Ambulance Safety: Thinking inside the box

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Wisconsin Division of the American Trauma Society (WATS)
William H. Perloff MD, PhD Trauma Care Conference,
Steven's Point, WI, November 9th, 2007

"Reality Trauma"

A tragic emergency health care intervention outcome

Wisconsin Division of the American Trauma Society (WATS), William H. Perloff MD, PhD Trauma Care Conference, Steven’s Point, WI, November 9th, 2007

"Reality Trauma"

Paramedic critically injured
November 7, 2007

Yesterday's news...

Paramedic critically injured
November 7, 2007

Wisconsin Division of the American Trauma Society (WATS), William H. Perloff MD, PhD Trauma Care Conference, Steven’s Point, WI, November 9th, 2007

"Reality Trauma"

In a nutshell

Yesterday's news...

...Today's fatality

Thursday July 5th 2007 ......

http://www.objectivesafety.net

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

**Five Killed in Crash of Ambulance and Semi**

JAN 21, 2007 08:20 AM EST

An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved.

**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, including members of the public - AND wipe out an EMS systems response capacity......

**Safety leadership, here and NOW...**

If a leader chooses to ride with his/her drivers?

- Watchful EMT training sponsored by whom?

**Gregg Theune’s Appeal to your Senator, December 2005**

Charged with Vehicular Homicide

- September 23, 2007 - PA

- 2 killed, 3 injured....

- November 5, 2007 - PA

- 2 counts of vehicular homicide...
An interhospital transport?

I. Review of data on ambulance crashes and safety standards and guidelines
II. Identification of 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 EMS and patient transport

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

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

National EMS data
- In the USA:
  - ~ 50,000 vehicles
  - ~ 5,000 crashes a year
  - ~ 20 fatalities a year
- 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)
- 79% 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 46% of fatal occupant injuries•
- More likely to crash at an intersection with traffic lights (37% vs 13% p<0.001) & more people & injuries/crash than similar sized vehicles**

*National EMS Database...
**Kahn CA, Pirrallo RG, Kuhn EM, Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9
***Becker, Zaloshnja, Levick, Li, Miller, Acc Anal Prev 2003
###Maguire, Hunting, Smith, Levick, Annals Emerg Med Dec 2002
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 (e.g., 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

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??

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

The Crash Event - Crash Testing

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

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?

For all patients you must use over the shoulder belts too
Absence of standards and oversight
- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No safety performance standards
- Absent national safety oversight

A very serious gap in data, performance and oversight
- FMCSA Truck safety goals – to decrease the fatality rate of 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008
- EMS crash fatality estimates are - 7.66 - 41.93 fatalities per 100 million ambulance-miles

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

USA Ambulances: FMVSS Exempt

Propaganda that kills…
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

KKK – static ‘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 AMD/KKK-F ‘safety testing’ practices and standards!!

No ‘a’... then NO ‘F’ !!!!!

F = ma

where F – force
m – mass
a – acceleration

FMVSS exempt......

Internationally, there are standards for proper automotive crash testing for safety performance

Most trucks, SUVs do poorly in whiplash test at new weights, even for the lightest in the non-halo category. Possible explanations include:

Unsatisfactory, as the crash test for the vehicle in question is listed in the American Society for Testing and Materials (ASTM) standards.

Colorado ambulance safety threat in spotlight

No ‘a’... then NO ‘F’ !!!!!
Predictable

Background: USA Problems

- No reporting system or database specifically for identifying ambulance crash related injury
- No occupational and health safety standards to protect providers from injury
- Rear passenger compartment, > 60cm behind driver - exempt from Federal Motor Vehicle Safety Standards (FMVSS)

A few key words about restraint systems...

NOT new technical data...

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

Vehicle design and safety

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

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

?!
An admirable goal – BUT… must be done with the right technical experts.

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….

Well intentioned BUT VERY DANGEROUS, AND UNACCEPTABLE

A focus on safety IS commendable – BUT… now about $4 million has been spent, (some by government grants to EMTs) on unskilled, non automotive technical folks building potential 'death traps' in the name of 'safety'….

Ideally Who, What and Where?

Automotive and Transportation Safety
Vehicle and Transportation Engineering and Impact Biomechanics science and technical expertise

Occupational Health and Safety
- Epidemiology, Bio/Chem Hazards and Ergonomics

EMS Industry
- Collaborate with Automotive, Transportation and Occ. Health Technical expertise, Clinical & Fiscal data
  - Practice Policy, Risk Management and Fleet Safety

Academia
- Independent and collaborative
  - R & D and evaluation of all of the above

USA 1960’s

1960 to 2007
- A passenger vehicle - sure
- A laundry or mail truck - ?

Ambulance Safety Research: A New Field

Ambulance transport has a death toll….
Clinical Care? Occupational Health and Safety.....?

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

'Workplace' Hazards

Preventable...

- James Woodman
  - is a paramedic who, on his first day as a paramedic, suffered a severe TBI when the ambulance he was riding in (in the back) was t-boned and rolled onto its side.
  - He remains in a persistent vegetative state in an ECF in Colorado.
  - It is assumed that when the ambulance rolled onto its side, the lifepack 10 struck James in the head.....

This is not how you want to see your partner during a transport

It does happen....
But what about head protection?

New EMS helmet prototypes for 2006-2007

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???

EMS Transport Safety

- 'patient safety'
  - AND also
  - ‘provider’ and ‘public safety’

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
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


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

- Perception + Reaction time + Vehicle Braking time (dry)
- Perception + Reaction time + Vehicle Braking time (wet)

- Stopping distance: Perception time + Reaction time + Vehicle braking time

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

A problem

2007 Insurance data –

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

A few weeks ago....

The Huntsville Times

Ambulance suit gets $3.1 million

Injured Ambulance Passengers Awarded $3.4 Billion

This month...
What do ambulance crashes really cost?

- Loss of life and injury
- Negative impact on EMS system
- Collisions are the largest liability cost and exceed malpractice or negligence
- Besides the direct financial costs of replacing a damaged ambulance and equipment, there are additional hidden costs incurred:
  - Investigating the ambulance collision
  - Litigation/settlement/lawsuit
  - Medical/disability costs of injured EMTs
  - Hiring of new employees to replace injured personnel
  - Re-training and psychological counseling of personnel involved and others
  - Increased insurance rates

June 2007

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?
- “Black Box” feedback technology?
- Tiered dispatch?

Air EMS is a role model for safety initiatives and focus

What are the solutions?

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

WEMSA Leadership

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?

Absence of ground standards and oversight

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

Balance of concerns and risk during transport

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

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

The Mabel Rule

- Never make a left
- Make three rights instead

The Driver

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

What about changing driver behavior in the real world??

Driver behavior monitoring and feedback device

- Demonstrated Effectiveness
  - Change driver behavior
  - Carrot not stick
  - Vehicle maintenance improvement
  - Decreased administrative burden
  - Insurance benefits
The "Feedback Box" - A transportation safety monitoring and feedback device

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

Purpose of '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

- 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

And when a rare crash happens….

- Driver risk behavior can be substantially modified and improved with monitoring device, with real time auditory feedback.

Unit 302 Accident

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

The jury is out on
- Opticon
- Simulators

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 YouTube?

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

R & D
“Ripoff and Duplicate”
- Avoid reinventing the wheel at all costs
- Where are the best practices that we need to transfer knowledge from

Risk/Hazards
- Predictable risks
- Predictable fatal injuries
- Serious occupational hazard
- Public safety hazards

EMS Best Practice, Sept 2006

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

Systems Safety Engineering - Z.15...

www.ASSE.org
http://www.objectivesafety.net/Transactions/Z15.pdf
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

Incident Rates
- Incident rate based on number of vehicles operated:
  \[ \text{Incident rate} = \frac{\text{Number of incidents}}{\text{Number of vehicles}} \]
- Incident rate based on vehicle mileage:
  \[ \text{Incident rate} = \frac{\text{Number of incidents} \times 100}{\text{Vehicle mileage}} \]
- Injury incident rate based on vehicle mileage:
  \[ \text{Injury incident rate} = \frac{\text{Number of incidents with injury} \times 1,000,000}{\text{Vehicle mileage}} \]
- Incident rates based on service activity:
  \[ \text{Incidents per 10,000 transports} = \frac{\text{Number of incidents} \times 10,000}{\text{Number of transports}} \]
- Vehicle injury rates based on work hours:
  \[ \text{Vehicle incidents per 200,000 hours} = \frac{\text{Number of incidents} \times 200,000}{\text{Number of hours worked}} \]

News we don't want to see

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

There are grants to assist you...

Being seen at the scene....
November 4, 2007

Recent Visibility Webinar
www.GlobalEMSForum.org
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!

We've known for 10 years that red fire trucks are twice as likely as lime yellow trucks to crash at an intersection.

Not rocket science...

Very cool !!!

Policy and practice ignorant of existing technical safety data

Day visibility

Night visibility
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

Global EMS Vehicle Safety Standards v Specifications and Guidelines

- EMS Safety and Performance Standards
  - Australia & New Zealand 4536
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - [Aviation - FAA/CAA/JAA]
  - [New ASSE/ANSI Z15 – fleet vehicles]
- USA Other
  - Purchase Specification: KKK & NTEA – AMD
  - Guidelines: EMSC Dos and Don’ts, and (CAAS and CAMTS)

Role of the NTSB

The National Transportation Safety Board (NTSB)

History and Mission

The National Transportation Safety Board (NTSB) is an independent federal agency charged with investigating civil aviation and railroad accidents and other transportation accidents. The Board is responsible for determining the cause of transportation accidents, promoting transportation safety, and advancing transportation safety technology.

- In 1967, Congress established the National Transportation Safety Board to investigate transportation accidents and promote safety.
- The Board has more than 400 employees, including investigators, engineers, analysts, and support staff.
- The Board is headquartered in Washington, D.C., and has regional offices in Atlanta, Chicago, and Kansas City.

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

Why ISN’T EMS on the NTSB’s “Most Wanted List”??

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASS), June 2006 & June 2007
- International Ergonomics 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
- SAFETY.AX, 2006
- [Aviation - FAA/CAA/JAA]
- State Strategic Highway Safety Plans, October 2007
- APHA, Nov 2007
- OSHA EMS best practices late 2008
- Transportation Safety Standards - Incadron EMS Safety
- Worker visibility Act, to be implemented, Nov 2008

New Information 2006-2008

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASS), June 2006 & June 2007
- International Ergonomics Association (IEA), June 2006
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Ground Transport Safety IS Complex AND Multidisciplinary

- Ergonomic Research
- Biomechanical
- Transportation Safety
- Engineering
- Public Safety
- Risk Management
- PPE
- Driver Training
- Communication Technology
- Safety Technology
- Regulations and Standards
- First Safety Program
‘Safety’ approaches being driven by manufacturers claims and sales rather than by science and data?

Innovation

Major events for innovation sharing — but regional and often language isolation

Vehicle Occupant Safety design

Ergonomic design

2007 European design

Safety technology is a key focus

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

Australia, Melbourne

UK Ambulance vehicles

Clear safety message

Sweden initiatives

Norway initiatives

Other successful models

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???

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

NAEMT July 2006 Position statement

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

September 2007, Its not magic.....

Valuable information from the transportation industry

IAFC June 2007

Transportation Research Board is an excellent resource… we should be using it!!
The truck and bus industry is on the right track at the TRB.

Knowledge transfer

July 2007

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

August 2007

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

Tips for Emergency Vehicle Operations

An excellent model

No need to reinvent the wheel...

USFA Emergency Vehicle Safety Initiative
Policy Changes

Coming Soon!
Traffic Incident Management Systems (TIMS)
- USFA report to be released any day
- Research and writing by IFSTA
- Covers setting up safe roadway incident work areas and using unified command at these incidents
- Will be available in a downloadable format

Canadian EMS occupational safety leadership

Policy makes a difference...

CPR?

Important changes underway

State Strategic Highway Safety Plans

Integration and Collaboration


VGIS
- New York's safety community will continue to work to reduce road deaths - focus on three key issues: vehicle restraint, impaired driver, and pedestrian safety.
New concepts out there now

- 'Feedback' Boxes
- Tiered dispatch
- Helmets
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies - ITS
- New Safety Standards

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

Breaking News!!
National Academies
TRB EMS/Medical Transport Safety Subcommittee – Jan 16, 2008

What needs to happen NOW?

- Implement a Fleet Safety Program
- Correct the basic policies and procedures regarding:
  - Intersections
  - Use of occupant restraints
  - Securing equipment
  - Driver performance
  - Visibility and conspicuity
- Data
  - Epidemiology
  - Ergonomic
- Safety oversight

Future

- Meaningful Goals
- New policies
- New practices
- New standards
- New vehicles
- New technologies

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

PREDICTABLE PREVENTABLE and NO ACCIDENT

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
Conclusion

- EMS transport has serious hazards and safety issues
- Major advances in EMS safety research, infrastructure and practice over the past 5 years
- Development of substantive EMS safety standards is a necessity and a reality
- Multidisciplinary safety issue that EMS cannot solve internally
- 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, transportation and occupational safety

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