

AMTC 07
Air Medical Transport Conference
Tampa Convention Center
September 17-19, 2007 - Tampa, Florida

GROUND AMBULANCE TRANSPORT SAFETY

So what's new...?



Nadine Levick, MD MPH
CEO, Research Director
EMS Safety Foundation
Objective Safety LLC

A tragic emergency health care intervention outcome



Roller 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.....

Thursday July 5th 2007.....

NEWS CENTER

Paramedic Killed in Turner Ambulance Crash

By Lisa Nixely
July 21, 2007

Turner, a 34-year-old paramedic, was killed when the ambulance he was driving crashed on Monday, July 2, at about 1:30 a.m. in Turner.

The Harrisonburg County Sheriff's Department says the ambulance was traveling south on Route 211 when the crash occurred on West St.

The ambulance driver, 34-year-old Adam Turner, of Turner, was killed in the crash. Turner was driving the ambulance westbound on West St. when it struck a car.

The crash occurred at the intersection of West St. and Turner St. in Turner.

The paramedic who died has been identified as 34-year-old Adam Turner.

A section of Route 211 was closed to traffic for about five hours.

Local police will attempt to help the county. Sheriff's Department will have to report whether there is any more on the scene after the crash. You can contact our Turner St. office at 540-863-2111 or our Turner St. office at 540-863-2111.



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

Posted By nymad at July 5, 2007 4:18 PM (Suggest Removal)

To all the people worried about how fast the emt was going, would it be fast enough if it was your loved one in there.....

| Add your comments

Posted By: tommy at July 5, 2007 4:49 PM (Suggest Removal)

To mad: It would be too fast if they ran over my family member on their way to another's family member...

| Add your comments

Duane By: Concerned at July 5, 2007 4:58 PM (Suggest Removal)

To X responder: Why can't I second guess this? A man is dead and I want to know if the actions and situation surrounding this were worth this sort of loss. And I'd like to know what can be done so that this never happens again.

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

The Highway Patrol says three EMS workers were killed. They were identified as 34-year-old Sammy Smith, 31-year-old medics McDougall and 35-year-old EMT Egan. The two patients were also killed. They were identified as 64-year-old Robert West and 60-year-old Arnette West 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.

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 376 and County Road 87. The ambulance then burst into flames.

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

Lisa Nixely
July 21, 2007

By LISA NIXELY
lisa@harrisonburg.com

ANTWERP — They were known with the aid of their siren.

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 Shuhert of the Payson 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."



<http://www.objectivesafety.net>



Outline

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

Emergency Medical Service Ground Transport

- ▶ What are the transport safety issues that pertain to this important public service and public safety industry?
- ▶ What do we know of the risks and hazards and how can we measure these ?
- ▶ How can the safety of this transport system be optimized?

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

1960 to 2007



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

Is there an acceptable rate of morbidity and mortality for pre-hospital transport systems??

Firstly!

▶ **An accident ?**

- ▶ or a predictable and preventable event

EMS Transport Safety

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

This is not acceptable

In the USA*

- ▶ ~ 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 2004

USA TODAY SPECIAL SECTION USA TODAY CAREERS NETWORK

Win a 5-day, 4-night trip to Phoenix International Raceway!

Nation

By Robert Davis, USA TODAY

Federal officials say there is no pattern that triggers any alarms.

"There is not a lot of data out there," says Jeffrey Runge, a former street medic and emergency room doctor now heading the National Highway Traffic Safety Administration. His agency collects data on fatal accidents and sets response guidelines. "It tells me there is not a huge safety problem."

Many in the industry disagree. "This is a very, very big problem," Leonard says.



What's new

- ▶ New expertise and collaborations
- ▶ New automotive and transportation safety technologies
- ▶ New Information
- ▶ New events

New expertise and collaborations

- ▶ TRB
- ▶ ASSE
- ▶ OSHA
- ▶ SAE
- ▶ UTRC
- ▶ Ergonomics
- ▶ Industrial Design

New Information

- ▶ Enhanced Safety of Vehicles (ESV), June 2007
- ▶ American Society Safety Engineers (ASSE), June 2006 & June 2007
- ▶ International Ergonomists Association (IEA), June 2006
- ▶ AMD Engineering Public Comments, July 2007
- ▶ KKK-F, August 2007
- ▶ OSHA September 11, 2007 Federal Register
- ▶ SAFETEA-LU, 2006
 - (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)
- ▶ State Strategic Highway Safety Plans, October 2007
- ▶ State EMS Council Policies
- ▶ APHA, Nov 2007
- ▶ OSHA best practices
- ▶ Worker visibility Act, to be implemented, Nov 2008

And what's really not new...

▶ "Ambulance transport has a death toll...."

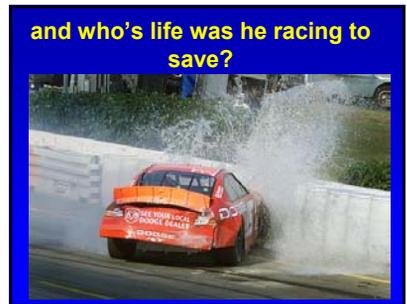
*Carl Craigie EMT-P, Chief Platte Valley Ambulance
Colorado Springs, April 2007*



2007 Nascar Safety Expert

▶ On ambulance patient compartment
"It is a death vault"

*Tom Gideon,
Head of Safety, GM Nascar*



NASCAR, Car of tomorrow ready to go USA Today – March 23rd, 2007



What happened??

- ▶ Why is it that Emergency Medical Services have developed outside the umbrella of transportation safety infrastructure??

Absence of ground standards and oversight

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

Air and Ground EMS

- ▶ Major differences in safety culture and approach
- ▶ Dichotomy of Safety Standards
- ▶ Diverse safety oversight
- ▶ Absent ground safety regulatory control

Air EMS is a role model for safety initiatives and focus



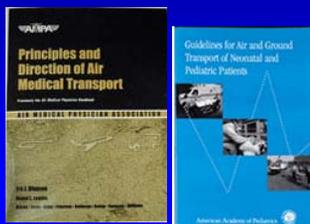
An Aviation Safety Plan



Air Safety Approach

- ▶ Safety Program Planning
- ▶ Evaluating
- ▶ Analysis of Safety Performance
- ▶ Analysis of Safety Information and Data
- ▶ Analysis of Risk Profiles and Plans

Ground Transport Safety ?



Internationally there are standards for ground safety performance



Common European Community (CEN) EN 1789:1999/A1:2003,

European Committee for Standardization
Medical vehicles and their equipment - Road Ambulances

▶ "Without exception, all persons, medical devices, equipment, and objects normally carried on the road ambulance shall be maintained to prevent them from becoming a projectile when subject to a force..."



- ▶ 50th percentile manikins - 10 G in Forward, Rearward, Transverse, & Vertical directions
- ▶ Certified by Notified Body and Ambulance Mfg.

Key Elements to Safety

- ▶ Data Capture
- ▶ Vehicle Biomechanics and Crashworthiness
- ▶ Ergonomics and Biohazards
- ▶ Transportation Environment
- ▶ Safety Management – evaluation and analysis

the EMS transport process

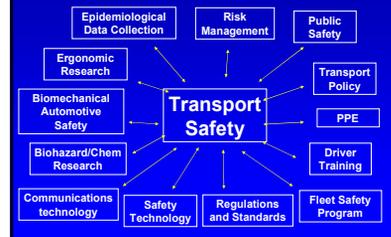
- ▶ communications/dispatch
- ▶ the patient
- ▶ restraining device/seat
- ▶ transporting device/gurney
- ▶ paramedics/transport nurses, doctors & family
- ▶ patient monitoring equipment
- ▶ clinical care & interventions
- ▶ protective equipment
- ▶ the vehicle
- ▶ the driver/driving skill
- ▶ other road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



An ambulance is not an ED /ICU on wheels



Ground Transport Safety IS Complex AND Multidisciplinary



And keep focus on 'All hazards' in addition to crashworthiness

- ▶ Driver age?
- ▶ Driving history?
- ▶ Driver impairment?
- ▶ Patient condition?
- ▶ Dispatch?
- ▶ Vehicle stability?
- ▶ Driver feedback technologies?



Occupational Health and Safety.....?

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

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



Safety Management

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

Risk/Hazards

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

Creating a Safety Culture

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

- ▶ Awareness
- ▶ Training
- ▶ Incentive

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

"Ripoff and Duplicate"

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

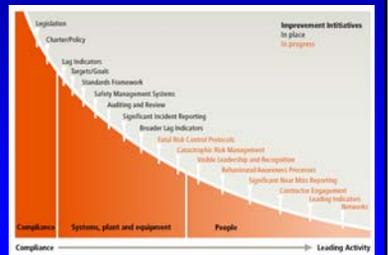
EMS Best Practice, Sept 2006



BHP - Key learnings for the organization were:

- ▶ Fatalities often have similar underlying causes
- ▶ High near miss reporting often correlates with declining injuries or fatalities
- ▶ Leadership visibility in the field is vital
- ▶ Hazard identification and risk awareness are fundamental to success.

Safety Improvement Roadmap



September 2007, Its not magic.....

improving FLEET safety

Transportation Symposium
September 10-13, 2007 - Atlanta, Georgia

IMPROVING FLEET SAFETY - AN ASSE SYMPOSIUM
Hosted at the ASSE Convention Center - 33 Geneva Parkway NE - Atlanta, GA 30328

• A 3-day event for trucking professionals

The symposium will offer trucking professionals an opportunity to participate in sessions and panel discussions on the challenges facing the transportation industry and how best practices and innovations can be implemented to meet their own programs, organizations and industry's needs.

Learn From Leaders in the Transportation Industry
Meet and hear from leaders in transportation safety, operational and management issues, as well as from the field and in program and policy-making. Hear from the industry's leading experts on transportation safety and what are the most effective ways to improve it.

The Improving Fleet Safety Symposium will offer trucking professionals an opportunity to participate in sessions and panel discussions on the challenges facing the transportation industry and how best practices and innovations can be implemented to meet their own programs, organizations and industry's needs. The 3-day event is scheduled at the ASSE Convention Center in Atlanta, Georgia.

Topics:
 • Vehicle Identification
 • Safety Information
 • Regulatory Issues
 • Best Practices

Valuable information from the transportation industry

TransActions

September 2007 Issue 1

September 2007 Issue 2

These folks know what we need to know...

Large Truck/Tractor Safety Council

Home | About Us | Contact Us | News | Publications | Training | Research | Policy | Advocacy | Safety | Security | International | Member Information | Registration | Site Map

Large Truck/Tractor Safety Council
1800 14th Street, N.E.
Washington, D.C. 20002
Phone: 202-462-1000
Fax: 202-462-1001
Email: info@ltscc.org

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

**Volume 15
NCHRP
REPORT 500**

Volume 15: A Guide to Enhancing Roadway Medical Care

The truck and bus industry is on the right track at the TRB

Commercial Truck and Bus Safety

Synthesis 1

Effective Commercial Truck and Bus Safety Management Technologies

A Synthesis of Research

The National Academies Press

Knowledge transfer

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Active Projects, July 2007

- ▶ Commercial Motor Vehicle Driver Training Curricula and Delivery Methods and Their Effectiveness
- ▶ Commercial Motor Vehicle Carrier Safety Management Certification
- ▶ The Role of Safety Culture in Preventing Commercial Vehicle Crashes
- ▶ The Impact of Behavior-Based Safety Techniques on Commercial Motor Vehicle Drivers
- ▶ Health and Wellness Programs for Commercial Motor Vehicle Drivers

July 2007

Commercial Truck and Bus Safety

Health and Wellness Programs for Commercial Drivers

Commercial Truck and Bus Safety

The Role of Safety Culture in Preventing Commercial Vehicle Crashes

Report of Multiple Event Safety Response on Commercial Motor Vehicle Drivers

Commercial Truck and Bus Safety

Effective Commercial Truck and Bus Safety Management Technologies

Commercial Truck and Bus Safety

August 2007

NCHRP

SYNTHESIS 207

Technologies for Improving Safety Data

A Synthesis of Highway Practice

The National Academies Press

An excellent model

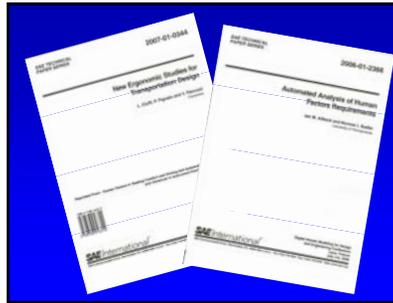
EVERYONE GOES HOME
SAFER COMMUNITIES. SAFER HOMES.

16 Firefighter Life Safety Initiatives

1. Define and assess the need for a culture change when it comes to safety, accountability, management, supervision, accountability and personal responsibility.
2. Conduct the personal and organizational accountability for health and safety throughout the fire service.
3. Place greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.
4. All firefighters should be empowered to stop unsafe practices.
5. Training and equipment national standards for training, qualifications, and certification including regular recertification that are equally applicable to all firefighters based on the ability that are essential to survival.
6. Develop and implement national health and physical fitness standards that are equally applicable to all firefighters based on the ability that are essential to survival.

<http://www.EveryoneGoesHome.com>

National Academies- TRB EMS Safety Subcommittee



Major crash investigation NTSB has expertise to do this comprehensively



Who has read this information??..

ATRI American Transportation Research Institute

Home | Search | State Data

ATRI Research Results

ATRI's research results are organized according to the focus area addressed, and are available in PDF format or, in some cases, a brochure may be requested through an online request form.

- Current Research
 - Safety and Human Factors
 - Technology and Innovation
 - Transportation Security
 - Environmental Factors
 - Economic Analysis
- Research Results
 - Safety and Human Factors
 - Technology and Innovation
 - Transportation Security
 - Environmental Factors
 - Economic Analysis
- Research Approach

Hours of service? Not new in other realms of ground transport...

Research Results

Safety and Health Impacts of the New Hours-of-Service Rules

The Problem

First instituted in 1939, the original commercial driver hours-of-service (HOS) rules combined for nearly six years with few revisions. Recently, the body of research on sleep patterns, driver fatigue, and safety analysis led to a major HOS program overhaul. The Federal Motor

rules. The study was designed to examine the perceptions of those most directly affected by the new rules and whether the changes were accompanied by improved health and safety outcomes. The study contained 2003 information until 2004 to provide a

July 2007 Report

ANALYSIS BRIEF

National Motor Carrier Safety Administration

FACTORS UNDERLYING THE ADOPTION OF NEW SAFETY TECHNOLOGIES BY U.S. COMMERCIAL MOTOR CARRIERS

Summary

New safety technologies for commercial motor vehicles have shown increased awareness among carriers, shippers, insurers, and government as some of the potential benefits of the technologies, in order to identify factors contributing to the adoption of new safety technologies, this survey explored the relationship between motor carrier organizational factors and rates of safety technology adoption. The results of this survey

.....May 21st, 2007, Seattle

KOMOTV.COM

EMT seriously injured in crash on I-5

SEATTLE - An emergency medical technician was seriously injured early Sunday morning when he was struck by a pickup truck on Interstate 5.

The State Patrol says it was around 7:45 a.m. when a 1998 Nissan ambulance drove a line on I-5 South near Boeing Field. Evan Marston, who was driving the ambulance, pulled over to the right shoulder and got out to get his keys.

A speeding truck came along and crashed into Marston, then smashed onto the ambulance. This caused the ambulance to flip several times, nearly

.....May 25th 2007?

Original Message

Subject: Feasibility for an EMS Workforce Safety and Health Surveillance System. Information from NHTSA's Office of EMS.

Date: Fri, 25 May 2007 16:42:14 GMT

From: Dave.Dexter@hhs.gov

Dave Dexter, Director

The National Highway Traffic Safety Administration (NHTSA)'s Office of Research, Evaluation, and Statistics (OERS) is pleased to announce publication of a report titled "Feasibility for an EMS Workforce Safety and Health Surveillance System." This is the final report of a study funded by NHTSA's Office of Evaluation and Research (OER) and conducted by the Transportation Safety Institute and National EMS Institute. This report examines the study and possible solutions to enhancing national epidemiologic surveillance of EMS worker injuries and illnesses.

This feasibility study serves as a valuable supplement to ongoing national EMS workforce research. NHTSA continues to explore ways of helping all Federal EMS workers, NHTSA, and the State, Territorial and Tribal Administrations (STTA) EMS for Children (EMSC) program are evaluated with the national EMS workforce to the EMS Workforce for the 21st Century program, managed by the University of California San Francisco (UCSF).

Feasibility for an EMS Workforce Safety and Health Surveillance System

Help is on the way ??? November 24th 2008



The 'workplace' IS a vehicle

- ▶ EMT's often in vulnerable positions during transport.
- Bench seat
- Captains chair
- Standing or kneeling



The 'workplace' is also a crash scene



C45 - A criminal offence to not act in a way that protects the worker

Department of Justice Canada

Ministry of Justice

Canada

THE DEPARTMENT

How does an organization become a party to a crime of negligence?

In offences based on negligence, the court must determine whether an individual acted in conformity or with such negligence for the safety of others as to deserve criminal punishment.

Programs

Business and Industry

Corporate Publications

A-Z Index

Business and Industry

For Trade

Business and Industry

Search Canada's criminal justice and regulatory information

With respect to the physical element of the crime, Bill C-45, paragraph 22.1 of the Criminal Code provides that an organization is responsible for the negligent acts or omissions of its representative. The Bill provides that the conduct of two or more representatives can be combined to constitute the offence. It is not therefore necessary that a single representative commit the offence.

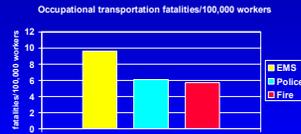
<http://canada.justice.gc.ca/en/dept/pub/c45/section03.html>

EMS Provider Fatalities

- ▶ 12.7 fatalities/100,000 EMS workers
- ▶ Greater than 2 X the national average (5.0 fatalities/100,000)
- ▶ Similar to Police (14.2/100,000) and Fire Fighters (16.5/100,000)

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

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

A problem

2007 Insurance data –

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

Is it your services tragic year?

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

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

EMS RESOURCES

June 2007

Crash Costs: Assessing the Hidden Consequences of an Ambulance Accident

EMS: A Hidden Crisis of Prevention

Driver issues



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.

The Driver

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

Some challenges

- ▶ No accepted national safety standards for -
 - EMS fleet management or safety practice
 - Ambulance vehicle rear compartment design and performance
 - Provider occupational injury protective equipment
- ▶ Yet convincing data for injury risk and hazard
- ▶ No data base of ambulance crash events
- ▶ Need for patient, provider and public safety focus

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

What about Federal Motor Carrier Safety Administration

- ▶ Mission -
 - To reduce the number and severity of commercial motor vehicle (CMV) crashes and enhance the efficiency of CMV operations

A very serious gap in data, performance and oversight

- ▶ FMCSA Truck safety goals -
 - to decrease the fatality rate of 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008
- ▶ EMS crash fatality rate estimates are -
 - 7.66 - 41.93 fatalities per 100 million ambulance-miles

So UPS and laundry trucks have mandatory FMCSA data.....

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 15,000 pounds and operates on highways	OR	Any motor vehicle with seating to transport more than 10 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 transported away from the scene by a tow truck or other vehicle
Crashes involving commercial motor vehicles and state 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 in a hazardous for the transportation of goods, property, or people in interstate or intrastate commerce.		
INCLUDED:		EXCLUDED:
Trucks and some categories of commercial and passenger		Trucks and some categories of non-commercial passenger

Transport related aspects of EMS

- ▶ dispatch of EMS vehicles
- ▶ transport policies and protocols
- ▶ vehicle fleets and vehicle design
- ▶ vehicle purchase standards
- ▶ Intelligent Transportation Systems technology
- ▶ driver training
- ▶ training simulation
- ▶ driver performance monitoring
- ▶ roadside and road design
- ▶ integrated traffic safety technologies
- ▶ scene safety and visibility
- ▶ safety data capture
- ▶ safety oversight

The National Transportation Safety Board (NTSB)

NTSB

History and Mission

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in the other modes of transportation - railroad, highway, marine and pipeline - and issuing safety recommendations aimed at preventing future accidents. The Safety Board determines the probable cause of:

- all U.S. civil aviation accidents and certain public-use aircraft accidents;
- selected highway accidents;
- railroad accidents involving passenger trains or any train accident that results in at least one fatality or major property damage;
- major marine accidents and any marine accident involving a public and a navigable vessel;
- pipeline accidents involving a fatality or substantial property damage.

Selected transportation accidents that involve jurisdiction of a reviewing nation

The Board issues its authority from Title 49 of the United States Code, Chapter 1. The rules of the Board are located in Chapter 1001, Title 49 of the Code of Federal Regulations.

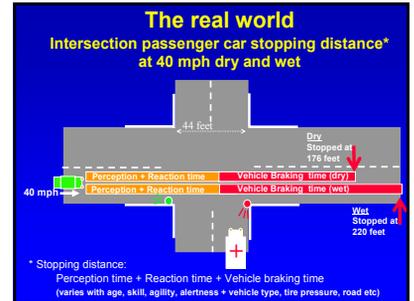
The NTSB is responsible for examining the government's database of civil aviation accidents and also conducts special studies of transportation safety issues of national significance. The NTSB provides investigations to serve as U.S. Accident Representatives in

What happened??

- ▶ Why is it that Emergency Medical Services have developed outside the umbrella of transportation safety infrastructure??

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.....



A peer reviewed tragedy

- ▶ Persistent disconnect between automotive safety science and EMS transport safety approach
- ▶ Pre-hospital and Emergency Care 2004
 - ♦ "EMS vehicle drivers are advised to approach the intersection, slowing to ensure that traffic has stopped and making eye contact with other drivers before entering the intersection."
- ▶ In the modern era of road safety to suggest that a strategy of "eye contact" to be made at an intersection with a driver traveling at ~ 40mph in the hope that this would result in a safety intervention, is at best frightening

A few months ago....

2 dead in Michigan ambulance crash

The Associated Press

SKANDIA TOWNSHIP, Mich. — An ambulance carrying two people died in a rollover crash on a snowy road here, state police say.

The truck was stopped at a red light when it was struck from behind by a car. The ambulance rolled over and caught fire.

Investigators found no evidence of driver error.

Ambulance patient Carrie Cornell, 31, died at the scene. Another patient, Ryan Peterson, 31, died at a hospital.

This is about you and your safety

- ▶ What safety practices do you use??
 - ♦ Seat belts ?
 - ♦ EVOC training ?
 - ♦ Equipment lock down ?
 - ♦ Helmets ?
 - ♦ "Black Box" technology ?
 - ♦ Tiered dispatch ?

How you don't wish to see your partner transported...

Ambulance Collision Victim 12/18

Two people killed in an ambulance-involved collision Monday night have been identified as two men from Colmar, Pa., the Coroner's Office said Tuesday.

The two men were reportedly riding in a car on Route 66 in Colmar that stopped around 10 minutes before the collision with an ambulance responding.

Investigators reported the car, an unlicensed 1998 Ford Escort, was traveling on Route 66 eastbound.

The 30-year-old driver and the 30-year-old passenger were also injured.

State Dept. month of investigation closed for month of April. Cause investigated and reported out.

Guidelines – standards

- ▶ Transport safety
- ▶ Practice protocols
- ▶ Occupational Health and Safety

U.S. Department of Labor
Occupational Safety & Health Administration
www.osha.gov

Motor Vehicle Safety

According to the Bureau of Labor Statistics (BLS), more than 2,000 deaths a year result from occupational motor vehicle accidents. That number is more than 30 percent of the annual number of fatalities from occupational injuries. These deaths include driver and passenger deaths in highway crashes, farm equipment accidents, and industrial vehicle incidents, as well as pedestrian fatalities.

The following questions link to information relevant to motor vehicle safety:

- What standards apply? (Click 1 Other Federal)
- What information is available for the construction industry? (Click Standards | Materials and Methods | Additional Information)
- Where do motor vehicle accidents occur and what are possible solutions? (Click Recognition | Possible Solutions)
- What can be done in the workplace to promote vehicle safety? (Click | Fleet Management | Safety Programs | Driver Performance | More)
- What additional information is available? (Click Safety and Health Topics Page | Case Studies | Other Resources)

USA Ambulances: FMVSS Exempt

Department of Transportation
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589
(Docket No. 92-26; Notice 7)
[EIN No. 2127-AM05]

Federal Motor Vehicle Safety Standards
New Import Protection

10.1 Existing manufacturers of other September 1, 2000 and/or September 1, 2002. Except as provided in 10.3, the vehicles manufactured on or after September 1, 2000 and/or September 1, 2002, manufactured by the manufacturer (hereinafter referred to as "the manufacturer") shall comply with the requirements of 571, 572, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

Propaganda that kills....

AMBULANCE MANUFACTURERS DIVISION OF
The National Truck Equipment Association
Page 1 of 4

AMD Position Statement on Ambulance Safety and Occupant Protection

The purpose of this paper is to provide for review of the Department of the Ambulance Manufacturers Division (AMD) of the National Truck Equipment Association.

Ambulances must comply with some of the strictest safety and performance standards applicable to vehicles in the United States. All motor vehicles operated on public roads and highways must conform to Federal Motor Vehicle Safety Standards (FMVSS) contained in Title 49 of the Code of Federal Regulations Part 571. **Ambulances are no exception.** FMVSS are the most visible and vigorously enforced safety standards governing the design, engineering and production of such vehicles. Nearly all government purchased ambulances, and the overwhelming majority of those sold to the public, also must be certified to the safety requirements of the Federal Star of Life Specification for Ambulances, KKK-A-1822F promulgated by the federal government. These requirements are in addition to FMVSS.

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 – static 'safety testing'

- ▶ Ignorant of automotive safety principles – and specifics -
 - 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

Bottom line

- ▶ The AMD should consider revising the standard comprehensively to reflect current accepted automotive safety practice, given the current vehicle crashworthiness and occupant protection knowledge and published literature.

Occupant protection.....?? July 2007

Medic Survivors Medic Fatality



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

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

(1993) May 27, 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 vinyl floor 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 was no standard or specification which governs that the total design and construction of ambulances or modified by the manufacturer. Available are no specific structural strength and stability to withstand inert forces similar to requirements imposed on the original vehicle manufacturer. FMVSS 205 "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 components including, but not limited to, interior occupant protection and the addition of items such as litter, benches, cabinets, oxygen bottles, or flooring. The only guidance concerning these safety

But what about head protection?



Role of a head protective device

- ▶ A simple, immediate and inexpensive adjunct – a protective device -
 - To protect occupants from hazardous interiors
 - As vehicle crashworthiness design advances
 - As driver training advances
 - For when equipment becomes unsecured
 - As EMS Safety Standards are developed, for both EMS vehicles and EMS occupational safety

Problems

- ▶ No Standards
- ▶ Unique safety and hazard protection needs
- ▶ A number of less than appropriate devices out there

New EMS helmet prototypes for 2007



JEMS.com
[HOME](#) [ABOUT](#) [NEWS](#) [PRODUCTS](#) [RESOURCES](#) [TRAINING](#) [MEMBERSHIP](#)
 Product: _____
 News Report
 Page Last Updated: Tuesday, May 16, 17:20 PST
[Print Report](#) | [Email Report to a Friend](#)
Colorado ambulance safety thrust in spotlight
 A pair of ambulance crashes in little more than a week have left three people dead in Colorado. State health officials plan to make ambulance safety a key issue in the coming weeks. JEMS is highlighting a series of news stories about the incidents and an article from the November 2003 issue of JEMS that details a common-sense approach to staying safe while riding in an ambulance.
 - California

With many aspects in addition to crashworthiness

- ▶ Human factors and ITS
- ▶ Crash avoidance technologies
- ▶ Predictors of crash risk
- ▶ Policy

The Crash Event - Crash Testing

- ▶ An introduction
- ▶ What one needs to know
- ▶ What do the tests really mean
- ▶ And, what tests are meaningful

Intrusion vs Deceleration

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

Dynamic Safety Testing

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

If we know this – and its published....



Why do we do this?



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



PPE from the stationary environment can be highly hazardous in the automotive setting



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 sidefacing occupants are potentially lethal – and is in **NO WAY SUPPORTED BY ANY DATA OR AUTOMOTIVE SAFETY EXPERTISE**

Vehicle design and safety

- ▶ The principles of automotive safety involve a complex science, engineering technical skill, expertise, training and knowledge
- ▶ “Give the engineers a working list of our needs and let them tell us how it should be built to accomplish those tasks.....”

John Russell MD, Advisory Panel, EMS Safety Foundation, 2007

Rash of “Safety Concept” vehicles.....

Devoid of substantive automotive safety engineering input or testing





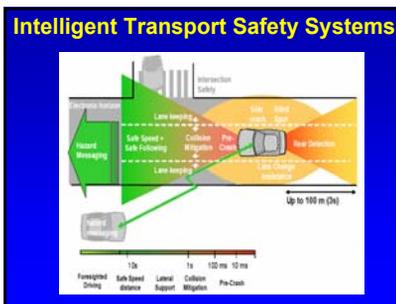
NO automotive safety engineer
NO crashworthiness engineer
NO ergonomist
NO reference to ANY existing or relevant automotive safety or crashworthiness technical publications....
yet multiple occupant fatalities and injuries annually....

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?

Innovation

Tiered Dispatch



Back up Camera..... Shouldn't all vehicles have one of these?

VRBCS300 - Backup Camera

Backup Camera

- Compatible with all accessories. Nothing else to buy!
- 120° Horizontal Camera Viewing Angle
- 80° Vertical Camera Viewing Angle
- Monitor Mounts on Dash or Visor
- For Use With 12 Volt DC-Electrical Systems
- Great for Cars, SUVs, RVs and Delivery Vehicles!
- Helps Avoid Accidents & Injuries!

English product manual
 FAQs - English

NAEMT July 2006 Position statement

National Association of Emergency Medical Technicians Statement on Safety Restraint Use in Emergency Medical Services

Statement

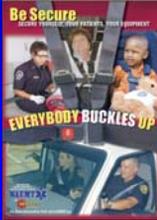
The National Association of Emergency Medical Technicians (NAEMT) strongly condemns the use of seatbelts while resident patients to prevent injury to EMS, if necessary, patients, and all occupants of the emergency response vehicle.

Background

The NAEMT strongly advocates the creation of a National EMS Seat Belt Law which can be used to educate all patients to the proper use of seatbelts in all EMS vehicles.

The NAEMT strongly advocates the development of guidelines and standards to determine appropriate restraint and protection systems for the EMS provider, patient and passengers of all emergency response vehicles.

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



Use proven safety tools



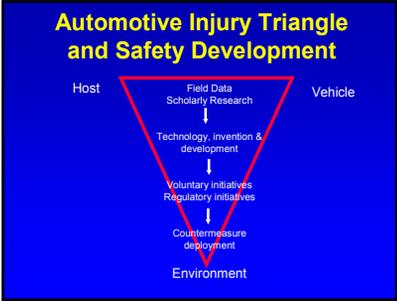
Safety leadership... from the IAFIC and USFA



IAFIC NEWS ALERT FOR IMMEDIATE RELEASE
 Contact: IAFIC Communications Department
 International Association of Fire Chiefs
 703/279-0911
 www.iafic.org

The IAFIC and the USFA Develop Model Policy and Procedures Guide for Emergency Vehicle Safety

Fairfax, Va., October 30, 2006. — The International Association of Fire Chiefs (IAFIC) and the Department of Homeland Security's United States Fire Administration (USFA) announce the release of a Guide to Model Policies and Procedures for Emergency Vehicle Safety. This innovative, web-based educational program is aimed at reducing the impact of vehicle related incidents on the fire service and the communities they protect. The guide provides in-depth information for developing policies and procedures required to support the safe and effective operation of all fire and emergency vehicles, as well as privately-owned vehicles, which are the leading cause of volunteer firefighter on-duty fatalities responding and returning to emergencies.



- ### Protective devices/concepts
- To prevent a crash**
- ▶ Driver feedback
 - ▶ Driver monitoring
 - ▶ Driver training
 - ▶ Vehicle Intelligent Transportation System (ITS) technologies
 - ▶ Tiered dispatch
 - ▶ Appropriate policies
- In the event of a crash**
- ▶ Vehicle crashworthiness
 - ▶ Seat/seat belt systems
 - ▶ Equipment lock downs
 - ▶ Padding
 - ▶ Head protection

The "Black Box"

Driver behavior monitoring and feedback device

EMC Education - Article

How to modify the risk-taking behaviour of emergency medical services drivers?

How to modify the risk-taking behaviour of emergency medical services drivers?

Dr. Norman KJ Street, KJ, Galla, ON, Vaughan, ON, August 1995

It is a common misconception that emergency vehicles are immune from the consequences of poor driving. In fact, emergency vehicles are involved in a significant number of accidents each year. While an aggressive style of driving is sometimes necessary, we are convinced that a "Black Box" is a good idea to modify the risk-taking behaviour of emergency medical services drivers.

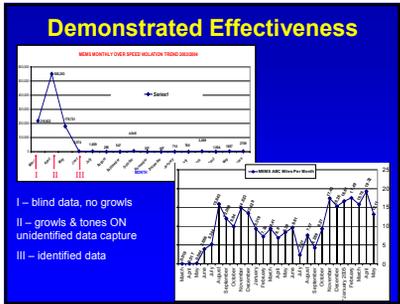
Dr. J. J. Street, KJ, Galla, ON, Vaughan, ON, August 1995

Consequently, training emergency medical services vehicles has an increased educational. We must on time studies designed to modify the risk-taking behaviour of emergency medical services drivers.

The "Black Box" - A transportation safety monitoring and feedback device

This technology is conceptually like a vehicle safety 'pulse oximeter' - that with auditory feedback - can save your life, your coworkers life, your patients life, and others on the road

- ### Purpose of 'Black box' Program
- ▶ Enhance Safety
 - ▶ Improve Driver Performance
 - ▶ Save Maintenance Dollars
 - ▶ Aid Accident / Incident Investigation



A key to safe ambulance transport



Other monitoring devices

- ▶ Primarily to record events during and immediately preceding a crash
- ▶ Give no driver crash prevention feedback
- ▶ Administratively burdensome
- ▶ Intrusive
- ▶ Not demonstrated to be as effective in improving vehicle maintenance costs or as effective in modifying driver behavior long term

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???

It isn't like this outside of the USA



Safety at the scene



The difference having data makes?



Strategic Highway Safety Plan

 Saving Lives. Moving America Forward.

Elements of the Safety Plan

Goal 20: Enhancing Emergency Medical Capabilities to Increase Survivability

 The number deaths following the occurrence of a traffic incident are often related to the time it takes to get emergency services to the scene. Both the timeliness and the quality of services at the scene are critical factors in the likelihood of survival. The goal of this plan is to improve the timeliness and quality of emergency services to the scene of a crash.

Recommended Strategies:

- Strategy 20.1: Develop and implement a public transportation approach that will ensure appropriate services are available to the emergency scene of a crash.
- Strategy 20.2: Develop and implement a plan to improve education and awareness of EMS agencies in the availability of public safety.
- Strategy 20.3: Develop and implement an emergency services database that will track emergency services and provide a means to analyze and improve services.
- Strategy 20.4: Develop and implement a plan to improve the timeliness and quality of emergency services to the scene of a crash.

**The missing E's
Education, Engineering and
Enforcement
Integration and Collaboration**



Education

- ▶ Where does ambulance safety feature in EMS education programs – we do know now that it is biggest threat to a medics life and wellbeing

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**



**High speed crash, rolled and the
occupants (patient and medics)
had only minor scratches**



Vehicle Occupant Safety design

2007 European design
Safety technology is a
key focus



Ergonomic design



Ergonomic layout and equipment



New Australian vehicles



[Home](#) | [About Us](#) | [Contact Us](#) | [Privacy Policy](#) | [Terms & Conditions](#)

NETS Transport

Newborn Emergency Transport Service (Victoria)

Launch of Custom-built Ambulance for the Newborn Emergency Transport Service (NETS), Victoria

22nd Mar 2018

Media Release

Special ambulance to transport sick tiny

The Victorian Health Services Group (HSG) has announced the launch of a new custom-built ambulance to safely transport Victoria's sickly babies from south to north to specialist intensive care units in Melbourne.

[Home](#) | [About Us](#) | [Contact Us](#) | [Privacy Policy](#) | [Terms & Conditions](#)

Paramedic

Australian paramedic praised for revolutionary ambulance design

of Australia PPT Limited

Paramedic has designs on road safety

UK Ambulance vehicles



Clear safety message



Sweden initiatives



Norway initiatives



Basically..

- ▶ The failure to address the design of these vehicles based on accepted published and peer reviewed automotive safety literature, and in isolation of the extensive global expertise in automotive safety, human factors and ergonomics, remains a serious concern for this aspect of the EMS system.

Were we safer in the Cadillac???



What do we know works...

- ▶ Policy
- ▶ Lap seat belts
- ▶ Over the shoulder harnesses
- ▶ Securing equipment
- ▶ Forward and rear facing seating
- ▶ Some electronic technical devices
- ▶ Safety awareness
- ▶ Cultural change

Future

- ▶ Vehicle design
- ▶ PPE
- ▶ Practice policy
- ▶ Data/Monitoring/Oversight

**PREDICTABLE
PREVENTABLE
and
NO ACCIDENT**

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

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>

