33rd Annual EMS Symposium
Anchorage, Alaska, November 13-14th , 2008

Ambulance Transport Safety:
Everything You Really Need to Know

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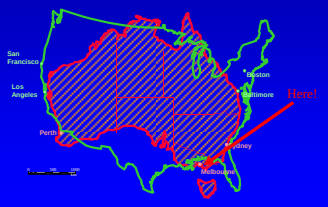
CEO, Objective Safety
New York, USA

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

"We want everyone to get home safely each day"

Here we are!

Where am I really from?
...Yes, it IS that big!



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?

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

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http://www.objectivesafety.net

Firstly!

- **An accident ?**
- or
  a predictable and preventable event

A tragic emergency health care intervention outcome

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……

Ambulance Transport Safety

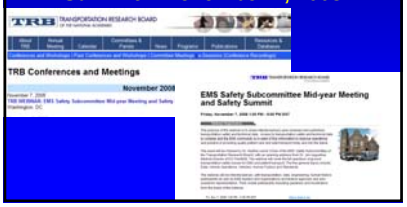
- Emergency care, public heath, public safety, and patient transportation.
- Important Principle:
  Ambulance transport safety is part of a system, the overall balance of risk involves the safety of all occupants and the public
- All get home safely

In a nutshell

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

October 2008 JEMS Article "Rig Safety – 911"

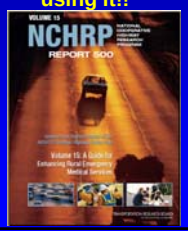
Breaking News!!
National Academies
TRB EMS/Medical Transport Safety Summit – November 7, 2008



The TRB and EMS

- TRB Mission:
  To provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multi modal.
- Provides service to government, public, and scientific and engineering communities.
- TRB Goals:
  - Being prepared for challenges.
  - Conduct and promote knowledge.
  - Provide timely and informed advice.
  - Act as an effective and impartial forum.
  - Promote collaboration.
  - Contribute to the professional development
  - Conduct and promote communications efforts.
  - Contribute to public's understanding.
  - A resource to the nation and to the transportation community worldwide

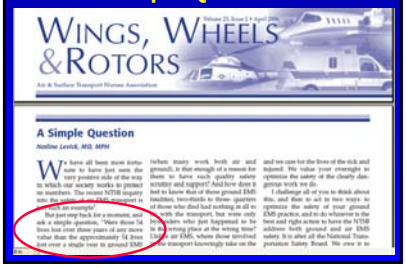
Transportation Research Board is an excellent resource… we should be using it!!



October 28, 2008 - Air EMS on NTSB's Most Wanted List…

2008 - Air EMS on the NTSB's "Most Wanted List", where is ground EMS??

A Simple Question....



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

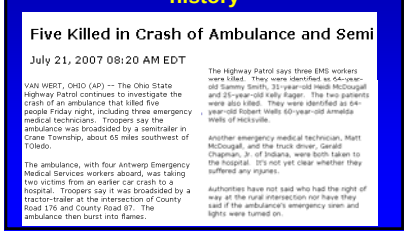
Ambulance transport safety is part of a SYSTEM, the overall balance of risk involves the safety of all occupants and the public

New Information 2006-2008

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASSE), June 2006 & June 2007
- International Ergonomists Association (IEA), June 2006
- Transportation Research Board – EMS Safety address, Jan 2007
- 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
- Transportation Research Board – Inaugural EMS Safety Subcommittee meeting Jan 2008
- NIOSH Emergency Responder Round table March 2008
- Transportation Research Board – Ambulance Transport Safety Summit
- Worker visibility Act, to be implemented, Nov 24 2008
- OSHA EMS best practices late 2008

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

2 weeks later… Friday July 20th 2007 The worst ambulance crash in USA history



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

Lisa Nicely

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

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

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

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

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

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

This is not a crashworthy environment

Jan 28th, 2008

Monday, January 28, 2008 10:14 am

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

Posted at 7:33 am | 3 Comments

1 dead, others injured in Sussex crash involving ambulance

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

April 14th, 2008

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

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

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

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

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

The paramedic van driver, 19-year-old Scot

there to Westchester Medical Center, said

April 20, 2008..??

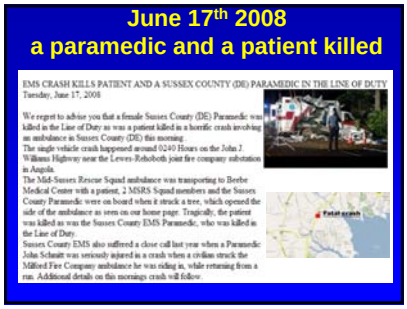
MORRIS DAILY HERALD

State News

Child injured after being struck by ambulance

Springfield boy hit by ambulance dies

June 17th 2008
a paramedic and a patient killed



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

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

Fatal crash

In this vehicle…

October 31, 2009, Kentucky

Fatalities and funerals


Funeral Services Held For Marble Falls Paramedic

Charged with Vehicular Homicide

Penn Twp. ambulance driver faces charges in crash - Pennsylvania
A Penn Township Rescue 6 ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hempfield that killed a Westmoreland County Prison guard.

A Penn Township Rescue 6 ambulance driver faces a charge of homicide by vehicle in an Oct. 30 accident in Hempfield that killed a Westmoreland County Prison guard.

Jason Fait, 30, of 9850 Barnes Lake Road, North Huntingdon, was arraigned this week and will have a preliminary hearing at 1:45 p.m. Sept. 27 before Jeannette District Judge Joseph DeMarchis. Bond was set at $25,000 unsecured. Fait also was charged with reckless driving, careless driving and other traffic offenses.

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

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

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

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

Drunken ambulance driver killed 2 in car crash - Pennsylvania

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

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

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

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

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

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

Date last updated: Tuesday, January 23, 7:14 PST

01/24/2007 | PRINT THIS ARTICLE | | EMAIL ARTICLE TO A FRIEND |

LexisNexis

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

By Elizabeth Evans
The York Dispatch (Pennsylvania)
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A Adams County ambulance rolling a patient to York Hospital collided with a car at the intersection of Routes 30 and 616 in West Manchester Township at 9:47 Jan. morning, and the patient was pronounced dead at the scene.

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

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

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

Benefit of Safety

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

Unique workplace

- In vehicles
- At roadside and other emergency scenes

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 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

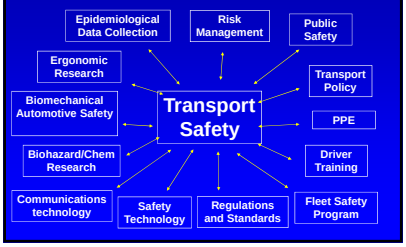
Some odd facts

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

EMS Transport General Concerns

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

Ground Transport Safety IS Complex AND Multidisciplinary



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

the EMS transport process

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

TIME & PLACE

The Emergency Department (ED)

An ambulance is <u>not</u> an ED /ICU on wheels

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

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

*FARS/BTS 2005-6

Is it your service's tragic year?

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

So for EMS personnel…

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

'Workplace' Hazards

and what is killing EMS ?

EMS personnel fatalities*

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

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

- "Ambulance transport has a death toll…. "

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

'Real world' head-on post crash

Anchorage Daily News

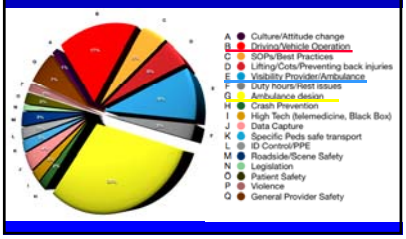
Paramedic injured in crash is recovering

Clinical Care? Occupational Health and Safety…..?

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

Key Safety Priority areas of focus

n = 155



Safety is Good Business

June 2007

A problem

2007 Insurance data –

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

EMS CANNOT Afford to keep paying out like this….

A number of potential interventions to enhance safety have been identified:

- Safety Policy
- Safety performance standards
- Vehicle crashworthiness
- Vehicle interior ergonomics
- Personal Protective Equipment design
- Driver selection, training and simulation
- Safety and risk awareness modification
- Risk behavior modification
- Intelligent Transportation Systems (ITS)

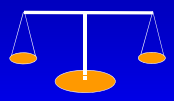
Benefit of Safety

- Safe practices save lives, time and money

This is about you and your safety

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

Balance of concerns and risk during transport

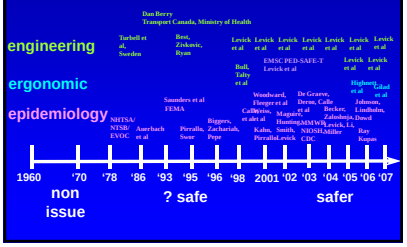


- Response and transport time
- Clinical care provision
- Occupant safety/protection
- Public Safety

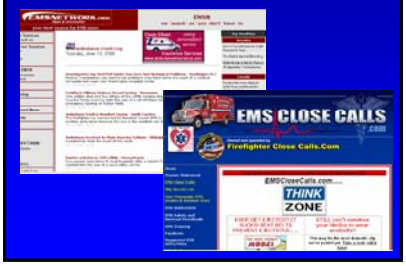
Goals

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

Ambulance Safety Research: A New Field



Increasing awareness …



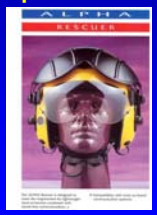
EMS Best Practice, Sept 2006

IMPORTANT ADVISORY

- Due to respect for the wishes of the families of medics killed in the line of duty there is to be NO PHOTOGRAPHY of any aspect of the images in this presentation - that is NO video, NO photography, NO digital images of any type

It does happen….

But what about head protection?



New EMS helmet prototypes for 2008

Problems

- No Standards
- Unique safety and hazard protection needs
- A number of <u>less than appropriate</u> devices out there

Dynamic vs. Static

Safety Testing

Dynamic Safety Testing

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

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

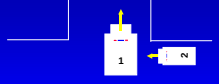
If we know this – and its published…

Levick NR, et al. Development and Application of a Dynamic Testing Procedure for Ambulance Pediatric Restraint Systems, SAE Australasia 1998;58:2:45-51

Why do we do this?

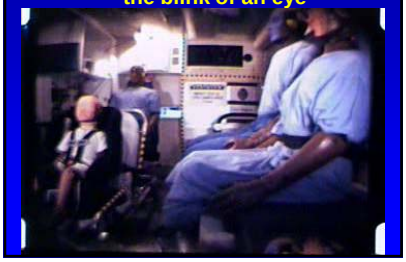
Full Vehicle Crash Testing

Test 1 – Right side impact



1 – Target vehicle, Type I ambulance
2 – Bullet vehicle, Type II ambulance
Closing speed 44 mph

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



NIOSH Ambulance Occupant Safety Crash Testing

Impact Direction

25 MPH !

And very Predictable…

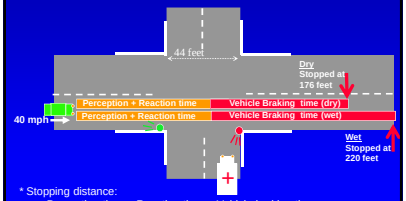
- Intersections are lethal environments

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

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

The real world

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



* Stopping distance:
Perception time + Reaction time + Vehicle braking time
(varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)

Ambulance Standards??

- KKK?
- AMD?
- FMVSS?
- NFPA?

What KKK-A-1822F, AMD and FMVSS state and don't state…

USA KKK ambulance purchase specifications GSA:KKK-A-1822F, Aug 2007

- Specifications for the purchase of a Star of Life Ambulance
- Static Pull test
- 2200 Lbs. static stretcher test in longitudinal, lateral & vertical
- No dynamic test for vehicle, occupants or equipment
- No automotive test manikin
- Voluntary www.ntea.com/WorkArea/downloadasset.aspx?id=1352

USA Ambulance Manufacturing Division (AMD) Ambulance Standards – August 2007

- No dynamic or impact test
- No automotive test manikin
- Mandates NO 'crumple zone'
- No impact tested anchorages for occupant restraint or equipment
- Internal, not independent

http://www.ntea.com/WorkArea/showcontent.aspx?id=1359

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

KKK certified and FMVSS exempt..?

03/04/2007 | Print this Article | Mail this Article to a friend |

2 dead in Michigan ambulance crash

The Associated Press

SKANDIA TOWNSHIP, Mich
along an Upper Peninsula r
members, state police sai

The truck was stopped Mo
Township waiting for traff
General Hospital rear-end

Investigators found no evi

Ambulance patient Carrie
Cornell, died at the scene
member, Ryan Peterson, 2

No 'a'… then NO 'F' !!!!!

- **F = ma**

where F – force
m – mass
a – acceleration

Sir Isaac Newton (1642-1727), Philosophiae Naturalis Principia Mathematica (Mathematical Principles of Natural Philosophy), published in 1687. http://en.wikipedia.org/wiki/Newton's_laws_of_motion

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

USA Ambulances: FMVSS Exemption

DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589
[Docket No. 92-28; Notice 7]
[RIN No. 2127-AB85]

Federal Motor Vehicle Safety Standards;
Head Impact Protection

S6.1 Vehicles manufactured on or after September 1, 1998 and before September 1, 2002. Except as provided in S6.3, for vehicles manufactured on or after September 1, 1998 and before September 1, 2002, a percentage of the manufacturer's production, as specified in S6.1.1, S6.1.2, S6.1.3, or S6.1.4, shall, when tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 when impacted by the free motion headform specified in S8.9 at any speed up to and including 24 kilometers per hour. The requirements do not apply to any target that cannot be located using the procedures of S10. The phase-in schedule the manufacturer chooses to use during this period shall be reported to the National Highway Traffic Safety Administration pursuant to 49 CFR 589.6.

SUMMARY: On August 18, 1995, NHTSA published a final rule amending Standard No. 201, "Occupant Protection in Interior Impact," to require passenger cars and trucks, buses, and multipurpose passenger vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less, to provide protection when an occupant's head strikes upper interior components, including pillars, side rails, headers, and the roof, during a crash. In response to petitions for

S6.2 Vehicles manufactured on or after September 1, 2002. Except as provided in S6.3, vehicles manufactured on or after September 1, 2002 shall, when tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 when impacted by the free motion headform specified in S8.9 at any speed up to and including 24 kilometers per hour. The requirements do not apply to any target that cannot be located using the procedures of S10.

S6.3 A vehicle need not meet the requirements of S6.1 through S6.2 for:

(a) Any target located on a convertible roof frame or a convertible roof linkage mechanism.

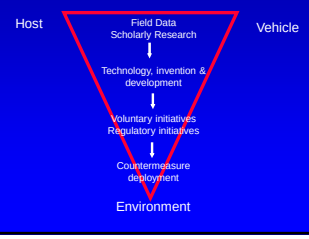
(b) Any target located rearward of a vertical plane 600 mm behind the seating reference point of the rearmost designated seating position.

(c) Any target located rearward of a vertical plane 300 mm behind the seating reference point of the driver's seating position in an ambulance or a motor home

NFPA Ambulance Standard Development

- NFPA Ambulance Standard Development Public Comment
- The Public Comment period for the development of the new NFPA Ambulance Standard – is open until October 15, 2008
- http://www.emssafetyfoundation.org/NFPA Ambulance0001.pdf

Automotive Injury Triangle and Safety Development

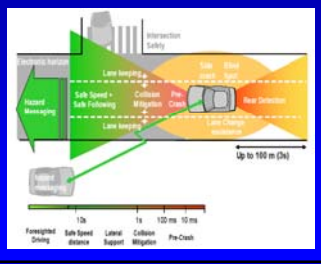


Protective devices/concepts

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

Intelligent Transport Safety Systems



'Safety' approaches being driven by manufacturers claims and sales rather than by science and data

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

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

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

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

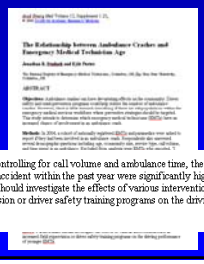
Safety concepts out there now

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

The Driver

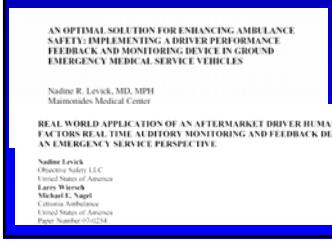
- Driver selection
- Driver monitoring and feedback
- Driver Impairment
- Driver training

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.

What about changing driver behavior in the real world??



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

Nadine R. Levick, MD, MPH
Maimonides Medical Center

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

Nadine Levick
Objective Safety LLC
United States of America
Lars Wiersch
Michael E. Nagel
Cetronia Ambulance
United States of America
Paper Number 05-0234

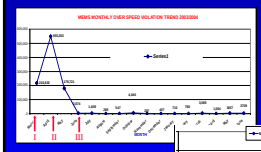
Purpose of 'Feedback box' Program

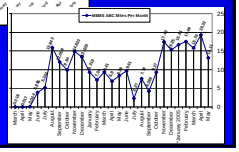
- Enhance Safety
- Improve Driver Performance
- Save Maintenance Dollars
- Aid Accident / Incident Investigation

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

Demonstrated Effectiveness





I – blind data, no growls

II – growls & tones ON unidentified data capture

III – identified data

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.

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??

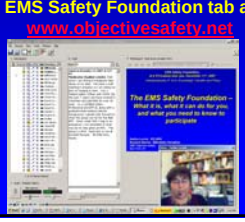
The jury is out on

- 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

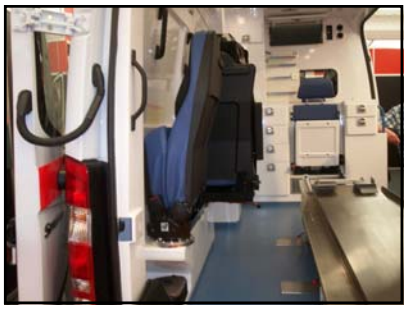


International approaches

- 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/

EMS Safety Foundation's 2008 RETTmobil Delegation

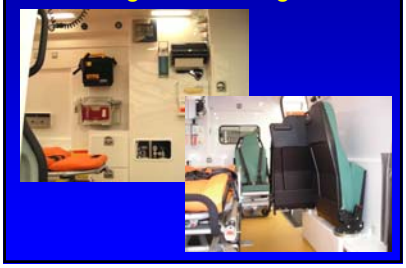


Vehicle Occupant Safety design

2008 European design

Safety technology is a key focus

Ergonomic design



One patient or Two patients and you can reach both AND your equipment…

a fleet based initiative

Flexibility to manage two patients

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

Ergonomic layout and equipment

Securing equipment

So….

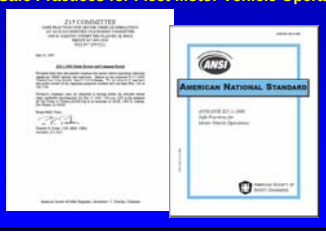
- Which vehicle do you want to be in ?
- Which vehicle is the best for efficient, and effective patient care?
- Which vehicle provides optimal risk management ?
- What is the optimal fleet mix?

Were we safer in the Cadillac???

Other successful models

American National Standard ANSI/ASSE Z15.1-2006

Safe Practices for Fleet Motor Vehicle Operations

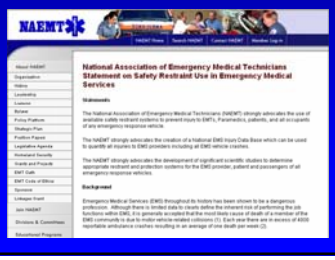


What Z15 encompasses

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

Use proven safety tools

NAEMT July 2006 Position statement



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

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???

News we don't want to see

Jan 22, 2007 6:39 am US/Eastern

Caught On Video: EMT Struck By Car

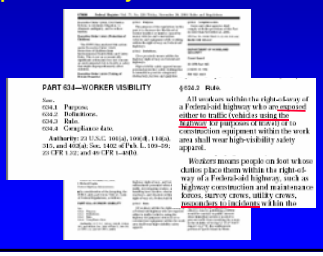
Lou Young
Reporting

(CBS) BRONX The car hit 46 year-old Capt. Steven Quirindongo so violently it smashed the vehicle's windshield and sent him flying through the air.

Quirindongo, a 19-year veteran of the city's emergency medical services, was on the scene of a fire on Riverdale Avenue in the Bronx Sunday afternoon when a civilian car moved past police barricades and caught him from behind. Chief Wayne McFarland was on the scene as the damaged health food store where his men had successfully put out the flames.

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

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



PART 634—WORKER VISIBILITY

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

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

§ 634.3 Rule.

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

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

Distances of Nighttime Visibility

Policy and practice ignorant of existing technical safety data

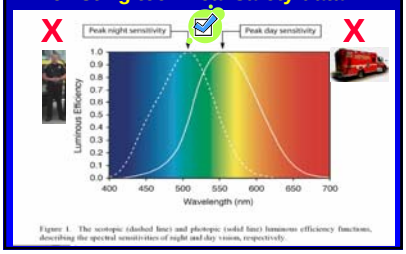
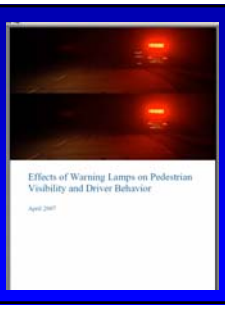


Figure 1. The scotopic (dashed line) and photopic (solid line) luminous efficiency functions, describing the spectral sensitivities of night and day vision, respectively.

Night visibility

Visibility and Conspicuity …?.

Visibility and lighting issues



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

This looks cool AND SAFE!

This is AWESOME – and addresses some very real risks, very creatively – and currently ONLY available in London Ontario!

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

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

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

R & D
"Ripoff and Duplicate"

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

Air EMS is a role model for safety initiatives and focus

Integration and Collaboration

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

State Strategic Highway Safety Plans

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

Ambulance Safety Summit November 7th, 2008

- EMS Transportation Safety Subcommittee of the National Academies Transportation Research Board (TRB)
- Onsite panel of invited technical experts, in addition to policy makers and EMS leaders:
  - Safety data capture
  - Transport /fleet management, EMS vehicle operations
  - Automotive safety and occupant protection
  - Ergonomics and human factors
  - Standards
- Will be beamed live via Webinar and recorded electronically and TRB e-circular produced
- Access to live participation requires pre-registration
- Pre-registration info disseminated in early October

TRB Jan 2009 EMS Subcommittee Meeting and Seminar

- The Subcommittee on EMS Transportation Safety of the National Academies Transportation Research Board winter subcommittee meeting and seminar is in DC during the 2009 January TRB symposium
- Your input and participation (onsite or online) is valued
- You can submit your suggestions/input for the TRB EMS Subcommittee meeting online -
  - http://www.emssafetyfoundation.org/TRBpriority.htm

New NHTSA EMS info link

- There is a new Federal link to EMS info – a great resource!
- www.EMS.gov

www.GlobalEMSForum.org "Running Hot or Not", "Being Seen at the Scene" and "Ambulance Standards" Webinars

No need to reinvent the wheel...

March 2007 - FHWA

Tips for Emergency Vehicle Operations

USFA Emergency Vehicle Safety Initiative

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

Risk/Hazards

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

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

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