This morning… June 17th a paramedic and a patient killed

In this vehicle…

To quote Steve “Sid” Caesar – Director IHS ES

“We want everyone to get home safely each day”

A tragic emergency health care intervention outcome

A devastating tragedy…

• An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved
• BUT an EMS crash can kill all involved AND wipe out an EMS systems response capacity……

… Nov 8th’s Fatality

Putnam Co. paramedic dies in ambulance crash

And Nov 10th’s 2007 obituary….

Patient and Provider Safety in Ambulances

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

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A BIG Problem

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

Safety concepts out there now

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

Real world answers to real world questions -

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

Outline

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

Thursday July 5th 2007......

"...I'd like to know what can be done so this never happens again...."
Friday July 20th 2007...
The worst ambulance crash in USA history

July 21, 2007, 06:20 AM EDT

HARRISBURG, PA (AP) — The worst ambulance crash in American history has killed two patients in a single incident.

The crash occurred on Interstate 78 near Lebanon, Pennsylvania, near the Lebanon County Hospital. The crash was caused by a medical emergency that required emergency medical services.

According to the Lebanon County Emergency Management Agency, the crash occurred due to a medical emergency. The emergency medical services were on their way to the hospital when the accident occurred.

One patient died at the scene, and the other died in the hospital. The patients were both on stretchers and had to be treated on the scene.

The crash was caused by a medical emergency, and the patients were on the way to the hospital when the crash occurred.

An interhospital transport

"Do no harm…?"

An interhospital transport is a medical transport that is performed between hospitals. The transport is performed to transport a patient from one hospital to another.

In this case, an ambulance involved in a crash hit a patient who was on a stretcher. The patient died at the scene.

Charged with Vehicular Homicide

2 counts of vehicular homicide

October 5, 2007 - PA

Charged with vehicular homicide

Firstly!

An accident? or a predictable and preventable event
In a nutshell
- Am here to try to save you Lives Time and Money

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

Ground Transport Safety IS Complex AND Multidisciplinary

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

Safety oversight of what and .... by whom
- Vehicle Safety
- Vehicle Design
- Transportation systems safety
- Safety Equipment Design
- Vehicle and Safety Equipment Testing and Standard development
- Safety policies

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

A Simple Question....

Fatalities and funerals

New Information 2006-2008
- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASSE), June 2006 & June 2007
- International Ergonomics Association (IEA), June 2006
- Transportation Research Board – EMS Safety address, Jan 2007
- NID Engineering Public Comments, July 2007
- NAA - August 2007
- OSHA, June 1, 2007 Federal Register
- SAFETY Act, 2005
- AAPEX – Advanced, Efficient, Transportation Equity Act: A Legacy For Success
- State Strategic Highway Safety Plans, October 2007
- State EMS Council Policies
- APHA, Nov 2007
- CSIA EMS best practice late 2006
- Transportation Research Board – inaugural EMS Safety Technology Program
- Worker visibility Act, to be implemented, Nov 2008
Can no longer say – “I didn’t know…..”

**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

**New paradigm - Integration of EMS**
- Public health departments
- Social service agencies
- Community outreach
- Hospitals
- Health care networks / Insurers
- Industry

**Key 5 Safety Priority areas of focus**
- Here is what you sent in: n = 155

**Challenges to Optimizing EMS Transport Safety**
- Disparate and fragmented safety infrastructure
- Lack of a centralized EMS Safety oversight or data
- A large number of small groups of end users, with a mix of volunteers and professionals
- Ambulances are hybrid non-standard vehicles, a truck chassis and an after market box or a modified van
- EMS vehicle safety is not integrated as a part of the transport safety industry

**1960 to 2007**
- A passenger vehicle – sure
- A ‘laundry or mail truck’ -?
- A passenger vehicle - now
Some recent adverse outcomes

UPS and Laundry trucks have very similar design and even more stringent safety requirements to EMS vehicles BUT very different cargo...... People are passengers and NOT packages or parcels

Some odd facts

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

EMS Transport General Concerns

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

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

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

the EMS transport process

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

The Emergency Department (ED)

An ambulance is not an ED / ICU on wheels
National EMS data

*In the USA*
- ~50,000 vehicles
- ~5,000 crashes a year
- One fatality each week
  - ~20 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

Is it your service’s tragic year?
- ~50 fatalities a year
- 15,000 EMS services
- Each year one in 300 services experiences a fatality

Predictable risks
- Fatal crashes more often at intersections, & with another vehicle \( (p < 0.001) \)
- 70% of fatal crashes EMS crashes during Emergency Use
- Most serious & fatal injuries occurred in rear (OR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)
- 82% of fatally injured EMS rear occupants unrestrained
- >74% of EMT occupational fatalities are MVC related
- Serious head injury in >65% of fatal occupant injuries
- More likely to crash at an intersection with traffic lights (21% vs 16% \( p < 0.001 \)) & more people & injuries/crash than similar sized vehicles

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*

‘Workplace’ Hazards

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
  - Mediation/litigation/settlement
  - Medical/disability costs of injured EMTs
  - Hiring of new employees to replace injured personnel
  - psychosocial support counseling for personnel involved in accidents
  - Increased insurance rates

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*

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

“Ambulance transport has a death toll….”
Carl Craigle EMT-P, Chief Platte Valley Ambulance
Colorado Springs, April 2007

Policy makes a difference...

“Are our policies killing people?”

- 1991-2000, 302,969 Emergency vehicles were involved in MVCs - 1,565 involving fatalities
- In PA 1997-2001, ambulances were more likely than similar sized vehicles to be involved in:
  - 4 way intersection crashes (43% vs 23%, p=0.001)
  - Collisions at traffic signals (37% vs 18%, p=0.001)
  - MVCs with more people injured (76% vs 61%, p=0.001)

*Comparison of Crashes Involving Ambulances with those of similar sized vehicles – Adam Ray, Douglas Kupas, PEC Dec 2005; 9:412-415

Vehicle Operations Position Statement

WEMSA – October 2007

1. Emergency Vehicle Operations Policy
2. Vehicle operations training and evaluation
3. A program of graduated driver responsibility
4. Drivers only age 25 and over
5. Complete stop at an intersection
6. Restricted use of Red Lights and Sirens
7. Monitoring of emergency vehicle operations

WEMSA covered some key and important policies and procedures

But…

- What about hours of service?
- What about visibility at the scene? For providers and the vehicles…?
- What about protective equipment?
- What about ambulance design safety?
- What about reporting of adverse events?

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

State SHSP EMS Focus*

Pennsylvania Code

NAEMT July 2006 Position statement
- Patients must be in the over the shoulder harness, medics restrained in seat belts, equipment secured

Safety saves time, lives AND money
- Canada, Nova Scotia
  - Since 2000 working towards a goal of zero loss ratio with insurance provider
  - 15 million kilometers per year
  - 150 emergency response ambulance units
  - Collision claim history measured in dollars per 100,000 kilometers traveled:
    - 2000/2001 $1725.00
    - 2001/2002 $1049.00
    - 2002/2003 $751.00
    - 2003/2004 $416.00
    - 2004/2005 $220.00

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

Levick et al

Best, Zivkovic, Ryan

Levick et al

Engineering

Epidemiology

EMS Transport Safety Challenges 2008

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

Safety for emergency transport

Policy that reflects SCIENCE

Increasing awareness ...

EMS Best Practice, Sept 2006

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

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

Problems

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

EMS has unique head protection needs – not well met by a ‘truncated’ fire helmet…

New EMS helmet prototypes designed by international EMS helmet technical experts for 2007-2008

What are the solutions?

- Training?
- Practice Policy?
- Transportation Systems Engineering?
- Automotive Engineering?
- Education of other road users???

The Driver

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

Driver issues

- Correlation: When monitoring the road, drivers and pedestrians, the role of hierarchy, stress, and distractions needs to be understood. The new EMS helmet design is intended to protect the wearer's face, head, and neck. A helmet should not only protect the wearer but also serve as a barrier between the driver and the environment.

Which is best, how many hours…??
What about changing driver behavior in the real world??

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 ‘growl’, and penalty tones
- Data downloaded automatically every day

Demonstrated Effectiveness

Unit 302 Accident

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
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

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

Intrusion vs Deceleration
- Intrusion = vehicle to vehicle or vehicle to fixed narrow object
- Deceleration = sudden stop - i.e. sled test

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


Why do we do this?
**Full Vehicle Crash Testing**

Test 1 – Right side impact

1. Impact point
2. Bullet vehicle
3. Target vehicle

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

**NIOSH Ambulance Occupant Safety Crash Testing**

Impact Direction 25 MPH !

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

**Propaganda that kills...**

USA Ambulances: FMVSS Exempt

FMVSS (Federal Motor Vehicle Safety Standards) are minimum performance and design standards applicable to vehicles in the United States. All motor vehicles (except...)

**Occupant protection......??**

USA Ambulances: FMVSS Exempt

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

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

Propaganda that kills...

USA Ambulances: FMVSS Exempt

July 2007
USA ambulance purchase specifications
- Static Pull test
- 2200 lbs. (8G's) in Longitudinal and Lateral
- No dynamic test
- No definition to manikin mass
- No restraint for equipment
- Voluntary

AMD 2007 – ‘safety testing’
- Ignorant of automotive safety principles – and specifies that a ‘successful test’ is -
  - No structural damage to any load bearing or supporting members, i.e., torn or broken material, broken welds, popped or sheared body rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

Unacceptable, and ridiculous current 2007 USA ambulance ‘safety testing’ practices!!??

No 'a'... then NO 'F' !!!!!
F = ma
where
F – force
m – mass
a – acceleration

FMVSS exempt......

And today’s crash....
It was just a roadside tree ...

Its not magic... what is safe is known and understood
Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds.

The Ride of Your Life….

- 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 side-facing occupants are potentially lethal – and is in NO WAY supported by any data or automotive safety expertise.

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

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

Yes, the ride of your life….
- Sure… these vehicles all parade around the EMS and Fire shows BUT…
- NOT ONE of these vehicles has been to the automotive safety shows or scrutinized by the automotive safety industry.

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

The EMS Safety Foundation
Intro and Logistics Webinars from December 11th 2007 & Jan 8th 2008
EMS Safety Foundation tab at www.objectivesafety.net

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

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

TRB EMS Safety Update
- Brought together NHTSA, FHWA, TRB, National Academies, DOT, CAMTS & EMS
- 3 presentations
  - Trip and EMS
  - Safety air/ground
  - Ground Ambulance Safety Issues and Directions
- Recorded presentations and handouts available at www.objectivesafety.net
- Potential for EMS safety research funding
- Next TRB meeting January 11-15, 2009 – all are welcome

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.

Vehicle Occupant Safety design
- 2007 European design
- Safety technology is a key focus
Australia, Melbourne

NSW Australian vehicles

Flexibility to manage two patients

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

Norway initiatives

Swedish initiatives

Other successful models

Ergonomic layout and equipment
Securing equipment

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

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

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
Caught On Video: EMT Struck By Car

Worker visibility Act:
Help is on the way!! November 24th 2008
There are grants to assist you.

Science not, next best guess

Recent Visibility Webinar
www.GlobalEMSForum.org

Policy and practice ignorant of existing technical safety data

Day visibility

Night visibility

Visibility and Conspicuity ...?

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!
Having access to that technical knowledge supports changes to improve safety practice.

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

R & D “Ripoff and Duplicate”

Avoid reinventing the wheel at all costs

Air EMS is a role model for safety initiatives and focus

Another excellent example - From this to … this!

Not rocket science...

But whatever color … if you run a red light some will be killed
UPS: The ‘Big Brown’

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

Tips for Emergency Vehicle Operations

March 2007 - FHWA

USFA Emergency Vehicle Safety Initiative

Traffic Incident Management Systems (TIMS)

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

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 gunny 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

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??

So….
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

Some simple and available solutions out there now
- Intersection Policy
- PPE
- ‘Feedback’ boxes

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

What you can do now
- Have a written and implemented ‘safety program’
- Secures 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 (i.e. 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