

STEP COUNCIL
 2009 STEP EMS Conference, Rochester, NY, March 20, 2009

Rig Safety 911- Everything You Really Need to Know State of the Art on Ambulance Transport Safety



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

▶ To quote Steve "Sid" Caesar –
 Director IHS ES

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

STEP EMS Mission

▶ STEP –
 • Study of Trauma and Emergencies Project

▶ STEP's mission is to inform and educate the Emergency Medical Services (EMS) community and promote opportunities for the improvement of the EMS system.

▶ STEP began these activities in 1967

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



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?

Emergency Medical Service 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?



The EMS Safety Foundation

www.EMS-SafetyFoundi
 EMS Safety Innovation and Knowledge Transfer

Live from RETTmobil!!!
 Webinar Thursday May 15th 1600 UHR



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



Firstly!

► An accident ?

► or a predictable and preventable event



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.....

Ambulance Transport Safety

► Emergency care, public health, public safety, and patient transportation.

► Important Principle: Ambulance transport safety is part of a system, the overall balance of risk involves the safety of all occupants and the public

► All get home safely

In a nutshell

► Am here to try to save you Lives
Time and Money



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 in the USA



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



USA 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 2006-6

Is it your service's tragic year?

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

Creating a Safety Culture

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

- ▶ Awareness
- ▶ Training
- ▶ Incentive

Safety - Why now?

- ▶ Operating optimally in a transportation environment that is largely devoid of specific safety standards for the hazards and risks present
- ▶ Bridge the gap between what technical information exists and what is accessible and applied to EMS

EMS 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

... Nov 8th's Fatality

Putnam Co. paramedic dies in ambulance crash
By Staff Writers

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

Authorities say Matthew Lamb of Carmel was riding in an ambulance with a patient when the crash occurred at about 5 a.m. Wednesday when a semi-truck off the road and struck a tree in Garrison.

Lamb suffered massive head trauma.

State police senior investigator Bruce Cuccia told the Journal News it appears the ambulance was traveling on the road at the time.

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

The driver, Jonathan Rowers of the Dept. of Public Works, was not injured.

Thursday July 5th 2007..... Paramedic Allan Parson's killed

NEWS CENTER

Paramedic Killed in Turner Ambulance Crash

By Staff Writers

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


Authorities say Allan Parson of Carmel was riding in an ambulance with a patient when the crash occurred at about 5 a.m. Thursday when a semi-truck off the road and struck a tree in Garrison.

Parson suffered massive head trauma.

State police senior investigator Bruce Cuccia told the Journal News it appears the ambulance was traveling on the road at the time.

Carmel Fire Chief Cheryl Johnson says Parson was taken off life support and pronounced dead on Thursday at the Westchester County Medical Center.

The driver, Jonathan Rowers of the Dept. of Public Works, was not injured.



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

Posted By: anand at July 5, 2007 4:58 PM (Suggest Removal)

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

| Add your comments

Posted By: anand at July 5, 2007 4:16 PM (Suggest Removal)

It is sad, it would be too fast if they ran over my family member on their way to another's family member...

| Add your comments

Posted By: anand at July 5, 2007 4:16 PM (Suggest Removal)

In X response: Why can't I remind guess this? A man is dead and I want to know if this action and situation surrounding this was worth this cost loss. And I'd like to know what can be done so that this never happens again.

2 weeks later... 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 41-year-old Sammy Smith, 31-year-old Heidi McCougl and 25-year-old Kelly Ruggin. The two patients were also killed. They were identified as 56-year-old Robert Wells, 60-year-old Amanda Wells of Hicksville.

Another emergency medical technician, Matt McCougl, 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.

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 braked 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 braked by a tractor-trailer at the intersection of County Road 176 and County Road 87. The ambulance then burst into flames.

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

LiveVideo
 July 21, 2007



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 Shevek of the Payne Fire Department.

"Everyone is a brother," 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."

Car, Ambulance Collide in Marshall Township; 2 Dead

POSTED: 8:08 am EDT September 23, 2007
 UPDATED: 9:42 am EDT September 23, 2007

MARSHALL TOWNSHIP, Pa. — An ambulance and car collided along Route 19 at Brutschek Road in Marshall Township Sunday, killing two people and injuring three others.

Police said Douglas Stitt, 33, of Mercer, and Phillip Bacon, 31, of Sharpsville, were driving a car at about 2:30 a.m. when their vehicle and the ambulance collided.

The medical examiner said both Stitt and Bacon died of head injuries.

Three people riding in a Cranberry Township ambulance were also injured. Their conditions 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 Clinco, 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 Berry 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 Clinco.

Zappala said Clinco 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.

Fatalities and funerals

Funeral Services Held For Marble Falls Paramedic

By Staff Writers

MARBLE FALLS, Texas, (AP) — Funeral services were held for paramedic Eric Hester, 33, who died Tuesday when his ambulance was struck by a semi-truck on Highway 75 near Turner.

Hester and four other paramedics were killed in the crash in Marble Falls.

Hester was an emotional loss for Hester's family and for fellow emergency workers, but also remained calm during emergency and getting transportation.

Hester's two sons, 10 and 12, were with him when he died, leaving his family and colleagues grieving that he's gone.

But Hester, an husband of 10 years in his 10th year that received a promotion to the rank of sergeant in an unexpired position.

He is a South Dallas funeral home, an unexpired second shift position.

His name will be added and memorial the death of Eric Hester, who grew up in Marble Falls.

Funeral services for Hester will be held at 10 a.m. on Thursday at the funeral home.



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

By Staff Writers

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

By: Staff Writers
 The heart of a patient from an interhospital transport ambulance involved in a crash in Marshall Township Sunday night, and the patient was pronounced dead at the scene.

An Adams County ambulance taking a patient to York Hospital, collided with a car at the intersection of Routes 19 and 87 in Marshall Township at 2:30 a.m. Sunday, and the patient was pronounced dead at the scene.

York County Health Center CEO Dr. Halley Lee, the CEO, said, "We are deeply saddened by the death of the patient, and we are committed to providing the best care possible."

We would not be trying to determine whether the work is to be done, and it is not prior to the crash, or whether the ambulance was involved in a crash because of a "do no harm" policy, and the patient was pronounced dead at the scene.

- ▶ **This IS a Transportation and Automotive Safety issue**

Safe Systems Approach



Source: Road Safety Branch, Infrastructure and Surface Transport Policy, Department of Infrastructure, Transport, Regional Development and Local Government, Australia.

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

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

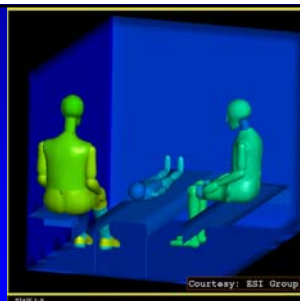
Some recent adverse outcomes



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

Testing the real world



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?**

So

- ▶ What's important
- ▶ What's not important

- ▶ What's going to save your life
- ▶ What might take your life

- ▶ What's going to hurt you
- ▶ What's going to protect you

- ▶ What is factual
- ▶ What is garbage

- ▶ What is new
- ▶ What is not new

Unique workplace

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

Absence of standards and oversight

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

- ▶ What we need to consider, where is the 'bang for buck' in ambulance transport safety:

1960 to 2009



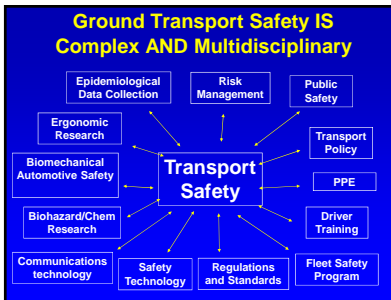
▶ “Ambulance transport has a death toll....”

Carl Craigle EMT-P, Chief Platte Valley Ambulance



So for EMS personnel...

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



Occupational Health and Safety.....?

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

What is a survivable impact?

$$E = \frac{1}{2} mv^2 \quad v^2 = 2as$$



37 mph (60 km/h) - survivable



What is a survivable impact?

$$E = \frac{1}{2} mv^2 \quad v^2 = 2as$$



62 mph (100 km/h) – not survivable





It does happen....

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

New EMS helmet prototypes for 2007-2009



Problems

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

EMS Transport Safety

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

Goals

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

Ambulance Safety Research: A New Field



EMS Best Practice, Sept 2006



AMD 2007 - 025 'occupant safety testing'

- Compared with -

Accepted automotive safety occupant testing

AMD – static 'safety testing'

▶ Inconsistent with 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.

Occupant protection.....??
July 2007

Medic Survivors

Medic Fatality

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://en.wikipedia.org/wiki/Newton's_laws_of_motion

USA Ambulances: FMVSS Exemption

DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589
[Docket No. 92-26, Notice 7]
[RIN No. 2127-AB66]

Federal Motor Vehicle Safety Standards.
New motor vehicles.

§ 571.1 Vehicles manufactured on or after September 1, 1989, except September 1, 2002. Except as provided in § 571.1, for vehicles manufactured on or after September 1, 1989 and before September 1, 2002, a percentage of the manufacturer's production, as specified in § 571.1, for 1, 2, 3, 4, or 5 of the vehicles described in the conditions of § 571.1, complying with the requirements, standards, or test methods specified in § 571.1, shall be required by the manufacturer. Section 571.101, as amended, shall apply to all vehicles. The requirements do not apply to any target that is not only the procedures of § 571.101. The phrase "include the manufacturer" chosen to use during this period shall be reported to the National Highway Traffic Safety Administration pursuant to 49 CFR 563.010.

SUMMARY: On August 18, 1995, NHTSA published a final rule amending Standard No. 201, "Occupant Protection: Interior Impact," to require passenger air seats, seats, and modifications passenger vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less. To provide protection when a occupant's head strikes interior components, including seats, side rails, headrests, and the roof, during a crash. In response to problems for § 201 vehicles manufactured on or after September 1, 2002, except as provided in § 571.1, certain motor vehicles on or after September 1, 2002 that, when used under the conditions of § 571.1, do not meet the requirements specified in § 201. At the target location specified in § 201, motor vehicles with a GVWR of 10,000 pounds or less at any speed up to and including 30 kilometers per hour. The requirements do not apply to any target that cannot be tested using the procedures of § 571.101.

§ 571.2 A vehicle is exempt from the requirements of §§ 1 through 201 if:

- (1) Any target installed in a convertible or frame of a convertible, roof collapse mechanism.
- (2) Any target installed in a convertible or frame of a convertible, roof collapse mechanism.
- (3) Any target installed in a convertible or frame of a convertible, roof collapse mechanism.
- (4) Any target installed in a convertible or frame of a convertible, roof collapse mechanism.

FMVSS exempt.....

NFPA Ambulance Standard Development

- ▶ NFPA Ambulance Standard Development underway
- ▶ Scope for integrating appropriate technical expertise
- ▶ http://www.emssafetyfoundation.org/NFPA_Ambulance0001.pdf

Balance of concerns and risk during transport

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

Benefit of Safety

- ▶ Safe practices save lives, time and money

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??

Safety Management

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

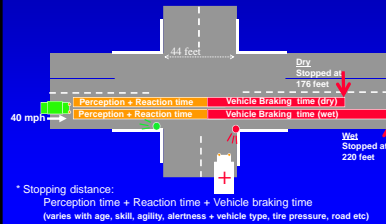
And very Predictable...

- ▶ 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



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?



Foldable



What is actually happening during an ambulance crash

1 - Target vehicle, Type I ambulance
2 - Buffer vehicle, Type II ambulance
Closing speed 44 mph



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

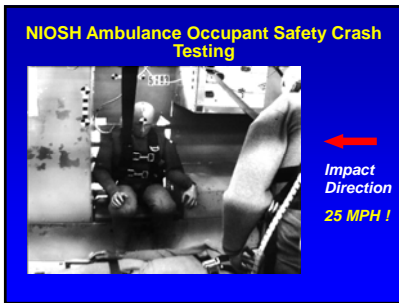
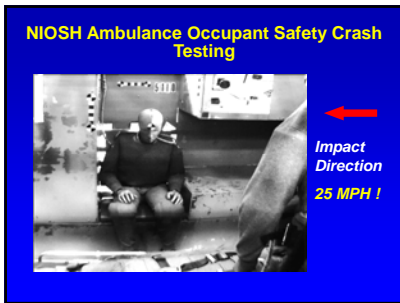


A few key words about restraint systems...

NOT new technical data...

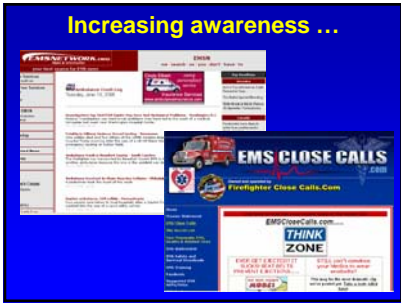


Richardson S.A., et al, *Int. J. of Crash*, 4:3, 239 - 259, 1999
Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds



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



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??



An admirable goal – BUT... implementing interventions that have not in anyway been demonstrated to be effective let alone safe is a very serious problem

**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....**



There is NO vehicle safety without real world injury data and automotive safety expertise

- ▶ With what authority has ground EMS squandered >\$3,000,000 on these concept vehicle shams??
- ▶ We NEED meaningful injury data to better understand the mechanism of injury and fatality
- ▶ A crash test program without automotive safety expertise and real world representative injury data is irresponsible
- ▶ Without real world injury data it is not possible to effectively measure the burden of the hazard NOR the effectiveness of any interventions

Yet another potentially lethal example marketed as a 'safety innovation' YET outside of automotive safety practice



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

JEMS and EMS Responder ARE NOT automotive safety journals

- ▶ And the reviews in them are completely inappropriate, misleading and outside of what is known in automotive safety
- ▶ We should NOT TOLERATE this as it is both completely irresponsible and very dangerous

Innovation

BEST PRACTICES
IN EMERGENCY SERVICES

Maryland Modifies Air Medical Fly Guidelines

Ambulance Safety Finally Gains National Attention

Readers and experts in transportation safety will remember this month in Washington, DC, for the Transportation Safety Board (TSB) of the National Academies. The board, which is led by Nicholas, will present the report and will be presenting a research and analysis through the meeting proceedings a reference to the state of all currently available, but fragmented, data on ambulance safety. TSB will release the final report and recommendations to the board, NHTSA, and the public.

National Academies TRB EMS/Medical Transport Safety Summit – November 7, 2008

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

TRB Conferences and Meetings
November 2008

EMR Safety Subcommittee Mid-year Meeting and Safety Summit

Safety concepts out there now

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

Important...

- ▶ Ergonomics and automotive safety issues are interrelated
- ▶ Crashworthiness priorities override the ergonomic issues

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. Levisk, 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 Levisk
Objective Safety LLC
United States of America
Larry Wiersch
Michael E. Nagel
California Automobile
United States of America
Paper Number 07-0124

Purpose of 'Feedback box' Program

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

How the Device Works

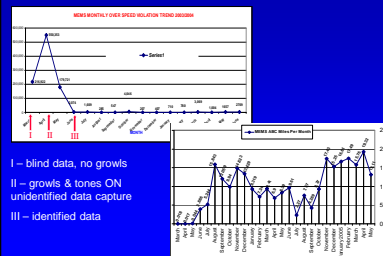
- ▶ Computerized monitoring device installed on each vehicle to measure parameters
- ▶ Each driver has individual key "fob"
- ▶ Data collected every second
 - including: vehicle speed and performance, driver behaviors and emergency mode
- ▶ Auditory feedback of warning 'growls', and penalty tones
- ▶ Data downloaded automatically every day



Over speed - accelerating

- ▶ Listen for growl – 15 sec warning begins
- ▶ Growl frequency increases near end of warning
- ▶ Tone on – penalty points awarded
- ▶ Slow down – tone stops
- ▶ Accelerate again - growl on – slow down – growl stops - no points

Demonstrated Effectiveness



A key to safe ambulance transport



Monitoring and feedback devices

- ▶ Implementation well received by the providers.
- ▶ 20% cost saving in vehicle maintenance within 6 months.
- ▶ No increase in response times
- ▶ Fewer crashes and less severe crashes
- ▶ Sustained improvement in safety proxies, with no inservice or retraining after the initial introduction period.

Extensive Indirect cost savings

- ▶ Fewer out of service vehicles
- ▶ Improved transport times
- ▶ Decreased administrative lost in managing unsafe behaviors
- ▶ Decreased legal burden
- ▶ Automatic system wide data
- ▶ Insurance benefits

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

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??

The jury is out on

- ▶ Opticon
- ▶ Simulators

The EMS Safety Foundation

Intro and Logistics Webinars from December 11th 2007 & Jan 8th 2008

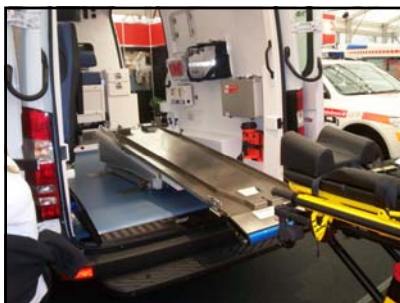
EMS Safety Foundation tab at www.objectivesafety.net



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.

RETTmobil – 'Mobile Rescue'
Major European event for EMS innovation
Fulda, Germany May 2008
<http://www.rettmobil.com/>



Vehicle Occupant Safety design

2008 European design
Safety technology is a
key focus



Ergonomic design



Ergonomic layout and equipment



NSW Australian vehicles



Flexibility to manage two patients



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



Awkward tasks? Develop solutions!



Visibility and lighting issues



Color-blindness affects 10% of the population



▶ As seen with normal vision



▶ As seen with color blind vision



Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response

- ▶ Location
- ▶ Size
- ▶ Shape
- ▶ Speed
- ▶ Intended path



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



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



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?

Were we safer in the Cadillac???



Fleet Mix ?



“Ripoff and Duplicate”

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

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

The image shows the front cover of the ANSI/ASSE Z15.1-2006 standard. The cover is white with a blue border and features the ANSI logo at the top. The title 'ANSI/ASSE Z15.1-2006' is prominently displayed in the center, with 'Safe Practices for Fleet Motor Vehicle Operations' written below it. The document is published by the American Society of Safety Engineers (ASSE).

- ### 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

IAFC June 2007

The Effects of Sleep Deprivation on Fire Fighters and EMS Responders

The image shows the cover of a report titled 'The Effects of Sleep Deprivation on Fire Fighters and EMS Responders'. The cover features a photograph of emergency responders at night, with one person lying on a stretcher. The text 'Final Report, June 2007' is visible at the bottom of the cover.

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

The image shows the cover of 'NCHRP Report 800'. The cover is dark with a photograph of a car on a road at night. The text 'NCHRP REPORT 800' is prominently displayed in the center. Below the title, it says 'Volume 15: A Guide to Enhancing Night Emergency Medical Services'.

Tips for Emergency Vehicle Operations

The image shows the cover of a report titled 'Tips for Emergency Vehicle Operations'. The cover is white with a photograph of an emergency vehicle. The text 'Alive on Arrival' is visible on the right side of the cover. The FEMA logo is at the bottom right.

An excellent model

The image is a screenshot of the 'Everyone Goes Home' website. The website has a blue header with the title 'EVERYONE GOES HOME' and a sub-header 'PREVENTING THE LOSS OF FIREFIGHTERS'. Below the header, there is a navigation menu and a main content area titled '16 Firefighter Life Safety Initiatives'. The website URL 'www.EveryoneGoesHome.com' is visible at the top right.

The image shows the cover of a report titled 'Effects of Warning Lamps on Pedestrian Visibility and Driver Behavior'. The cover features a photograph of a car with its warning lamps on at night. The text 'Effects of Warning Lamps on Pedestrian Visibility and Driver Behavior' is written below the photograph. The date 'April 2007' is also visible.

USFA Emergency Vehicle Safety Initiative

The image shows the cover of a report titled 'Emergency Vehicle Safety Initiative'. The cover features a photograph of a fire truck. The text 'Emergency Vehicle Safety Initiative' is written below the photograph. The FEMA logo is at the bottom left.

Traffic Incident Management Systems (TIMS)

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

The image shows the cover of a report titled 'Traffic Incident Management Systems (TIMS)'. The cover features a photograph of a traffic incident scene with emergency vehicles. The text 'Traffic Incident Management Systems' is written below the photograph. The FEMA logo is at the bottom left.

Risk/Hazards

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

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>

