To quote Steve "Sid" Caesar – Director IHS ES

"We want everyone to get home safely each day"
Charged with Vehicular Homicide

After the accident, the driver of the ambulance was charged with vehicular homicide. The driver, who had been trained to do...??

Outline

I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS

II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public

III. Highlight unacceptable mythology and challenges to advancing EMS transport safety

IV. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

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

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 EMS, occupational fatalities are MVC related**
- Serious head injury in 46% of fatal occupant injuries#
- More likely to crash at an intersection with traffic lights (OR 3.3 vs. 2.3, p<0.001) & more people & injuries/crash than similar sized vehicles**

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

- Emergency ambulance transport for children that required intubation or resuscitation
- Sentinel event nursing
- Resident’s viewpoint
- The sentinel event nurse
- Key Elements to Safety

Data Capture

- Vehicle Biomechanics and Crashworthiness
- Ergonomics and Biohazards
- Transportation Environment
- Safety Management – evaluation and analysis
### 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??

### Firstly!
- An accident?
- or a predictable and preventable event

### 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

### Do we ask our vehicle builders to write cardiac arrest protocols...?
- Vehicle design and safety is not what we are trained to do!!!!

### 1960 to 2007
- A passenger vehicle - sure
- A Laundry or Mail truck - ??

- "Ambulance transport has a death toll...."
  - Carl Craigle EMT-P, Chief Platte Valley Ambulance
Clinical Care?
Occupational Health and Safety....?

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

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

National 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

So for EMS personnel...
- What’s going to kill you?
- What’s going to injure you?

‘Workplace’ Hazards

But what about head protection?

It does happen....
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

EMS Provider Fatalities

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

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

So does it make sense?

▸ Gloves and universal precautions?... good biohazard protection BUT aren’t going to give much protection in a ambulance crash

▸ Occupational transportation fatalities...

▸ WE HAVE A BIG PROBLEM HERE

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

Goals

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

“What are the solutions?”

▸ EMS provider injury events *

▸ EMS Injuries*

▸ Higher than the injury rate for any private industry published by DOL
▸ 34.6 injuries/100 fulltime workers per year
▸ 1.5 x that of fire fighters
▸ 5.8 x that of health services personnel
▸ 7 x the national average

▸ What are the solutions?

▸ EMS Best Practice, Sept 2006
Ambulance Safety Research: A New Field

We should use the best safety practices demonstrated in engineering.

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?

Full Vehicle Crash Testing

Test 1 – Right side impact

And this all takes place in 60 milliseconds – the blink of an eye
Absence of standards and oversight

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

USA Ambulances: FMVSS Exempt

- No definition to manikin mass
- No restraint for equipment
- Static Pull test
  - 2200 Lbs. (8G’s) in Longitudinal and Lateral
  - No dynamic test

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.

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

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......

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)

Predictable

A few key words about restraint systems...

NOT new technical data...

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

Your taxes at work!
Valuable information... where are we??

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
- driver performance monitoring
- roadside and road design
- integrated traffic, safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

Increasing awareness ...

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 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 4535
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - (Aviation - FAA/CAA/JAA)
  - (New ASSE/ANSI 215 – fleet vehicles)
- USA Other
  - Purchase Specification: KKK & NTEA – AMD
  - Guideline: EMSC Dos and Don’ts, and (CAAS and CAMTS)

Transport Safety Guidelines EMSC/NHTSA fact sheet

- 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
- NTEA Engineering Public Comments, July 2007
- AMD Engineering Public Comments, August 2007
- GD30 September 11, 2007 Federal Register
- SAE J 2273, 2008
- NHTSA, Preventable Fodder, Efficient Transportation Equity Act: A Legacy for Users
- National Highway Safety Plan, October 2007
- EMSC Council Policies
- APHA, Nov 2007
- OSHA – “OSHA EMS best practices late 2006
- Worker visibility Act, to be implemented, Nov 2008

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
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- Worker visibility Act, to be implemented, Nov 2008
Ground Transport Safety IS Complex AND Multidisciplinary

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

Vehicle design and safety

- The principles of automotive safety involve a complex science, engineering technical skill, expertise, training and knowledge

  "Give the engineers a working list of our needs and let them tell us how it should be built to accomplish those tasks..."

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

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

NO automotive safety engineer NO crashworthiness engineer NO ergonomist
NO reference to ANY existing or relevant automotive safety or crashworthiness technical publications.... yet multiple occupant fatalities and injuries annually....
Balance of concerns and risk during transport

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

Safety concepts out there now

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

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

Risk/Hazards

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

Innovation

- New automotive safety technologies
  - crashworthiness
  - EVS
  - ITS
  - Monitoring and feedback enhancements
- New expertise
  - TRB
  - ASSE
  - SAE
  - UTRC
- Ergonomics
- Industrial Design

Conclusion: With more effective technology you can tell if your driver has had an argument with their spouse – and take appropriate action, in advance!

With this all get to see is that you killed two people with your driver drunk – and that you got no information to avert this horrific event!!!
“Ripoff and Duplicate”

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

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

Systems Safety Engineering - Z.15....

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:
  Incident rate = Number of incidents / Number of vehicles
- Incident rate based on vehicle mileage:
  Incident rate = Number of incidents / Vehicle mileage
- Injury incident rate based on vehicle mileage:
  Injury incident rate = Number of incidents with injury / Vehicle mileage
- Incident rates based on service activity:
  Incidents per 10,000 transports = Number of incidents / Number of transports
- Vehicle injury rates based on work hours:
  Vehicle incidents per 200,000 hours = Number of incidents / Number of hours worked

Legal Perspectives on Z.15

What about changing driver behavior in the real world??

The Mabel Rule
- Never make a left
- Make three rights instead

Driver behavior monitoring and feedback device

What Z15 encompasses
- 

incident rates
- 

incident rate based on number of vehicles operated:
  
  incident rate = number of incidents / number of vehicles
- 

incident rate based on vehicle mileage:
  
  incident rate = number of incidents / vehicle mileage
- 

injury incident rate based on vehicle mileage:
  
  injury incident rate = number of incidents with injury / vehicle mileage
- 

incident rates based on service activity:
  
  incidents per 10,000 transports = number of incidents / number of transports
- 

vehicle injury rates based on work hours:
  
  vehicle incidents per 200,000 hours = number of incidents / number of hours worked

Legal Perspectives on Z.15

What about changing driver behavior in the real world??

The Mabel Rule

- never make a left
- make three rights instead

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

Purpose of a real-time monitoring and auditory feedback program
- Enhance Safety
- Improve Driver Performance
- Save Maintenance Dollars
- Aid Accident / Incident Investigation

And when a rare crash happens….

Unit 302 Accident

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
An ideal technology tool for improving driver behavior and enhancing safety
- Implementation of feedback and monitoring system over 2 years
- Safety performance improvement
- Cost savings
- Improved transport times

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

A key to safe 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 youtube??

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

Vehicle Occupant Safety design
2007 European design
Safety technology is a key focus

Ergonomic design
Ergonomic layout and equipment

NSW Australian vehicles

Flexibility to manage two patients

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???

Role of the NTSB

The National Transportation Safety Board (NTSB)

NTSB 1979 Accident Report

Recommendations
- EVOC
- LICENSE RECORDS

30 Years and 1,600 Fatalities later -
- NTSB 1979 Recommendations never implemented
- To NHTSA – Class II & III Priority Action
  - Extend Federal Motor Vehicle Safety Standards (220, 221, 301) to include ambulances and other emergency vehicles
- To GSA – Class II Priority Action
  - Maintenance of Handling
  - Loading Instructions
  - Body Structural Integrity
  - Anchorage for all equipment
- To National Committee on Uniform Traffic Laws
  - Modify criteria

History and Mission

The National Transportation Safety Board (NTSB) is an American government organization charged with investigating transportation accidents and issues reports on those accidents. The agency's mission is to reduce the number of deaths, injuries, and economic losses resulting from transportation accidents.
Why AREN'T we on the NTSB’s “Most Wanted List”??

A Simple Question....

Canada - Corporate Manslaughter
Corporate Homicide Act: 8th April, 2008

Alabama Safety Assessment

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....

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 exceeds malpractice or negligence
- Besides the direct financial costs of replacing a damaged ambulance and equipment, there are additional hidden costs incurred:
  - investigating the ambulance collision
  - litigation /settlement/lawsuit
  - medical/disability costs of injured EMTs
  - hiring of new employees to replace injured personnel
  - retraining and psychological counseling of personnel involved and others
  - increased insurance rates
June 2007

Indirect Costs
- Estimated to be 10X direct costs!

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” technology?
  - Tiered dispatch?

Use proven safety tools

NAEMT July 2006 Position statement

Policy makes a difference...

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

An excellent model

http://www.EveryoneGoesHome.com
September 2007, It's not magic.....

Valuable information from the transportation industry

These folks know what we need to know...

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
Tips for Emergency Vehicle Operations

Major crash investigation NTSB has expertise to do this comprehensively

July 2007 Report

Traffic Incident Management Systems (TIMS)

Coming Soon!

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

September 11, 2007

www.GlobalEMSForum.org recent Visibility Webinar

Science not, next best guess

News we don't want to see
Worker visibility Act: Help is on the way!! November 24th 2008

Science not, next best guess

Being seen at the scene...? Nov 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!

Not rocket science...
Policy and practice ignorant of existing technical safety data

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

### Day visibility

### Night visibility

#### Automotive Injury Triangle and Safety Development

**Host**
- Field Data
- Scholarly Research

**Vehicle**
- Technology, Innovation, Development
- Regulatory Framework
- Governmental措施

**Environment**

#### Protective devices/concepts

To prevent a crash:
- Driver feedback
- Driver monitoring
- Driver training
- Vehicle Intelligent Transportation System (ITS) technologies
- Tired dispatch
- Appropriate policies

In the event of a crash:
- Vehicle crashworthiness
- Seatbelt and seat systems
- Equipment lock downs
- Padding
- Head protection

#### Intelligent Transport Safety Systems
Policy Changes

Back up Camera… Shouldn’t all vehicles have one of these?

Vehicle visibility and conspicuity

Coming Soon!
Traffic Incident Management Systems (TIMS)

Policy makes a difference…

CPR?

Important changes underway
State Strategic Highway Safety Plans

Integration and Collaboration

Integration and Collaboration
USFA Emergency Vehicle Safety Initiative

No need to reinvent the wheel...

New York State
Strategic Highway Safety Plan
2006-2007

VISION
New York's safety community will continue to work together to eliminate fatalities, severe injuries, and non-motorized injury crashes on the state's roadways. The purpose is to make New York's roadway system safer and more accommodating to all users.

GOALS
- Reduce motor vehicle fatalities from 1,413 in 2006 to 1,286 in 2011
- Reduce the Fatel Crash rate from 6.5 per 100,000 in 2006 to 5.9 in 2011

March 2007 - FHWA

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

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
- Data
  - Epidemiology
  - Ergonomic
- Safety oversight

UK Ambulance vehicles

Clear safety message

Sweden initiatives

Norway initiatives

Other successful models

Fleet Mix?
So….

Future Directions
- Rational use of limited resource
- Avoid reinventing the wheel
- Formal safety research agenda
- Framework bridging key research and infrastructure
  - Society of Automotive Engineers
  - Involvement with ESV activities
  - EMS safety research funding
  - Foster evidence based initiatives

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

- 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

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

PREDICTABLE PREVENTABLE and NO ACCIDENT
Thank you!

Any Questions??

Electronic handout available online
http://www.objectivesafety.net