstly!

- An accident ?
- or

a predictable and preventable event

Your Interactive Handout awaits you online at…

- www.objectivesafety.net

This WILL be FAST!!
No need to take any notes – all text slides will be awaiting you in your online Handout

http://www.objectivesafety.net

It is with great irony that I speak here today

- Ambulance transport
  - the most lethal vehicle on the road both per mile travelled and per vehicle
  - is exempt from federal safety oversight
  - has the worst transportation safety data capture for any ground transportation system AND…..
  - Is THE VEHICLE THAT COMES TO RESCUE YOU ON THE HIGHWAY!!

A tragic emergency health care intervention outcome

Rollover Crash Kills Medical Technician
Ambulance Runs Off I-66 and Rolls Over, Injuring Two Employees and a Patient

It does happen….

Why is this crash different from every other crash

A devastating tragedy…

- In contrast to medical error – such as an ETT down the wrong hole which may kill the patient and be a terrible burden for the pts family and for the medic involved
- BUT an EMS crash can kill all involved AND wipe out an EMS systems response capacity……

Friday July 20th 2007... The worst ambulance crash in USA history

Five Killed in Crash of Ambulance and Semi

July 21, 2007 08:20 AM EDT

VAN WERT, OHIO (AP) -- The Ohio State Highway Patrol continues to investigate the crash of an ambulance that killed five people Friday night, including three emergency medical technicians. Troopers say the ambulance was broadsided by a semitrailer in Crane Township, about 65 miles southwest of TOledo.

The ambulance, with four Antwerp Emergency Medical Services workers aboard, was taking two victims from an earlier car crash to a hospital. Troopers say it was broadsided by a tractor-trailer at the intersection of County Road 176 and County Road 87. The ambulance then burst into flames.

The Highway Patrol says three EMS workers were killed. They were identified as 64-year-old Sammy Smith, 31-year-old Heidi McDougall and 25-year-old Kelly Rager. The two patients were also killed. They were identified as 64-year-old Robert Wells 60-year-old Armelda Wells of Hicksville.

Another emergency medical technician, Matt McDougall, and the truck driver, Gerald Chapman, Jr. of Indiana, were both taken to the hospital. It's not yet clear whether they suffered any injuries.

Authorities have not said who had the right of way at the rural intersection nor have they said if the ambulance's emergency siren and lights were turned on.

Antwerp fire chief says, 'They were doing what they loved...'

Lisa Nicely
July 22, 2007

By LISA NICELY

nicely@toledoblade.com

ANTWERP -- They were heroes until the end

Emergency personnel throughout the region are also shocked and mourning their own.

"That's one of our worst scenarios when it's one of our own," said Con Shuherk of the Payne Fire Department.

"Everyone is a brotherhood," said Friend. "Everybody looks after everybody."

Randy Shaffer, director of Paulding County Emergency Management Agency, said the accident has had a deep impact.

"It has affected every emergency personnel in the county," he said. "We know it could happen at any time. We read about it in our newsletter. We just don't think it's going to happen to us."

Shaffer said when a call came in that an ambulance was involved in an accident Friday, "I think every squad in the county activated."

EMS Transport Safety

- 'patient safety'

  AND also
- 'provider' and 'public safety'

Very Important Principle

Ambulance transport safety is part of a SYSTEM, the overall balance of risk involves the safety of all occupants and the public

EMS Transportation Safety Key elements

- What is the appropriate data to collect?
- Which is the optimal method to capture it?
- How do you identify and implement appropriate solutions?
- Who should be doing it?

Real world answers to real world questions -

- What policies offer the safest system?
- What features will enhance safety of ambulance vehicles?
- What technologies will optimize transport safety performance?
- What color scheme is best for vehicles and staff to make it safest?
- What data should be collected when something goes wrong, and how to best analyze it?

Emergency Medical Services (EMS)
An important and unique system

- Public safety, public health and emergency service
- Is there to save lives
- A more recent service compared to Fire and Police

USA EMS

- EMS Systems - >15,000
- Personnel - ~1 million
  (~30% F/T professional & 70% volunteer)
- Vehicles - ~50,000
  (Type I, Type II, Type III, Freightliners, ?motorcycles)
- Transports - ~50 million
  (to Emergency Depts ~ 50%, < 1/3 emergent)
- Cost - ~$8 Billion annually
- Safety Oversight - ? Disparate

History of EMS

- EMS is a relatively new industry
- An unusual history of beginnings within the mortician industry.
  - Early ambulances were hearses, once motorized usually a Cadillac, a vehicle in which an occupant could be transported in the recumbent position
- Over the past 100 years, the sophistication of EMS medical care has advanced dramatically
- EMS communications and transportation technology have not kept up with that pace

1960 to 2007

A passenger vehicle - sure

A 'laundry or mail truck' - ??

A passenger vehicle – yes!

Some recent adverse outcomes

UPS and Laundry trucks have very similar design and even more stringent safety requirements to EMS vehicles BUT very different cargo……

People are passengers and NOT packages or parcels

Some odd facts

- Ambulances are generally not built by the automotive industry
- Intelligent Transportation Systems (ITS), transportation safety engineering is not generally integrated into EMS systems
- Although all EMS systems have medical direction and oversight, it is rare for there to be transportation expertise oversight

Transport oversight?

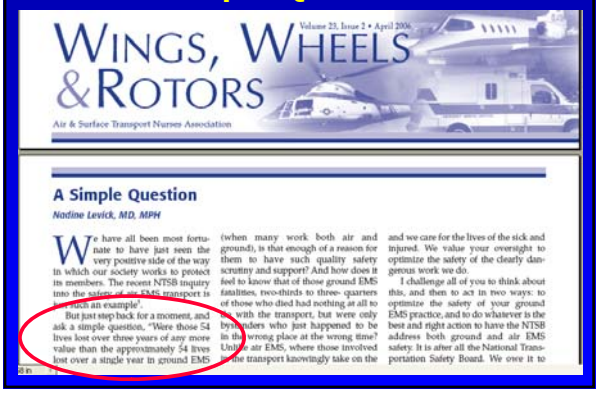
- In contrast to the bus and truck industries, which have -
  - comprehensive safety oversight
  - transportation safety interventions
  - transportation safety data capture via the Federal Motor Carrier Safety Administration (FMCSA)
- EMS has been focused more as an acute health care delivery and emergency medical service and largely outside of much of the other transportation oversight infrastructure that exists

Safety oversight of what and …. by whom

- Vehicle Safety
- Vehicle Design
- Transportation systems safety
- Safety Equipment Design
- Vehicle and Safety Equipment Testing and Standard development
- Safety policies

There are more safety standards for moving cattle than for moving patients

A Simple Question….



WINGS, WHEELS & ROTORS

Volume 23, Issue 2 • April 2006

Air & Surface Transport Nurses Association

A Simple Question

Nadine Levick, MD, MPH

We have all been most fortunate to have just seen the very positive side of the way in which our society works to protect its members. The recent NTSB inquiry into the safety of air EMS transport is just such an example.

But just step back for a moment, and ask a simple question, "Were those 54 lives lost over three years of any more value than the approximately 54 lives lost over a single year in ground EMS (when many work both air and ground), is that enough of a reason for them to have such quality safety scrutiny and support? And how does it feel to know that of those ground EMS fatalities, two-thirds to three- quarters of those who died had nothing at all to do with the transport, but were only bystanders who just happened to be in the wrong place at the wrong time? Unlike air EMS, where those involved in the transport knowingly take on the and we care for the lives of the sick and injured. We value your oversight to optimize the safety of the clearly dangerous work we do.

I challenge all of you to think about this, and then to act in two ways: to optimize the safety of your ground EMS practice, and to do whatever is the best and right action to have the NTSB address both ground and air EMS safety. It is after all the National Transportation Safety Board. We owe it to

Clinical Care? Occupational Health and Safety…..?

- This IS a Transportation and Automotive Safety issue
- This is a Systems safety issue

Jan 28th, 2008

Monday, January 28, 2008 10:14 am

Top Story | Previous Top Stories | Our Picks | Today's Poll

Posted at: 7:33 am | 3 Comments

1 dead, others injured in Sussex crash involving ambulance

Collision happened at the intersection of Beaver Dam and Indian Mission roads near Angola Launch »

April 14th, 2008

Ambulance worker loses arm in accident - West Nyack, New York

An emergency service worker lost her right arm today after the ambulance in which she was a passenger crashed into a truck parked along Route 59 near the flyover to the Palisades Center mall.

Bonnie Ames, 20, was taken by helicopter to the Westchester Medical Center in Valhalla where she underwent surgery.

"She's out of danger, but she lost her arm," Raymond Florida, director of **Rockland Paramedic Services** said early this evening.

"We used multiple units from the jaws of life to extricate her," West Nyack Fire Chief George Drescher said. "She appeared to be seriously injured."

The paramedic van driver, 19-year-old Scot
there to Westchester Medical Center, said

April 20, 2008..??

MORRIS DAILY HERALD

Home | News | Sports | Opinion | Communities | Entertainment

Local News | State News | National News | Obituaries | Police/Court Report | News Archive

State News

Print this story | Email this story | [+] Text Size

Child injured after being struck by ambulance

Sunday, April 20, 2008 9:40 AM CDT

SPRINGFIELD, Ill. (AP) - Springfield police say a 7-year-old child is hospitalized with life-threatening injuries after being struck by an ambulance.

Police Lieutenant Kenny Winslow said the unidentified child was riding a bicycle about 8:30 p.m. Saturday when the ambulance struck him, throwing him from the bike.

After treatment at the scene, the child was loaded into the ambulance and taken to St. John's Hospital. A hospital spokeswoman said he was still being treated in the emergency room late Saturday.

Winslow said the ambulance was not responding to an emergency when the accident occurred.

Communities | Entertainment

s | Obituaries | Police/Court Report | News Archive

Print this story | Email this story | [+] Text Size

Springfield boy hit by ambulance dies

Monday, April 21, 2008 6:31 PM CDT

SPRINGFIELD, Ill. (AP) _ A 7-year-old boy has died after being struck by an ambulance while riding his bike over the weekend.

Truvonte M. Edwards was pronounced dead at 8:37 a.m. Monday morning at St. Louis Children's Hospital, the (Springfield) State Journal-Register reported on its Web site. A spokesman with the St. Louis medical examiner's office says a cause of death has not yet been determined.

Police say Edwards was trying to cross a street on the east side of town around 8:30 p.m. Saturda

June 17th 2008
a paramedic and a patient killed

EMS CRASH KILLS PATIENT AND A SUSSEX COUNTY (DE) PARAMEDIC IN THE LINE OF DUTY
Tuesday, June 17, 2008

We regret to advise you that a female Sussex County (DE) Paramedic was killed in the Line of Duty as was a patient killed in a horrific crash involving an ambulance in Sussex County (DE) this morning .
The single vehicle crash happened around 0240 Hours on the John J. Williams Highway near the Lewes-Rehoboth joint fire company substation in Angola.
The Mid-Sussex Rescue Squad ambulance was transporting to Beebe Medical Center with a patient, 2 MSRS Squad members and the Sussex County Paramedic were on board when it struck a tree, which opened the side of the ambulance as seen on our home page. Tragically, the patient was killed as was the Sussex County EMS Paramedic, who was killed in the Line of Duty.
Sussex County EMS also suffered a close call last year when a Paramedic John Schmitt was seriously injured in a crash when a civilian struck the Milford Fire Company ambulance he was riding in, while returning from a run. Additional details on this mornings crash will follow.

In this vehicle…

Unacceptable, and ridiculous AMD/KKK-F '*safety testing*' practices and 'standards' !!??

adn.com Anchorage Daily News

Alaska Newsreader — All Alaska in one click -- news, blogs, videos and more. about the newsreader

Subscribe | missed delivery | vacation

Search in All for find ›

News | Sports | Outdoors | Features | Money | Entertainment | Opinion

Home | Alaska Newsreader | Editorial | Obituaries | Archives Movies | Music | Restaurants | Submit an Event

Paramedic injured in crash is recovering

By Julia O'Malley
Anchorage Daily News
Published: December 28, 2006
Last Modified: December 28, 2006 at 05:07 PM

An Anchorage Fire Department ambulance rushing a patient to the hospital was struck by a Dodge pickup this morning, injuring three paramedics, according to the Anchorage Police Department.

The Dodge broadsided the ambulance, which had lights flashing and sirens on, hitting it in the back around 8 a.m. as the medic vehicle was crossing the Glenn Highway at Airport Heights Drive. Onboard the ambulance were seriously injured patient Antonio Malavai, his wife, Gail Malavai, and four Anchorage Fire Department personnel: driver Eric Tuott, 31, EMT Jess Werner, 40, and paramedics Dave Wallace, 43, and Tony Brugliera, 36.

Brugliera, who was riding with Malavai in the back of the rig, was hospitalized with a head injury and is in stable but guarded condition. Werner and Wallace were treated for minor injuries and released. Clifton Tyler, 43, the driver of the pickup, and

More anchorage stories »
- Coalition says Strawberry plans don't quality for yes vote
- Bomb threat at elementary school leads to arrest of 4 eighth-graders
- City revises ads about smoking ban
- Suspect sought in death
- Alcohol seems a factor in tent death

Story tools
- E-mail a friend
- Print
- Digg this
- Feed Newsvine
- Send link via AIM

Font size : A | A | A

2 counts of vehicular homicide… November 5, 2007 - PA

Drunken ambulance driver killed 2 in car crash - Pennsylvania

A 22-year-old ambulance driver drank before her shift and was impaired when she collided with a car in Marshall, killing two men instantly, Allegheny County District Attorney Stephen A. Zappala Jr. said today.

Shanea Leigh Climo, 22, of Evans City, is charged with two counts of homicide by vehicle and involuntary manslaughter, driving under the influence and several traffic offenses in the Sept. 23 collision at Perry Highway and Brush Creek Road. She was arrested this morning, arraigned and released on her own recognizance, authorities said.

Police said an on-board camera system in the ambulance helped them decide to file charges. The camera allegedly shows the face of the driver, Shanea Climo.

Zappala said Climo was traveling south on Route 19, transporting a patient with a do-not-resuscitate order to UPMC Passavant, when she ran a red light and hit a Chevrolet Cavalier driven by Douglas Stitt. Stitt and a passenger, Phillip Bacon, were killed.

The patient later died, but his death was not believed to be related to the crash, Zappala said.

An interhospital transport ? "Do no harm…."?

Date last updated: Tuesday, January 23, 17:14 PST

01/24/2007 | Print this Article | EMail this Article to a friend | LexisNexis®

Pa. ambulance involved in crash; patient pronounced dead at scene

By Elizabeth Evans
The York Dispatch (Pennsylvania)
Copyright 2007 York Newspapers, Inc.
All Rights Reserved

An Adams County ambulance rushing a patient to York Hospital collided with a car at the intersection of routes 30 and 616 in West Manchester Township at 9:47 this morning, and the patient was pronounced dead at the scene.

York County Deputy Coroner Claude Stabley said the patient, a woman, was being transported from Gettysburg Hospital because she was suffering a "significant" heart condition.

He said he's still trying to determine whether she went into cardiac arrest and died prior to the crash, or whether she suffered a fatal heart attack because of or after the crash. Stabley said she suffered no significant traumatic crash-related injuries.

Goals

- Standards for safety
- Policy based on Science
- Databases to demonstrate outcome

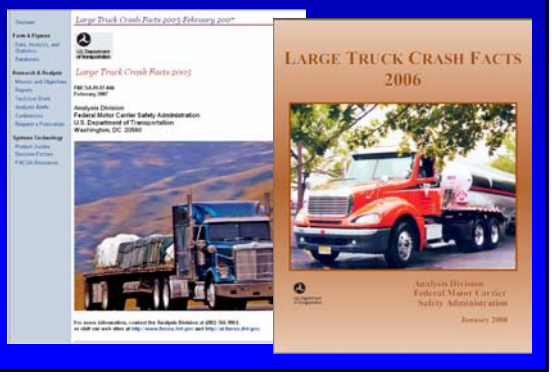
What data resources are there

What are the strengths and weaknesses of each

Existing transportation data systems

- FMCSA
  - EMS is exempt
  - extensive data on both numerator and denominator aspects of commercial truck safety, with safety performance monitoring and targeted safety guidance
- NHTSA re: EMS
  - FARS – incomplete mortality data
  - GESS/NASS/CDS – sample of low #
  - minimal data with incomplete numerator data for both morbidity and mortality and virtually non- existent denominator data
  - No safety monitoring nor any targeted safety guidance
- NTSB re: Ground EMS
  - One crash report, 1979
  - no system wide data capture (unlike aviation EMS)
  - No safety monitoring, no recommendations since 1979

Effective data capture is powerful…



Valuable information… EMS exempt

FMCSA - Exceptions

- Unless otherwise specifically provided, the rules <u>do not apply</u> to —
  - (f)(1) All school bus operations as defined in §390.5;
  - (f)(2) Transportation performed by the Federal government, a State, or any political subdivision of a State, or an agency established under a compact between States
  - (f)(3) The occasional transportation of personal property by individuals not for compensation nor in the furtherance of a commercial enterprise;
  - (f)(4) The transportation of **human corpses or sick and injured persons;**
  - (f)(5) The operation of **fire trucks and rescue vehicles while involved in emergency and related operations;**

Why isn't EMS ground transport data captured by FMCSA?

Truck and Bus Crashes Reportable to FMCSA

REPORT A TRAFFIC CRASH IF IT INVOLVES...

Any truck that has a gross vehicle weight rating (GVWR) of more than 10,000 pounds or a gross combination weight rating (GCWR) of more than 10,000 pounds used on public highways

OR

Any motor vehicle with seating to transport nine (9) or more people, including the driver's seat

OR

Any motor vehicle displaying a hazardous materials placard (regardless of weight)

...AND RESULTS IN

A fatality: any person(s) killed in or outside of any vehicle (truck, bus, car, etc.) involved in the crash or who dies within 30 days of the crash as a result of an injury sustained in the crash

OR

An injury: any person(s) injured as a result of the crash who immediately receives medical treatment away from the crash scene

OR

A tow-away: any motor vehicle (truck, bus, car, etc.) disabled as a result of the crash and transported away from the scene by a tow truck or other vehicle

Revised 10/06

Federal Motor Carrier Safety Administration

U.S. Department of Transportation www.fmcsa.dot.gov

Crashes involving commercial motor vehicles and some non-commercial motor vehicles must be reported on a State's crash report and to the FMCSA. A commercial motor vehicle is any motor vehicle that is used on a trafficway for the transportation of goods, property, or people in interstate or intrastate commerce.

INCLUDED:

Here are some examples of commercial and non-commercial operations that, when involved in a crash, should be included if they meet the criteria on the front of this card.

Examples:

1. A trucking company or individual owner/operator hauling the goods of a business for a fee.
2. A farmer hauling his own crops, his own products to retail stores, or a retail store delivering products to its buyers.
3. A farm hauling its produce to market.
4. A motorcoach, airport shuttle, or hotel-owned shuttle bus or limousine service transporting passengers.
5. A government-owned truck or bus.
6. A school bus transporting students to/ from school or school related activities.
7. A rented or leased truck used to transport either commercial or personal goods.
8. A motorcoach or passenger vehicle owned and operated for commerce transported for a personal trip or to transport personal goods.

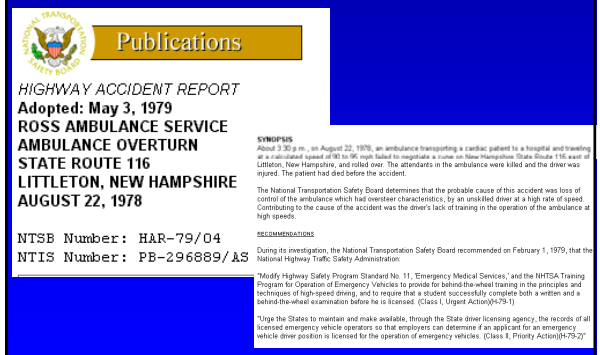
EXCLUDED:

Here are some examples of non-commercial operations that, when involved in a crash, should not be included.

Examples:

1. A non-commercial horse owner transporting hay bales from his pasture on one side of the road to his stables on the other side of the road in a truck with a GVWR greater than 10,000 pounds.
2. A farmer hauling his own produce to a drop off point in a personally owned pickup truck with a GVWR greater than 10,000 pounds.
3. A family of 10 persons taking a trip in the family's 12 passenger van.
4. A personally owned pickup truck hauling a boat, horse or utility trailer with a GCWR greater than 10,000 pounds not operating in commerce or as part of a business.
5. A family operating a personally owned and registered recreational vehicle or motor home.

NTSB 1979 Accident Report


Publications

HIGHWAY ACCIDENT REPORT

Adopted: May 3, 1979
ROSS AMBULANCE SERVICE
AMBULANCE OVERTURN
STATE ROUTE 116
LITTLETON, NEW HAMPSHIRE
AUGUST 22, 1978

NTSB Number: HAR-79/04
NTIS Number: PB-296889/AS

SYNOPSIS

About 3:30 p.m., on August 22, 1978, an ambulance transporting a cardiac patient to a hospital and traveling at a calculated speed of 90 to 95 mph failed to negotiate a curve on New Hampshire State Route 116 east of Littleton, New Hampshire, and rolled over. The attendants in the ambulance were killed and the driver was injured. The patient had died before the accident.

The National Transportation Safety Board determines that the probable cause of this accident was loss of control of the ambulance which had oversteer characteristics, by an unskilled driver at a high rate of speed. Contributing to the cause of the accident was the driver's lack of training in the operation of the ambulance at high speeds.

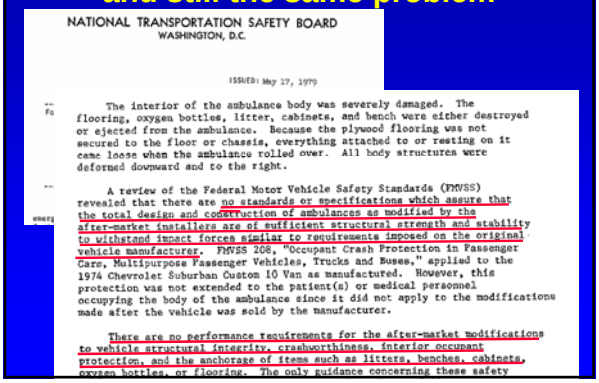
RECOMMENDATIONS

During its investigation, the National Transportation Safety Board recommended on February 1, 1979, that the National Highway Traffic Safety Administration:

"Modify Highway Safety Program Standard No. 11, 'Emergency Medical Services,' and the NHTSA Training Program for Operation of Emergency Vehicles to provide for behind-the-wheel training in the principles and techniques of high-speed driving, and to require that a student successfully complete both a written and a behind-the-wheel examination before he is licensed. (Class I, Urgent Action)(H-79-1)

"Urge the States to maintain and make available, through the State driver licensing agency, the records of all licensed emergency vehicle operators so that employers can determine if an applicant for an emergency vehicle driver position is licensed for the operation of emergency vehicles. (Class II, Priority Action)(H-79-2)"

30 years later, ~ 1,600 fatalities and still the same problem


NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

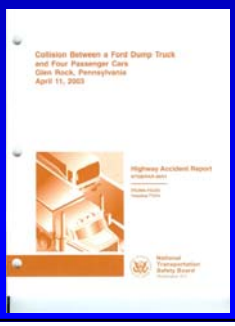
ISSUED: May 17, 1979

The interior of the ambulance body was severely damaged. The flooring, oxygen bottles, litter, cabinets, and bench were either destroyed or ejected from the ambulance. Because the plywood flooring was not secured to the floor or chassis, everything attached to or resting on it came loose when the ambulance rolled over. All body structures were deformed downward and to the right.

A review of the Federal Motor Vehicle Safety Standards (FMVSS) revealed that there are no standards or specifications which assure that the total design and construction of ambulances as modified by the after-market installers are of sufficient structural strength and stability to withstand impact forces similar to requirements imposed on the original vehicle manufacturer. FMVSS 208, "Occupant Crash Protection in Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses," applied to the 1974 Chevrolet Suburban Custom 10 Van as manufactured. However, this protection was not extended to the patient(s) or medical personnel occupying the body of the ambulance since it did not apply to the modifications made after the vehicle was sold by the manufacturer.

There are no performance requirements for the after-market modifications to vehicle structural integrity, crashworthiness, interior occupant protection, and the anchorage of items such as litters, benches, cabinets, oxygen bottles, or flooring. The only guidance concerning these safety

Major crash investigation - NTSB comprehensive analysis for commercial vehicles


Collision Between a Ford Dump Truck and Four Passenger Cars
Glen Rock, Pennsylvania
April 11, 2003

Highway Accident Report

National Transportation Safety Board

Why ISN'T EMS on the NTSB's "Most Wanted List"??

NTSB
MOST WANTE
Transportation Safety Improven
20
Critical changes needed to red
transportation accidents and save

Actions needed by Federal Agencies

HIGHWAY

The Federal Motor Carrier Safety Administration should act to:

Improve the Safety of Motor Carrier Operations
- Prevent motor carriers from operating if they put vehicles with mechanical problems on the road or unqualified drivers behind the wheel.

Prevent Medically-Unqualified Drivers from Operating Commercial Vehicles
- Establish a comprehensive medical oversight program for interstate commercial drivers.
- Ensure that examiners are qualified and know what to look for.
- Track all medical certificate applications.
- Enhance oversight and enforcement of invalid certificates.
- Provide mechanisms for reporting medical conditions.

The National Highway Traffic Safety Administration and U.S. DOT should act to:

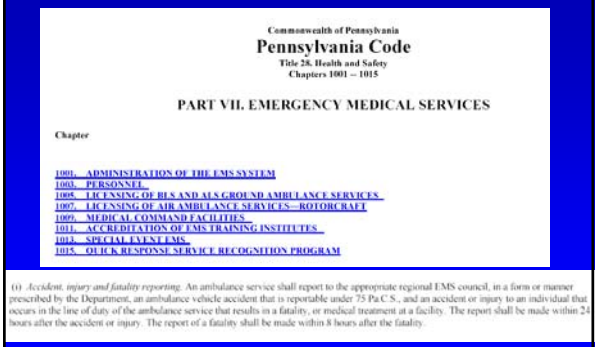
Enhance Protection for Bus Passengers
- Redesign motor coach window emergency exits so passengers can easily open them.
- Issue standards for stronger bus roofs and require them in new motor coaches.
- Devise new standards to protect motor coach passengers from being thrown out of their seats or ejected when a bus sustains a front, side, or rear impact or rolls over.
- Develop standard definitions and classifications for each of the different bus body types.

Other potential sources of EMS ground transport safety data?

- NEMSIS - a powerful EMS patient flow and management database, not a transportation safety database
- Some states (PA, MO, NY) have EMS transport fatality reporting systems – but data incomplete
- NEMS Memorial – incomplete – voluntary – verified
- EMSClosecalls.com, EMSNetwork.org – voluntary, anecdote

National EMS Information System

State based - incomplete


Commonwealth of Pennsylvania
Pennsylvania Code
Title 28. Health and Safety
Chapters 1001 -- 1015

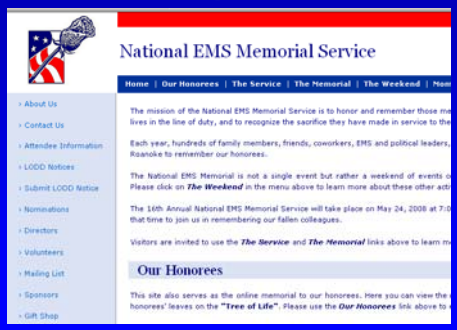
PART VII. EMERGENCY MEDICAL SERVICES

Chapter

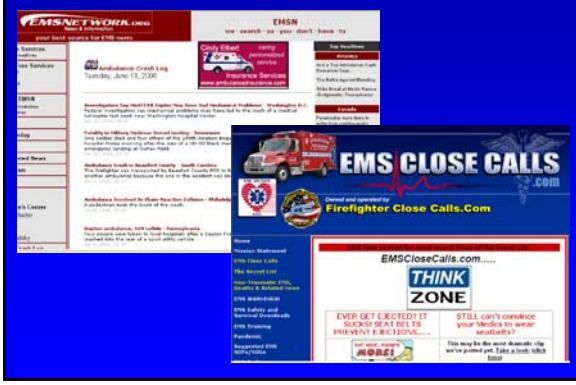
1001. ADMINISTRATION OF THE EMS SYSTEM
1003. PERSONNEL
1005. LICENSING OF BLS AND ALS GROUND AMBULANCE SERVICES
1007. LICENSING OF AIR AMBULANCE SERVICES—ROTORCRAFT
1009. MEDICAL COMMAND FACILITIES
1011. ACCREDITATION OF EMS TRAINING INSTITUTES
1013. SPECIAL EVENT EMS
1015. QUICK RESPONSE SERVICE RECOGNITION PROGRAM

(i) *Accident, injury and fatality reporting.* An ambulance service shall report to the appropriate regional EMS council, in a form or manner prescribed by the Department, an ambulance vehicle accident that is reportable under 75 Pa.C.S., and an accident or injury to an individual that occurs in the line of duty of the ambulance service that results in a fatality, or medical treatment at a facility. The report shall be made within 24 hours after the accident or injury. The report of a fatality shall be made within 8 hours after the fatality.

Voluntary, verified but incomplete …

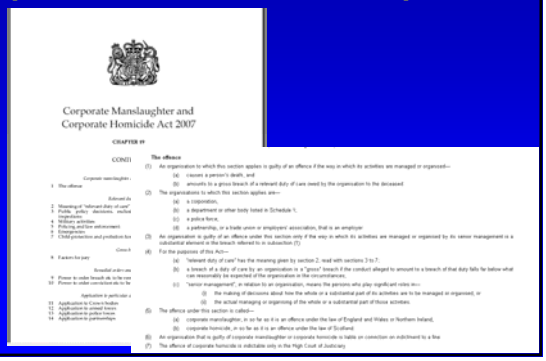


Voluntary, ? anecdote …



By contrast - Law enforcement and Fire detailed fatality data

Canada - Corporate Manslaughter Corporate Homicide Act: 8th April, 2008


Corporate Manslaughter and Corporate Homicide Act 2007

CHAPTER 19

CONTI

The offence

EMS safety data estimates

In the USA*

- ~ 50,000 vehicles
- ~ 5,000 crashes a year
- ~ One fatality each week
  - ~ 2/3 pedestrians or occupants of other car
  - Approximately 4 child fatalities per year
- ~10 serious injuries each day
- Cost estimates > $500 million annually
- USA crash fatality rate/capita >2x higher than in Australia

*FARS/BTS 2005-6

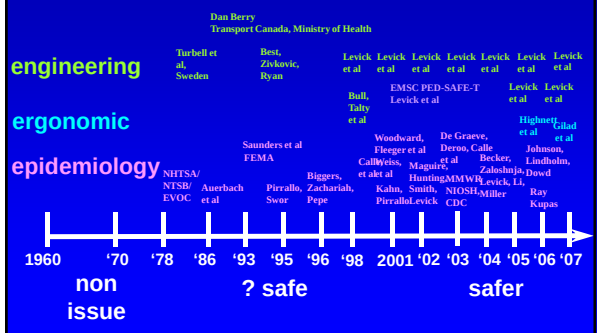
Is it your service's tragic year?

- ~ 50 fatalities a year
- 15,000 EMS services
- Each year one in 300 EMS services experiences a fatality

Commercial vehicle comparisons

- Estimates for ambulance fatality/mile traveled are 3 to 50 fold the rate of large truck fatal crashes
  - Large trucks - 2.2 fatal crashes/100 million miles traveled in 2005
  - Ambulance - 7.7 to 109 fatal crashes/100 million ambulance miles traveled
- Injury estimates
  - 37 truck crash injuries/100 million miles
  - Ambulance estimates of crash injury of 308 to 4,360 injuries/100 million ambulance miles traveled
- Ambulance vehicle occupant crash fatality percentage is double that for large trucks.

Ambulance Safety Research: A New Field



Priorities…… Research papers in the past 30 years

- EMS Safety
  - 40 papers - on ambulance safety
  - 2 papers - on ambulance ergonomics
  - 1 paper – on stretcher ergonomics
- Computer Workstations
  - 30,000 papers – on ergonomics of computer work stations
- Erectile Dysfunction
  - 100,000 papers – on Erectile Dysfunction

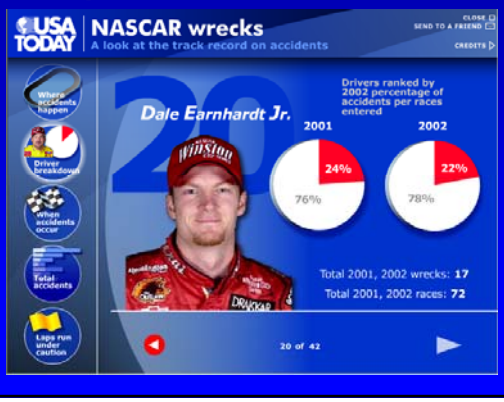
Ambulance Safety Research: A New Field

- Funding??

DOT Funding for Reptiles and Road Kill

Moose crash data….? – not EMS crash data

Comprehensive data here too…



Predictable risks

- Fatal crashes more often at intersections, & with another vehicle ($p < 0.001$)*
- 70% of fatal crashes EMS crashes during Emergency Use*
- Most serious & fatal injuries occurred in rear (OR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)**
- 82% of fatally injured EMS rear occupants unrestrained**
- > 74% of EMT occupational fatalities are MVC related***
- Serious head injury in >65% of fatal occupant injuries#
- More likely to crash at an intersection with traffic lights (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles##

*Kahn CA, Pirrallo RG, Kuhn EM, Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9
**Becker, Zaloshnja, Levick, Li, Miller, Acc Anal Prev 2003
***Maguire, Hunting, Smith, Levick, Annals Emerg Med Dec 2002
#NIOSH, 2003
##Ray AM, Kupas DF, Prehosp Emerg Care 2005 Dec; 9:412-415

And very Predictable…

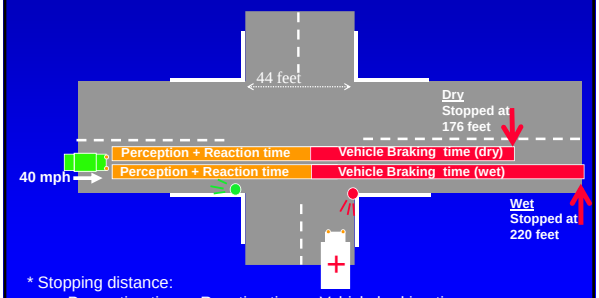
- Intersections are lethal environments

So.. The real world for an EMS vehicle approaching a red light

- You think they heard you…
- You know they must have seen you..
- And maybe they did
- ….. But..
- There is NO way humanly possible that they could stop…..

The real world

Intersection passenger car stopping distance* at 40 mph dry and wet

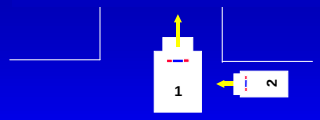


* Stopping distance:

Perception time + Reaction time + Vehicle braking time

(varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)

What is actually happening during an ambulance crash



1 – Target vehicle, Type I ambulance

2 – Bullet vehicle, Type II ambulance

Closing speed 44 mph

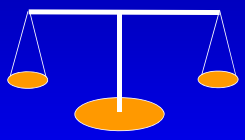
And this all takes place in 60 millisecs – the blink of an eye

NIOSH Ambulance Occupant Safety Crash Testing

Impact Direction

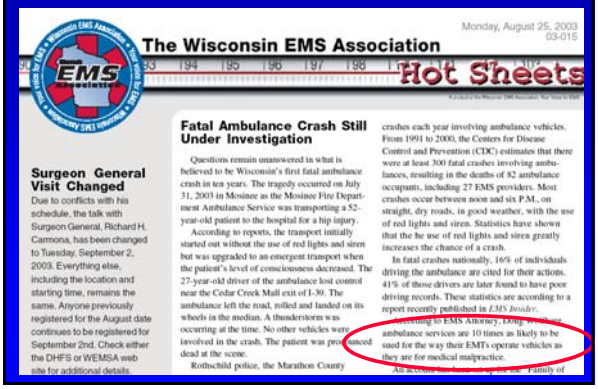
25 MPH !

Balance of concerns and risk during transport



- Response and transport time
- Clinical care provision
- Occupant safety/protection
- Public Safety

2003 a problem...



Monday, August 25, 2003
03-015

The Wisconsin EMS Association

Hot Sheets

Surgeon General Visit Changed

Due to conflicts with his schedule, the talk with Surgeon General, Richard H. Carmona, has been changed to Tuesday, September 2, 2003. Everything else, including the location and starting time, remains the same. Anyone previously registered for the August date continues to be registered for September 2nd. Check either the DHFS or WEMSA web site for additional details.

Fatal Ambulance Crash Still Under Investigation

Questions remain unanswered in what is believed to be Wisconsin's first fatal ambulance crash in ten years. The tragedy occurred on July 31, 2003 in Mosinee as the Mosinee Fire Department Ambulance Service was transporting a 52-year-old patient to the hospital for a hip injury.

According to reports, the transport initially started out without the use of red lights and siren but was upgraded to an emergent transport when the patient's level of consciousness decreased. The 27-year-old driver of the ambulance lost control near the Cedar Creek Mall exit of I-39. The ambulance left the road, rolled and landed on its wheels in the median. A thunderstorm was occurring at the time. No other vehicles were involved in the crash. The patient was pronounced dead at the scene.

Rothschild police, the Marathon County

crashes each year involving ambulance vehicles. From 1991 to 2000, the Centers for Disease Control and Prevention (CDC) estimates that there were at least 300 fatal crashes involving ambulances, resulting in the deaths of 82 ambulance occupants, including 27 EMS providers. Most crashes occur between noon and six P.M., on straight, dry roads, in good weather, with the use of red lights and siren. Statistics have shown that the be use of red lights and siren greatly increases the chance of a crash.

In fatal crashes nationally, 16% of individuals driving the ambulance are cited for their actions. 41% of those drivers are later found to have poor driving records. These statistics are according to a report recently published in *EMS Insider*.

According to EMS Attorney, Doug [illegible], ambulance services are 10 times as likely to be sued for the way their EMTs operate vehicles as they are for medical malpractice.

An accident can bring up the use "Family of

2007 a bigger problem

2007 Insurance data –

- **27** fold more likely to have a claim based on transport than related to medical care

What do ambulance crashes really cost ?

- Loss of life and injury
- Negative impact on EMS system
- Collisions are the largest liability cost and exceeds malpractice or negligence
- Besides the direct financial costs of replacing a damaged ambulance and equipment, there are additional hidden costs incurred:
  - investigating the ambulance collision
  - litigation /settlement/lawsuit
  - medical/disability costs of injured EMTs
  - hiring of new employees to replace injured personnel
  - retraining and psychological counseling of personnel involved and others
  - increased insurance rates

June 2007

EMSRESPONDER.com

Crash Costs: Assessing the Hidden Damages of an Ambulance Accident

EMS MAGAZINE

An Ounce of PREVENTION

Why your agency needs a vehicle safety program

PLUS:

Safety is Good Business

Federal Motor Carrier Safety Administration

Safety is Good Business—Crashes Hurt Your Bottom Line

Safety & Security

Overview

Why Safety is Good Business

EMS CANNOT afford to keep paying out like this….

So an ambulance is..

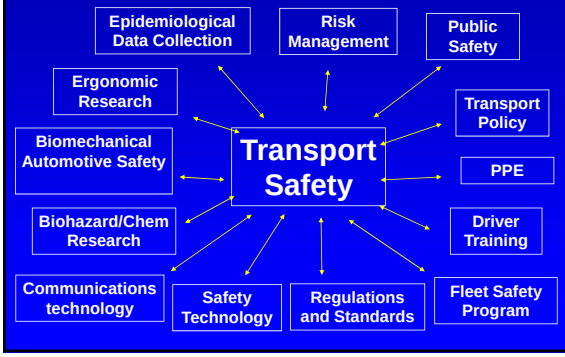
- Most lethal vehicle on the road per mile traveled
- >3 times more lethal per vehicle than other vehicles on the road
- Not designed by automotive engineers - nor are design features based on known automotive safety technology or ergonomic science
- NO transportation systems oversight

Absence of standards and oversight

- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No safety performance standards
- Absent national safety oversight

We appear to have a serious transportation systems problem

Ground Ambulance Transport Safety IS Complex AND Multidisciplinary



the EMS transport process

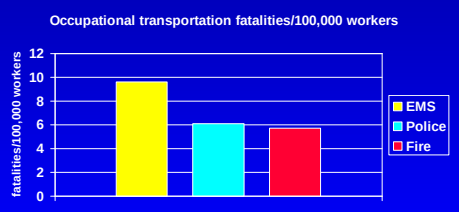
- communications/dispatch
- the patient
- restraining device/seat
- transporting device/gurney
- paramedics/transport nurses, doctors & family
- patient monitoring equipment
- clinical care & interventions
- protective equipment
- the vehicle
- the driver/driving skill
- other road users
- the road

TIME & PLACE

Ambulance Transportation Safety

- Dispatch policy and procedures
- Vehicle Operations Safety
- Vehicle Crashworthiness
- Vehicle Ergonomics
- Clinical care policies
- Scene Safety

Occupational transportation fatalities..



- WE HAVE A BIG PROBLEM HERE

** Maguire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec 2002*

Interrelated aspects

- The crash
- The patient condition
- The system status pressures

Crash Data that are routine

- Vehicle
- Time of Day
- Location
- Injuries and Fatalities

Crash Data that are not routine

- Emergency patient care data
- EMS System capacity and impact data
- Human factors data

The Driver

- Driver selection
- Driver monitoring and feedback
- Driver Impairment
- Driver training

EMS Driver issues

Acad Emerg Med Volume 11, Supplement 1 (2)

The Relationship between Ambulance Crashes and Emergency Medical Technician Age

Jonathan R. Studnek and Kyle Porter

The National Registry of Emergency Medical Technicians, Columbus, OH; The Ohio State University, Columbus, OH

ABSTRACT

Objectives: Ambulance crashes can have devastating effects on the community. Driver safety and crash prevention programs could help reduce the number of ambulance crashes. However, there is little research describing if there are subpopulations within the emergency medical services workforce where preventive strategies should be targeted. The study intends to determine which emergency medical technicians (EMTs) have an increased chance of involvement in an ambulance crash.

Methods: In 2004, a cohort of nationally registered EMTs and paramedics were asked to report if they had been involved in an ambulance crash. Respondents also answered several demographic questions including age, community size, service type, call volume, and time stored in an ambulance. Excluded from analysis were EMTs who smoked. ¶

increased field supervision or driver safety training programs on the driving performance of younger EMTs.

Conclusions: When controlling for call volume and ambulance time, the odds of having been in an ambulance accident within the past year were significantly higher for younger EMTs. Future studies should investigate the effects of various interventions such as increased field supervision or driver safety training programs on the driving performance of younger EMTs.

Which is best, how many hours…??

November 5, 2007

Speeding, Alcohol Blamed In Fatal Ambulance Crash

POSTED: 12:43 pm EST November 5, 2007
UPDATED: 5:54 pm EST November 5, 2007

MARSHALL TOWNSHIP, Pa. -- Speeding and alcohol are being blamed for a crash between an ambulance and car along Route 19 at Brushcreek Road in Marshall Township on Sept. 23, killing two people and injuring three others.

The driver of the ambulance, Shanea Leigh Climo, 22, of Evans City, was charged on Monday with two counts of homicide by vehicle and involuntary manslaughter, driving under the influence and several traffic offenses.

Impaired Driver

- Since 2003, medical oversight of commercial truck and bus drivers on NTSB's "most wanted" list
- The NTSB issued eight safety recommendations to crack down on unfit commercial drivers
- FMCSA has begun taking steps to address them

Medically unfit truck drivers still on roads

By HOPE YEN and FRANK BASS -- **6 days ago**

WASHINGTON (AP) — Hundreds of thousands of tractor-trailer and bus drivers in the United States carry commercial driver's licenses despite also qualifying for full federal disability payments, and some of those drivers have suffered seizures, heart attacks or unconscious spells, according to a new U.S. safety study obtained by The Associated Press.

The problems threatening highway travelers persist despite years of government warnings and hundreds of deaths and injuries blamed on commercial truck and bus drivers who blacked out, collapsed or suffered major health problems behind the wheels of vehicles that can weigh 40 tons or more.

The U.S. agency responsible for cracking down on unfit truckers, the Federal Motor Carrier Safety Administration, acknowledges U.S. safety regulators have proposed officials who determine whether trucke truckers from "doctor shopping" to find condition. It's unclear whether any of th President Bush leaves office.

"We have a major public safety proble Donaldson, senior research director at Auto Safety, whose members include companies. "You have an agency that the industry's economic situation."

Truckers violating federal medical rules review by the AP of 7.3 million commer Department in 2006, the latest data a Pennsylvania, Illinois, Michigan, Alaba where drivers were sanctioned most fr carry a valid medical certificate. Those the United States.

House committee probes medically unfit truckers

Associated Press - July 24, 2008 4:33 AM ET

WASHINGTON (AP) - Congressional investigators say there's a problem of unfit truck drivers on the road.

A study expected to be released at a House Transportation Committee hearing today says it's so easy for truckers to fake a medical certificate that there's almost no incentive to get a real one.

Officials from the Federal Motor Carrier Safety Administration will be on hand to explain why they haven't fully implemented recommendations made nearly seven years ago to keep medically unfit bus and truck drivers off the road.

Statistics show that seizures, heart attacks and other ailments have been factors in thousands of serious truck accidents.

No database or central repository exists allowing state inspectors to verify the legitimacy of a medical certificate.

Innovation

R & D
"Ripoff and Duplicate"

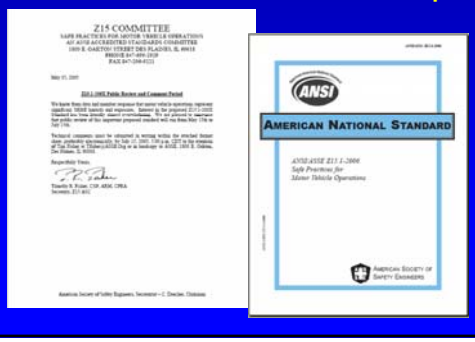
- Avoid reinventing the wheel at all costs
- Where are the best practices that we need to transfer knowledge from

Safety concepts out there now

- Fleet Safety Management
  - Z-15
  - Driver monitoring and feedback
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies - ITS
- Visibility and Conspicuity
- New Safety Standards
- Life Safety Initiatives
- Resources and information

September 2007, Its not magic…..

American National Standard
ANSI/ASSE Z15.1-2006
Safe Practices for Fleet Motor Vehicle Operations



What Z15 encompasses

- Safety Program
- Safety Policy
- Responsibilities and Accountabilities
- Driver Recruitment, Selection and Assessment
- Organizational Safety Rules
- Orientation and Training
- Reporting Rates and Major Incidents to Executives
- Oversight

Z15 Incident Rates

- Incident rate based on number of vehicles operated:
  Incident rate = Number of incidents x 100 / Number of vehicles
- Incident rate based on vehicle mileage:
  Incident rate = Number of incidents x 1,000,000 / Vehicle mileage
- Injury incident rate based on vehicle mileage:
  - Injury incident rates, the most frequently used indicator of incident severity, are useful for tracking events that have the potential to affect financial or operational performance of the operating unit.

  Injury incident rate = Number of incidents with injury x 1,000,000 / Vehicle mileage
- Incident rates based on service activity:
  - Motor vehicle operations that pose injury risks other than those associated with driving should also use the service activity as the basis of a safety performance rate. The number of deliveries, stops, or loads should be considered as appropriate indicators of performance.

  Incidents per 10,000 transports = Number of incidents x 10,000 / Number of transports
- Vehicle injury rates based on work hours:
  Vehicle incidents per 200,000 hours = Number of incidents x 200,000 / Number of hours worked

What about changing driver behavior in the real world??

AN OPTIMAL SOLUTION FOR ENHANCING AMBULANCE SAFETY: IMPLEMENTING A DRIVER PERFORMANCE FEEDBACK AND MONITORING DEVICE IN GROUND EMERGENCY MEDICAL SERVICE VEHICLES

Nadine R. Levick, MD, MPH
Maimonides Medical Center

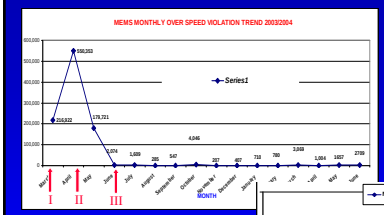
REAL WORLD APPLICATION OF AN AFTERMARKET DRIVER HUMAN FACTORS REAL TIME AUDITORY MONITORING AND FEEDBACK DEVICE: AN EMERGENCY SERVICE PERSPECTIVE

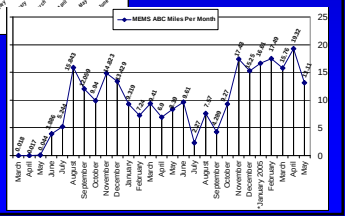
Nadine Levick
Objective Safety LLC
United States of America
Larry Wiersch
Michael E. Nagel
Cetronia Ambulance
United States of America
Paper Number 07-0254

Purpose of 'Feedback box' Program

- Enhance Safety
- Improve Driver Performance
- Save Maintenance Dollars
- Aid Accident / Incident Investigation

Demonstrated Effectiveness





I – blind data, no growls

II – growls & tones ON unidentified data capture

III – identified data

Demonstrated Effectiveness

- Change driver behavior
- Carrot not stick
- Vehicle maintenance improvement
- Decreased administrative burden
- Insurance benefits

Visibility and lighting issues

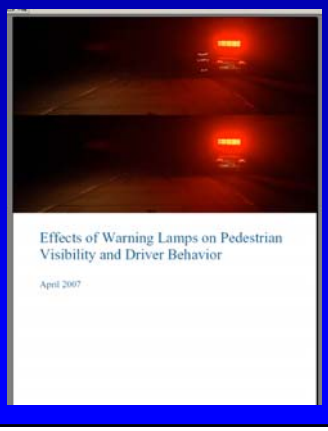
Warning Light Glare

Disability glare

- A bright light source in the visual field reduces the ability to see objects
  - (windscreen, rain & spectacles)

Discomfort glare

- Irritating or painful glare that may cause drivers to avert their gaze
  - (headlights in the mirror or rear-facing red fog-light)



Effects of Warning Lamps on Pedestrian Visibility and Driver Behavior

April 2007

Policy and practice ignorant of existing technical safety data

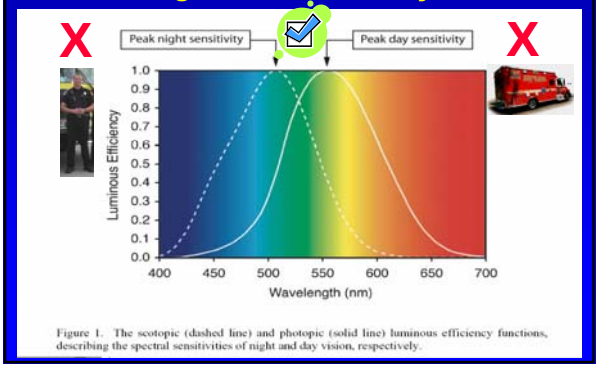


Figure 1. The scotopic (dashed line) and photopic (solid line) luminous efficiency functions, describing the spectral sensitivities of night and day vision, respectively.

" The multicolored (patterned) ambulance while distinctive, may suffer decreased conspicuity because of the effects of camouflage" *De Lorenzo & Eilers Annals EM 1991*

Color-blindness affects 10% of the population

- As seen with normal vision

- As seen with color blind vision

No uniform standards….

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response

- Location
- Size
- Shape
- Speed
- Intended path

from John Killeen at www.ambulancevisibility.com

But whatever color …. If you run a red light someone will be killed

State Strategic Highway Safety Plans

- Required as part of the SAFETEA-LU legislation
  - (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)
- Effective October 1st 2007
- Focus is the 4 'E's
  - Engineering
  - Education
  - Enforcement
  - Emergency Medical Services
- EMS is a core theme

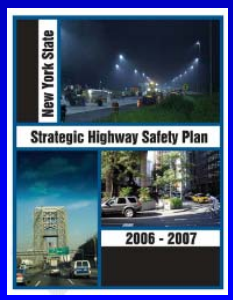
State SHSP EMS Focus*

STATE SHSP	AREA of EMS FOCUS
New York EMS Section 6 of 43 pages	1. Emergency Medical Services Dispatch Services 2. Emergency Medical Services Partnerships 3. Pre-hospital Training Programs 4. Road Condition and Incident Response 5. EMS Responder Crash Prevention
Montana EMS Section 4 of 36 pages	1. Establish EMS Legislation and Regulation 2. Provide EMS Funding 3. Enhance Capabilities for Medical Response to Disaster 4. Expand EMS Human Resources 5. Enhance EMS Education System 6. Expand EMS Services 7. Facilitate EMS Communications 8. Conduct EMS Public Education and Information Programs 9. Conduct Injury Prevention Public Awareness Efforts 10. Enhance Medical Direction 11. Provide Enhanced Trauma System and Facilities 12. Establish an EMS Information System 13. Evaluate and Monitor EMS Programs
Alabama EMS Section 8 of 47 pages	1. Identify and Analyze Performance Data 2. First Responders 3. Identify Crash Location 4. Statewide assessment and Plan 5. Improve EMS Rural Access

*Cordi H, Levick N, Strategic Highway Safety Plans –Where is EMS?, Jan 2008

Integration and Collaboration

EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan



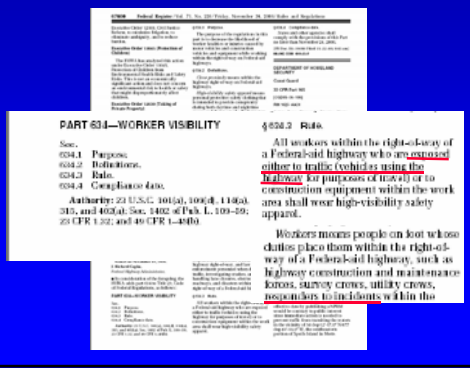
EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- EMERGENCY MEDICAL SERVICES DISPATCH SERVICES
- EMERGENCY MEDICAL SERVICES PARTNERSHIPS
  - Increase the participation and role of Regional EMS Councils in local and regional highway traffic safety boards and/or organizations
- PRE-HOSPITAL TRAINING PROGRAMS
  - Train EMS providers in the use of the new medical protocols; provide funds and/or other support to certified EMS Course Sponsors to train EMS providers in the use of these protocols; and collaborate with Regional EMS Councils and/or Regional Emergency Medical Advisory Committees (REMAC) on the development and implementation of training programs
- ROAD CONDITION AND INCIDENT RESPONSE
  - Provide a placeholder for regional and/or county EMS representatives in municipal DOT emergency management plan development and implementation

EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- EMS RESPONDER CRASH PREVENTION
  - Undertake a systematic review of other state actions and protocols on ambulance traffic safety measures to identify and prioritize those appropriate for the New York State pre-hospital system
  - Increase education and involvement of EMS providers in principles of appropriate traffic safety techniques
  - Develop and implement ambulance traffic safety protocols at state, regional and service level
  - Review treatment modalities and protocols to identify those that may contribute to injuries resulting from the impact of ambulance crashes
  - Identify methods to provide incentives for adoption by EMS services of protocols that enhance traffic safety
  - Partner with organizations that provide public driver awareness and education campaigns to improve driver awareness of driver responsibility and appropriate response to approaching emergency vehicles

Worker visibility Act: Help is on the way !! November 24th 2008



PART 634—WORKER VISIBILITY

Sec.
634.1 Purpose.
634.2 Definitions.
634.3 Rule.
634.4 Compliance date.

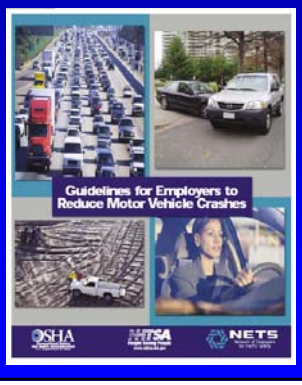
Authority: 23 U.S.C. 101(a), 109(d), 114(a), 315, and 402(a); Sec. 1402 of Pub. L. 109–59; 23 CFR 1.32; and 49 CFR 1.48(b).

§ 634.3 Rule.

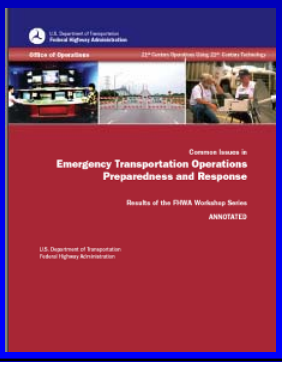
All workers within the right-of-way of a Federal-aid highway who are exposed either to traffic (vehicles using the highway for purposes of travel) or to construction equipment within the work area shall wear high-visibility safety apparel.

Workers means people on foot whose duties place them within the right-of-way of a Federal-aid highway, such as highway construction and maintenance forces, survey crews, utility crews, responders to incidents within the

No need to reinvent the wheel...

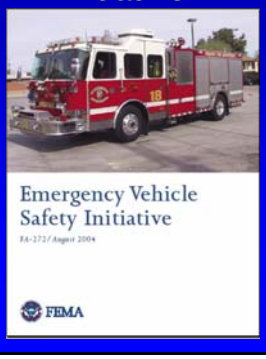


March 2007 - FHWA



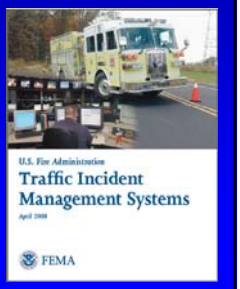
Tips for Emergency Vehicle Operations

USFA Emergency Vehicle Safety Initiative



Traffic Incident Management Systems (TIMS)

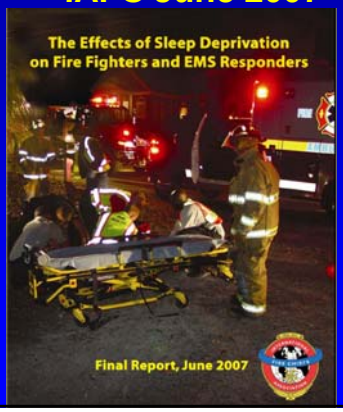
- Just released April 2008
- FEMA, USFA, IFSTA
- Covers setting up safe roadway incident work areas and using unified command at these incidents



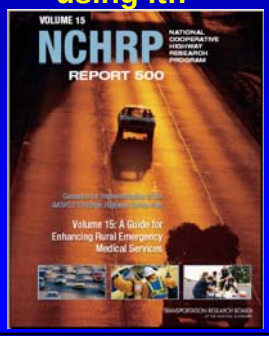
UPS: The 'Big Brown'

- No left turns – instead make three rights
- Don't back up
- Don't employ any drivers under 25 years of age
- Don't employ anyone with a history of driving convictions

IAFC June 2007



Transportation Research Board is an excellent resource… we should be using it!!



The Good News

- TRB
- New multidisciplinary safety initiatives
- ATS - EMS Transport Safety Summit

National Academies
TRB EMS/Medical Transport Safety Subcommittee – Jan 16, 2008

The EMS Safety Foundation
www.EMSSafetyFoundation.org

Discussion

- Existing data point clearly to ground EMS transport as being hazardous
- Exemptions from FMCSA oversight
- Scant data capture by NHTSA
- Lack of attention by NTSB
- No formal oversight, rather voluntary (even anecdote), absent of structured accepted transport systems safety data capture remains

Discussion:

- The mix of volunteer and career providers is raised as an explanation for this situation -
  - however such lack of safety data and standards does not occur for the fire dept which has a similar challenges
- FMCSA data capture system provides extensive data on both numerator and denominator aspects of truck safety –
  - EMS is exempt along with other emergency services, however police and fire have comprehensive alternate data bases to capture this data
- Vehicle, vehicle operations and transportation safety standards do not exist for EMS
  - Standards for vehicle operations, occupant protection and for securing equipment , patient and equipment handling loads do not exist in EMS

Summary

- Transport systems engineering and human factors safety hazards are serious issues in EMS transport injury and fatality
- Both are devoid of acceptable safety standards, and minimally addressed by any meaningful data
- Lack of a national oversight of EMS transport safety data and safety standards, as exists for fire, police and commercial vehicles
- Data driven best practices scarce – yet resources for transportation data capture abound

We need to take a good look at what data we do and don't capture on EMS transport and determine what we should be capturing so that we can measure and monitor the safety of the system and any system enhancements

Thank you!
Any Questions??

a .pdf handout of this presentation awaits you online

www.objectivesafety.net