


Medical Transport Leadership Institute  
Graduate Institute Program  
April 29<sup>th</sup>, 2008

## Ground Operations Safety: Low Hanging Fruit on High Risk Practices



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Research Director, EMS Safety Foundation  
CEO, Objective Safety  
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► To quote Steve "Sid" Caesar –  
Director IHS ES

*"We want everyone to get home  
safely each day"*

A tragic emergency health care intervention  
outcome



**Rollover Crash Kills Medical Technician**

It does happen....

A devastating tragedy...

► An ETT down the wrong hole  
may kill your 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.....

... Nov 8<sup>th</sup>'s Fatality

**Putnam Co. paramedic dies in ambulance  
crash**

Putnam County, N.Y. — A Putnam County paramedic returning from an ambulance call has died after the vehicle went off the road and struck a tree.

Authorities say Matthew Lamb of Carmel was riding in an ambulance when it rolled over on the road on Wednesday night.

Lamb suffered massive head trauma.

State police report investigator Bruce Curran told the Journal News it appeared the ambulance was traveling at a high speed.

Carmel Fire Chief David Johnson says Lamb was taken off life support on Thursday at the Westchester County Medical Center.

The ambulance was driven by the paramedic.

And Nov 10<sup>th</sup>'s 2007 obituary....

**N.Y. EMT killed in ambulance crash laid to rest**

Putnam County, N.Y. — "A tragic death" was the final word placed on the life of Matthew Lamb, a Putnam County paramedic who died in an ambulance crash on Wednesday night.

The news reached from his family and friends and was not a surprise to him. He had been told by his mother, Linda, that he should have made some, but it was a very big surprise to her.

"I had a great career and was very happy and looking forward to the future," Lamb said.

"I had a lot of fun and was very happy," Lamb said.

It was Lamb's last day on the job. He was driving the ambulance when it rolled over on the road on Wednesday night.

Lamb was taken off life support on Thursday at the Westchester County Medical Center.

The ambulance was driven by the paramedic.

<http://www.objectivesafety.net>



Real world answers to real world  
questions -

- What features will enhance safety of my new vehicle purchase?
- What color scheme do I want on my vehicle to make it safest?
- Do I need a helmet, and if so which one?
- What policies offer the safest system?
- How do I get my team to address safety issues?
- What data should I collect when something goes wrong, and how to analyze it?

Outline

- I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS
- II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
- III. Highlight unacceptable mythology and challenges to advancing EMS transport safety
- IV. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

## EMS Transport Safety

- ▶ 'patient safety'
- AND also
- ▶ 'provider' and 'public safety'

## Firstly!

❌

# ▶ An accident ?

▶ or

## ▶ a predictable and preventable event

## In a nutshell

- ▶ Am here to try to save you Lives
- Time and
- Money

## Thursday July 5<sup>th</sup> 2007..... Paramedic Allan Parson's killed

**NEWS CENTER**


**Paramedic Killed in Turner Ambulance Crash**

Two lives were lost Saturday night when an ambulance crashed into a residential home in Turner, about 100 miles northwest of Toledo.

The ambulance driver, Paramedic Allan Parson, 41, was killed. The driver of the car that struck the ambulance, a 2001 Ford Focus, was also killed. The driver of the ambulance was identified as Allan Parson, 41, of Turner. The driver of the car was identified as Robert L. Smith, 41, of Turner. The crash occurred at about 10 p.m. Saturday night.

The ambulance was traveling southbound on State Route 166 when it struck the car. The ambulance was carrying two patients. One patient was killed and the other was taken to the hospital. The ambulance was destroyed.

The crash occurred at the intersection of State Route 166 and County Road 116. The ambulance was traveling southbound on State Route 166 when it struck the car. The ambulance was carrying two patients. One patient was killed and the other was taken to the hospital. The ambulance was destroyed.



“...I'd like to know what can be done so this never happens again...”

**Posted By: user at July 5, 2007 10:58 PM (Subject: Paramedic)**

to all the people worried about how fast the emt was going, would it be fair, although it may never happen again.....

**Posted By: user at July 5, 2007 4:15 PM (Subject: Removal)**

To me, it would be 200 feet if they ran over my family member on their way to someone's front monitor....

**Posted By: user at July 5, 2007 4:26 PM (Subject: Paramedic)**

To a responder: Why can't I see your quest ions? I am in a dead end I want to know if the actions and doubt surrounding this were worth this point (up), and I'd like to know what can be done so that this never happens again.

## 2 weeks later... Friday July 20<sup>th</sup> 2007 The worst ambulance crash in USA history

Five Killed in Crash of Ambulance and Semi

July 21, 2007 08:20 AM EDT

The Highway Patrol says three EMS workers were killed. They were identified as 44-year-old Larry Smith, 37-year-old Herb McDougall and 33-year-old Kelly Pagan. The two patients were also killed. They were identified as 64-year-old Robert Webb, 60-year-old Amanda Webb of Wicksville.

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 road intersection nor have they said if the ambulance's emergency siren and lights were turned on.

The ambulance, with four Ashland 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 116 and County Road 87. The ambulance then burst into flames.

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

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 Shubert 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."



## Charged with Vehicular Homicide

**Param. Top, ambulance driver faces charges in crash - Pennsylvania**

A Penn Township Rescue II ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hempfield that killed a Westmoreland County prison guard.

A Penn Township Rescue II ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hempfield that killed a Westmoreland County prison guard.

Jason Fat, 35, of 8880 Barnes Lake Road, North Huntingdon, was arraigned this week and will face a preliminary hearing at 1:45 p.m. Sept. 27 before Juvenile District Judge Joseph DeMartino. Bond was set at \$25,000 unsecured. Fat also was charged with reckless driving, careless driving and other traffic offenses.

State police at Greensburg said Fat was driving an ambulance west on Route 130 at 5:49 a.m. Oct. 30 when he ran a red light at North Greengate Road and hit a Ford Bronco driven by Frank Scalis, 46, of Murfreesboro, that was heading south.

Scalis, who began working at the prison in 1992, was reportedly on his way there at the time, according to the coroner's report. Scalis was taken by medical helicopter to UPMC Pittsburgh, he died Nov. 3 of blunt-force trauma to the head, according to the Allegheny County Medical Examiner's Office.

Fat was not injured, but the ambulance was heavily damaged. Police indicated the ambulance was returning to its station after transporting a patient and did not have lights or siren activated. Asked about Fat's employment status Friday, a representative of the ambulance association had no comment.

## 2 killed, 3 injured.... September 23, 2007 - PA

**Car, Ambulance Collide in Marshall Township; 2 Dead**

Two people were killed and three others injured in a crash between a car and an ambulance in Marshall Township, Pa., on Sunday.

Police said Douglas Ditt, 36, of Mercer, and Philip Pagan, 31, of Elwynville, were driving a car at about 1:30 a.m. when their vehicle and the ambulance collided.

The medical examiner said both Ditt and Pagan died of head injuries.

Three people riding in a Cranberry Township ambulance were also injured. Their condition and names have not been released.

The three injured victims remain in the hospital.

## 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 Henry Highway and South 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 Pottsville, 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...."?

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EMT/Paramedic | EMT/Paramedic | EMT/Paramedic | EMT/Paramedic



An Adams County ambulance hauling a patient to York Hospital collided with a car at the intersection of routes 50 and 414, in West Manchester, Tuesday at 9:47 AM, resulting in the patient's pronounced dead at the scene.

By Elizabeth Evans  
The York Dispatch (Pennsylvania)  
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An Adams County ambulance hauling a patient to York Hospital collided with a car at the intersection of routes 50 and 414, in West Manchester, Tuesday at 9:47 AM, resulting in the patient's pronounced dead at the scene.

York County Deputy Coroner Charles Stubbler said the patient, a woman, was being transported from Gettysburg Hospital because she was exhibiting 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. Stubbler said the accident was significant because it involved a patient.

## Benefit of Safety

- ▶ Any cost of addressing these issues is dwarfed in contrast to the huge burden of not doing so - in financial costs let alone the personal, societal, ethical and litigation costs

## Unique workplace

- ▶ In vehicles
- ▶ At roadside and other emergency scenes

## 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



## The Emergency Department (ED)



## An ambulance is not an ED /ICU on wheels



## National EMS data

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 35x higher than in Australia

\*NHTSA 2008-9

### Is it your service's tragic year?

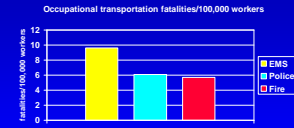
- ▶ ~ 50 fatalities a year
- ▶ 15,000 EMS services
- ▶ Each year one in 300 services experiences a fatality

### Predictable risks

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

<sup>\*</sup>Wells CA, Rosello RD, Kuhn EM. *Prehospital Emergency Care* 2001; 6:6-Sep; 532-261-9  
<sup>\*\*</sup>Harmon C. *Accident Analysis & Prevention* 2002  
<sup>\*\*\*</sup>Maguire, Hunting, Smith, Levick. *Annals of Emergency Medicine* Dec 2002  
<sup>#</sup>Wells CA 2003  
<sup>#</sup>Wells AM, Kibben DF. *Prehospital Emergency Care* 2005; Dec; 9:412-418

### Occupational transportation fatalities..



▶ WE HAVE A BIG PROBLEM HERE

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

### Absence of standards and oversight

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

### 1960 to 2007



### 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

### EMS Transport General Concerns

- ▶ Consequences can be predictable & likely preventable
- ▶ Costs of these adverse events are high in loss of life, financial burden and negative impact on delivery of EMS care
- ▶ Other high speed vehicles (eg. racing cars) have a different safety paradigm
- ▶ Design of interventions to mitigate injury is predicated on a valid testing model
- ▶ Complex both engineering and public health issues

### Clinical Care? Occupational Health and Safety.....?

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

### So for EMS personnel...

- ▶ What's going to kill you?
- ▶ What's going to injure you?



**and what is killing EMS ?**

**EMS personnel fatalities\***

- ▶ 74% transportation related
  - ♦ 1/5 of ground transport fatalities were struck by moving vehicles
- ▶ 11% were cardiovascular
- ▶ 9% were homicide
- ▶ 4% needle sticks, electrocution, drowning and other

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

**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 involved and others
  - retraining and psychological counseling of personnel
  - increased insurance rates

**Safety is Good Business**

**EMS** June 2007

**Crash Costs: Assessing the Hidden Damages of an Ambulance Accident**

**A problem**

2007 Insurance data –

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


**Benefit of Safety**

- ▶ Safe practices save lives, time and money

### This is about you and your safety

- ▶ What safety practices do you use??
  - Seat belts ?
  - EVOC training ?
  - Equipment lock down ?
  - Helmets ?
  - Driver Feedback technology ?
  - Tiered dispatch ?

### Balance of concerns and risk during transport

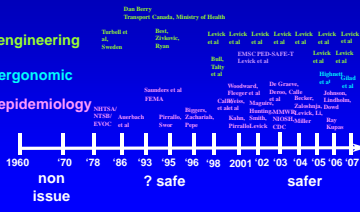


- ▶ Response and transport time
- ▶ Clinical care provision
- ▶ Occupant safety/protection
- ▶ Public Safety

### Goals

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

### Ambulance Safety Research: A New Field



**engineering**

**ergonomic**

**epidemiology**


1960 70 75 80 85 90 2001 02 03 04 05 06 07

non issue ? safe safer

### What do we know now??

- ▶ Intersection crashes are the most lethal
- ▶ There are documented hazards, some which can be avoided
- ▶ Occupant and equipment restraint with standard belts is effective. (Over the shoulder harnesses for patients should be used, with the gurney in the upright position where medically feasible)
- ▶ Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- ▶ Electronic Driver monitoring/feedback systems appear to be highly effective
- ▶ Head protection??

### Increasing awareness ...



### Risk/Hazards

- ▶ Predictable risks
- ▶ Predictable fatal injuries
- ▶ Serious occupational hazard
- ▶ Public safety hazards

### EMS Best Practice, Sept 2006



### Rollover Crash Kills Medical Technician



It does happen....



- ### The Driver
- ▶ Driver selection
  - ▶ Driver monitoring and feedback
  - ▶ Driver Impairment
  - ▶ Driver training

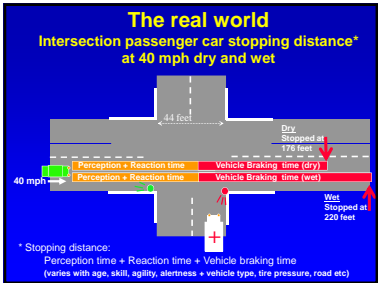
### Driver issues

**The Relationship Between Ambulance Operator and Emergency Medical Technician Age**

**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.

- ### 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.....



### Dynamic vs. Static Safety Testing

- ### Dynamic Safety Testing
- ▶ requires sophisticated, expensive equipment
  - ▶ measurably demonstrates forces generated during collision
  - ▶ accepted international standard for vehicle restraint systems


- ### Intrusion vs Deceleration
- ▶ Intrusion = vehicle to vehicle or vehicle to fixed narrow object
  - ▶ Deceleration = sudden stop – ie. sled test



### USA ambulance purchase specifications

GSA:KKK-A-1822F, Aug 2007

- ▶ Static Pull test
- ▶ 2200 Lbs. (8G's) in Longitudinal and Lateral
- ▶ No dynamic test
- ▶ No definition to manikin mass
- ▶ No restraint for equipment
- ▶ Voluntary



### KKK/AMD – 'safety testing'

- ▶ Ignorant of automotive safety principles – and specifies that a 'successful test' is -
  - No structural damage to any load bearing or supporting members, i.e., torn or broken material, broken welds, popped or sheared body rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

### Unacceptable, and ridiculous current 2007 USA ambulance 'safety testing' practices !!??

**AMBULANCE TEST RECORD BROKEN**

36,000 lbs. 55,000 lbs on ROOF 55,000 lbs on SIDE

THAT WAS THEN THIS IS NOW

In 2000, shattered industry records by testing and certifying the modular body to more than double the 150% curb weight Federal Standard. In addition, they performed a body side test that had never been seen before. Now has broken that record with a 55,000 body test on the top and side of the module. The ambulance body is now certified to a 500% curb weight level. **MORE INFO**

**INDUSTRY LEADING SAFETY INNOVATION**

### No 'a'... then NO 'F' !!!!!

▶ **F = ma**

where F – force  
m – mass  
a – acceleration

Sir Isaac Newton (1642-1727), Philosophiæ Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy), published in 1687. [http://www.kipedia.org/wiki/Newton's\\_laws\\_of\\_motion](http://www.kipedia.org/wiki/Newton's_laws_of_motion)

### Most trucks, SUVs do poorly in whiplash test

NEW YORK (2/16/09) – Two thirds of pickup, van and sport-utility vehicles don't provide adequate protection against whiplash in rear-end collisions, according to tests by the Insurance Institute for Highway Safety (IIHS).

Some 54 models were rated "marginal" or "poor" by the institute in tests that involved measurements of neck and head restraints and, in some cases, simulated rear-end collisions.

Vehicle necks and head restraints are first measured to determine if the headrest, because of its shape and angle, is likely to provide adequate protection.

Some 54 models were rated "marginal" or "poor" by the institute in tests that involved measurements of neck and head restraints and, in some cases, simulated rear-end collisions.

Only 14% of the models tested earned the best possible rating of "good." Twelve models earned an "acceptable" rating, the second-best rating.

"Twenty-one current models – or 24 percent of those tested – earned the best possible rating of "good." Twelve models earned an "acceptable" rating, the second-best rating.

"To stop and go commutable traffic, you're more likely to get in a rear-end collision than any other crash type," says IIHS's David Zicke. "It's not a major field of programming to design seats and head restraints that afford good protection in these common crashes."

Source: [www.iihs.org](http://www.iihs.org)

### Its not magic... what is safe is known and understood



### A few key words about restraint systems...

### NOT new technical data...



Richardson S.A., et al. *Int. J. of Crash*, 4:3, 239 – 259, 1999

Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds

### The Ride of Your Life....



**JEMS**  
Advanced Seating System

1 THERE'S ONLY ONE CHOICE FOR SAFETY. THE ADVANCED SEATING SYSTEM FROM JEMS.

**Being seated IN an automotive seat is what will protect you**

- ▶ Anything that allows or encourages you to get up out of your seat will also encourage you to be injured or killed – it is potentially lethal to be out of your seat in any fashion
- ▶ 4 or 5 point harnesses for sidelifing occupants are potentially lethal – and is in **NO WAY SUPPORTED BY ANY DATA OR AUTOMOTIVE SAFETY EXPERTISE**

**Rash of "Safety Concept" vehicles.....  
Devoid of substantive automotive safety engineering input or testing**



**NO automotive safety engineer  
NO crashworthiness engineer  
NO ergonomist  
NO reference to ANY existing or relevant automotive safety or crashworthiness technical publications.....  
yet multiple occupant fatalities and injuries annually....**



**Yes, the ride of your life....**

- ▶ Sure... these vehicles all parade around the EMS and Fire shows
- BUT...**
- ▶ **NOT ONE** of these vehicles has been to the automotive safety shows or scrutinized by the automotive safety industry

**Innovation**

**Safety concepts out there now**

- ▶ Driver feedback technologies
- ▶ Tiered dispatch
- ▶ Enhanced ambulance vehicle design
- ▶ Intelligent Transport Technologies - ITS
- ▶ New Safety Standards

**The EMS Safety Foundation  
Intro and Logistics Webinars from  
December 11th 2007 & Jan 8th 2008  
EMS Safety Foundation tab at  
[www.objectivesafety.net](http://www.objectivesafety.net)**



**Ambulance Transport Safety  
Task Force (ATS) and the  
National Transportation safety  
Board (NTSB)**

**National Academies Transportation Research  
Board's (TRB)  
And Your New EMS Transport Safety  
Subcommittee**



### TRB EMS Safety Update

- ▶ Brought together NHTSA, FHWA, TRB, National Academies, DOT, CAMTS & EMS
- ▶ 3 presentations
  - TRB and EMS
  - Safety alignment
  - Ground Ambulance Safety Issues and Directions
- ▶ Recorded presentations and handouts available at [www.objectivesafety.net](http://www.objectivesafety.net)
- ▶ Potential for EMS safety research funding
- ▶ Next TRB meeting January 11-15, 2009 – all are welcome

### Ambulance Transportation Safety Task Force January 25<sup>th</sup> 2008



### International approaches

- ▶ The state of the art non-USA vehicles have NO squad bench nor the after market structural vehicle modifications that can potentially decrease crashworthiness integrity that were seen in study vehicles.

### Major events for innovation sharing

– but regional and often language isolation  
<http://www.rettmobil.org/>



### Vehicle Occupant Safety design

2007 European design  
Safety technology is a  
key focus



### Australia, Melbourne

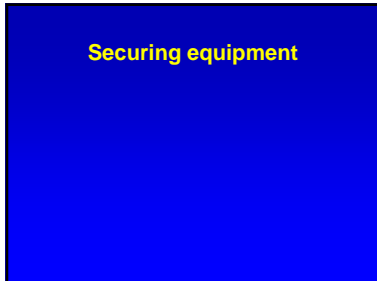


### NSW Australian vehicles



### Norway initiatives





- ### 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



- ### 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



## NAEMT July 2006 Position statement

**NAEMT**  
National Association of Emergency Medical Technicians

**Statement on Safety Restraint Use in Emergency Medical Services**

**Statement**

The National Association of Emergency Medical Technicians (NAEMT) strongly advocates the use of available safety restraint systems in patient care by EMS, the general public, and all participants in an emergency response vehicle.

**Background**

Emergency Medical Services (EMS) throughout the United States have been shown to be a dangerous profession. Although there is no single factor study that has looked at occupational fatalities, EMS consistently ranks in the top ten most dangerous occupations. Each year there are an average of 4000 occupational emergency response fatalities or an average of 100 per year per state.

## Patients must be in the over the shoulder harness, medics restrained in seat belts, equipment secured in seat belts, equipment secured

**Be Secure**  
EVERYBODY BUCKLES UP

## Hmm...



## So why is it...

- ▶ That the EMS providers -
  - ♦ Were wearing navy blue – one of the most difficult colors to see at night
  - ♦ Had no head protection, when all other emergency personnel at the scene did
  - ♦ Had no protective clothing, when other emergency personnel at the scene did???

## 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**

Nathan R. Lovick, MD, MPH  
Mannheim Medical Center

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

Nathan Lovick  
Phonetic Safety LLC  
United States of America  
Larry Winick  
Michael E. Nagel  
Cabrera Automotive  
United States of America  
Paper Number 07-0234

## Purpose of 'Feedback box' Program

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

## You want a system that works!!

- ▶ Does the system really work
- ▶ Is it going to be a major burden on your staff to implement
- ▶ What are the real costs
- ▶ Are you going to have video of your company vehicle on you tube??

## News we don't want to see

Jan 22, 2007 6:29 am UT/ESTern

### Caught On Video: EMT Struck By Car

Fran Young  
Reporting

(081) 660W The car hit 46-year-old Capt. Steven Quindongo so violently it smashed the vehicle's windshield and sent him flying through the air.

Quindongo, a 23-year veteran of the city's emergency medical services, was on the scene of a fire on Riverdale Avenue in the Bronx Sunday afternoon when a stolen car moved past police barricades and caught him from behind. Chief Wayne Rodriguez was on the scene as the damaged health food store where his men had successfully put out the flames.

"We had two firefighter minor injuries," he told us, "and they were taking care of our men and when he (Quindongo) was walking back to the ambulance he was struck by the civilian vehicle."

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

**PART 561 - WORKER VISIBILITY**

§ 561.1 Purpose

§ 561.2 Definitions

§ 561.3 Compliance date

§ 561.4 Construction law

§ 561.5 Rules

§ 561.6 Enforcement

§ 561.7 Penalties

§ 561.8 Construction law

§ 561.9 Construction law

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§ 561.100 Construction law

### There are grants to assist you..

**Federally-Mandated Worker Visibility Regulation Summary**

The Department of Transportation (DOT) has issued a final rule that requires all new commercial motor vehicles (CMVs) to be equipped with reflective safety markings. This rule is part of a broader effort to improve the visibility of CMVs and reduce the risk of accidents. The rule applies to all new CMVs manufactured after September 8, 2006. The rule requires that all new CMVs be equipped with reflective safety markings that meet the requirements of 49 CFR 393.101. The rule also requires that all new CMVs be equipped with reflective safety markings that meet the requirements of 49 CFR 393.102. The rule is effective for all new CMVs manufactured after September 8, 2006.

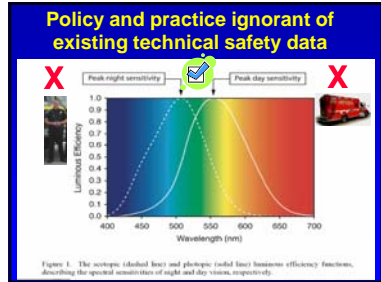



### Science not, next best guess

**UMTRI TRANSPORTATION RESEARCH INSTITUTE**



**Research on Modelling Emergency Vehicle Warning Lighting Systems**

The University of Michigan Transportation Research Institute (UMTRI) is conducting research on modeling emergency vehicle warning lighting systems. The research is part of the Human Factors - Industry Affiliation Program (IAP) and is focused on understanding the factors that influence the effectiveness of emergency vehicle warning lighting systems. The research is being conducted in collaboration with the Michigan State Police and the Michigan State Highway Patrol. The research is being funded by the Michigan State Police and the Michigan State Highway Patrol.

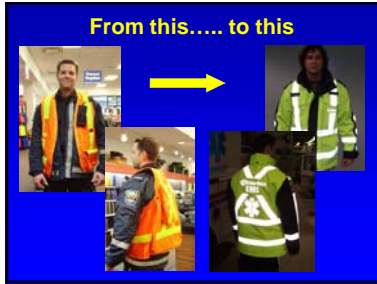



### Under Way... Emergency Vehicle Visibility and Conspicuity Study

- Funded by the USFA, conducted by IFSTA
- Looking at the effectiveness of reflective markings used on emergency vehicles
- Doing best practice research and working with manufacturers


- Having access to that technical knowledge supports changes to improve safety practice



- ▶ Operating in an environment where many aspects of safety are still devoid of safety standards – requires technical knowledge and understanding



**R & D  
"Ripoff and Duplicate"**

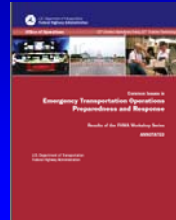
- ▶ Avoid reinventing the wheel at all costs
- ▶ Where are the best practices that we need to transfer knowledge from



## No need to reinvent the wheel...



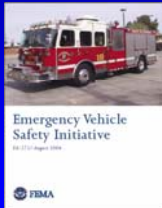
## March 2007 - FHWA



## Tips for Emergency Vehicle Operations



## USFA Emergency Vehicle Safety Initiative



## Coming Soon! Traffic Incident Management Systems (TIMS)

- ▶ USFA report to be released any day
- ▶ Research and writing by IFSTA
- ▶ Covers setting up safe roadway incident work areas and using unified command at these incidents
- ▶ Will be available in a downloadable format



## Safety Management

- ▶ A Safety Culture
- ▶ Protective Policies
- ▶ Protective Devices
  - To prevent a crash
  - In the event of a crash
- ▶ Continuous Education and Evaluation

## So....

- ▶ Which vehicle do you want to be in ?
- ▶ Which vehicle is the best for efficient, and effective patient care?
- ▶ Which vehicle provides optimal risk management ?
- ▶ What is the optimal fleet mix?

## Creating a Safety Culture

within a company must start with upper management's commitment to safety

- ▶ Awareness
- ▶ Training
- ▶ Incentive

## Some simple and available solutions out there now

- ▶ Intersection Policy
- ▶ PPE
- ▶ 'Feedback' boxes

### What do we know works...

- ▶ Vehicle Operations Safety Policies
- ▶ Squad bench lap seat belts
- ▶ Patient over the shoulder harnesses
- ▶ Securing equipment
- ▶ Forward and rear facing seating
- ▶ Some electronic technical devices
- ▶ Safety awareness
- ▶ Cultural change

### What you can do now

- ▶ Have a written and implemented 'safety program'
- ▶ Secure all equipment
- ▶ Secure occupants with standard belts
- ▶ Don't drive through red lights/stop signs
- ▶ Use properly implemented "Feedback Boxes"
- ▶ Monitor crash events with common denominators (ie. per 100,000 miles and per trip)

### Important Principles !

1. A culture of safety
2. Drive cautiously
3. Wear your belts & restrain all occupants
4. Secure all equipment
5. Integrate scientific data into your policies and procedures

- Unrestrained occupants and equipment are a potential injury risk to all occupants

### 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

### small changes can make a BIG DIFFERENCE

- ▶ **PREPARE – TEACH – REACH – RESPOND**
  - ♦ **Look** at your own safety record
  - ♦ **Teach** safety and hazard awareness
  - ♦ **Reach** out with safety information to all your EMS providers
  - ♦ **Respond** with the best safety practices

**PREDICTABLE  
PREVENTABLE  
and  
NO ACCIDENT**

### Conclusion

- ▶ EMS transport has serious hazards and safety issues
- ▶ Major advances in EMS safety research, infrastructure and practice over the past 5 years
- ▶ New technologies for vehicle design, occupant PPE and equipment restraint and driver performance are now available
- ▶ Development of substantive EMS safety standards is a necessity and a reality
- ▶ Failure to transfer knowledge from transportation and automotive safety is unacceptable and dangerous
- ▶ EMS is still way behind the state of the art in vehicle safety and occupant protection

### And....

- ▶ It is no longer acceptable for EMS to be functioning outside of automotive safety and PPE safety standards for prevention of and protection of EMS providers and the public from injury and death

### Thank you! Any Questions??

Electronic handout available online  
<http://www.objectivesafety.net>

