Ambulance Transport Safety - What You Can’t Afford Not To Know

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To quote Steve “Sid” Caesar – Director IHS ES
“We want everyone to get home safely each day”

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…….

Jan 28th, 2008

January 30th, 2008

February 4th, 2008

Feb 21st, 2008
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 ones?
- What policies offer the safest system?
- How do I get my team to address safety issues?

http://www.objectivesafety.net

Occupational Health and Safety.....?

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

Problems

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

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

Ambulance Standards??

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

Ambulance Manufacturer Division (AMD) Standards

- Public Comment, July 2007
- Engineering Analysis, Jan 2007

A Simple Question....

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASSE), June 2006 & June 2007
- International Ergonomics Association (IEA), June 2005
- Transportation Research Board – EMS Safety address, Jan 2007
- AMD Engineering Public Comments, July 2007
- KKK-F, August 2007
- OSHA September 11, 2007 Federal Register
- SAFE ACT, 2006
- FMVSS, 2006
- APHA, Nov 2007
- 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 2005
- Transportation Research Board – EMS Safety address, Jan 2007
- AMD Engineering Public Comments, July 2007
- KKK-F, August 2007
- OSHA September 11, 2007 Federal Register
- SAFE ACT, 2006
- FMVSS, 2006
- APHA, Nov 2007
- Transportation Research Board – Inaugural EMS Safety Subcommittee meeting Jan 2008
- NIOSH Emergency Responder Round table March 2008
- OSHA EMS best practices late 2008
- Worker visibility Act, to be implemented, Nov 2008
Firstly!

An accident?

or

a predictable and preventable event

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

Five Killed in Crash of Ambulance and Semi

July 21, 2007 06:20 AM EDT

The worst ambulance crash in USA history.

The collision occurred on Thursday after a 12-hour tense delay with the driver.

The driver lost control of the ambulance after driving into the path of the trailer.

Friday July 20th 2007...

The worst ambulance crash in USA history

Canada - Corporate Manslaughter

Corporate Homicide Act: 8th April, 2008

March 18, 2008

Charged with Vehicular Homicide

Baltimore, Jan 2008 - Three killed...

Do your policies and procedures protect you from this??

Both Vehicular Homicide

Corporate Manslaughter
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

EMS Transport Safety

» 'patient safety'

AND also

» 'provider' and 'public safety'

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

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

the EMS transport process

- communications/dispatch
- the patient
- restraining devices/cert
- transporting devices/cert
- paramedics/transport nurses, doctors & family
- patient monitoring equipment
- clinical care & interventions
- protective equipment
- the vehicle
- the driving/safety skill
- other road users
- the road
The Emergency Department (ED)

An ambulance is not an ED/ICU on wheels

Ground Transport Safety IS Complex AND Multidisciplinary

National EMS data

In the USA*

- 50,000 vehicles
- ~5,000 crashes a year
- One fatality each week
  - 23 pedestrians or occupants of other car
  - Approximately 3 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 (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles#

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)

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
Safety is Good Business

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 – yes!

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

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

“Ambulance transport has a death toll….”

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

EMS Transport General Concerns

2007 Nascar Safety Expert
On ambulance patient compartment “It is a death vault”
Tom Gideon, Head of Safety, GM Nascar

and who’s life was he racing to save?

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 & Related Careers, Annals of Emergency Medicine, Dec 2002
So does it make sense?

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

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
  - Re-training and psychological counseling of personnel involved and others
  - Increased insurance rates

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

Occupational transportation fatalities

<table>
<thead>
<tr>
<th>Year</th>
<th>EMS</th>
<th>Police</th>
<th>Fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>8</td>
<td>3</td>
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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


June 2007

A problem

2007 Insurance data – 27 fold more likely to have a claim based on transport than related to medical care
Goals

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

Ambulance Safety Research: A New Field

Priorities...... Research papers in the past 30 years

- EMS Safety
  - 40 papers - on ambulance safety
  - 1 paper - on ambulance ergonomics
  - 1 paper - on stretcher ergonomics
- Computer Workstations
  - 30,000 papers – on ergonomics of computer work stations
- Erectile Dysfunction
  - 100,000 papers – on Erectile Dysfunction

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??

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

And keep focus on ‘All hazards’ in addition to occupant protection and crashworthiness

- Driver age?
- Driving history?
- Patient condition?
- Dispatch?
- Vehicle stability?
- Driver feedback technologies?

New EMS helmet prototypes for 2008

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

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 a strategy of "eye contact" to be made at an intersection with a driver traveling at ~40 mph in the hope that this would result in a safety intervention, is at best frightening"

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

What about changing driver behavior in the real world??

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
- 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

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
Active Projects, 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

Knowledge transfer

Its not magic.....

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

ASSE Transactions, Fall 2007

Valuable information from the transportation industry

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

IAFC June 2007

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*

- EMS Section
  - 1. Emergency Medical Services Dispatch Services
  - 2. Emergency Medical Services Partnerships
  - 3. Pre-hospital Training Programs
  - 4. Road Condition and Incident Response
  - 5. EMS Responder Crash Prevention
- EMS Section
  - 1. Establish EMS Legislation and Regulation
  - 2. Provide EMS Funding
  - 3. Enhance Capabilities for Medical Response to Disaster
  - 4. Expand EMS Human Resources
  - 5. Enhance EMS Education System
  - 6. Expand EMS Services
  - 7. Facilitate EMS Communications
  - 8. Conduct EMS Public Education and Information Programs
  - 9. Conduct Injury Prevention Public Awareness Efforts
  - 10. Enhance Medical Direction
  - 11. Provide Enhanced Trauma System and Facilities
  - 12. Establish an EMS Information System
  - 13. Evaluate and Monitor EMS Programs


EMS Responders Crash Prevention
- Undertake a systematic review of other state actions and protocols for EMS responder crash prevention
- Identify and provide guidance on efforts to minimize those appropriate for the New York State pre-hospital system
- Increase implementation of restraint provisions to promote safety in traffic situations
- Develop and implement education programs to promote appropriate traffic safety techniques
- Develop and implement implementation protocols at state, regional, and service levels
- Review current protocols and identify those that may need revision to reduce risk for responders
- Develop protocols to provide incentives for adoption by EMS services of protocols that enhance traffic safety
- Increase awareness and implementation of protocols to provide public awareness and education
- Increase awareness of the potential of drug abuse among responders and appropriate response to approaching emergency vehicles

Virginia’s Strategic Highway Safety Plan
- How can you or your organization help reduce vehicle crash injuries and deaths?
- What safety solutions do you most interested in learning more about?
- What are the transportation safety issues in your area?

National Academies Transportation Research Board’s (TRB) EMS Transport Safety Subcommittee – Washington DC, Jan 16, 2008
- Brought together NHTSA, FHWA, TRB, National Academies, DOT, CAMTS & EMS
- 3 presentations
  - TRB and NHTSA
  - Ground Ambulance Safety Issues and Directions
  - Recorded presentations and handouts available
- Potential for EMS safety research funding
- Next TRB meeting January 11-15, 2009

Ambulance Transport Safety Task Force (ATS) and the National Transportation Safety Board (NTSB)
No need to reinvent the wheel...

March 2007 - FHWA

Tips for Emergency Vehicle Operations

USFA Emergency Vehicle Safety Initiative

An excellent model

http://www.everyonegoeshome.com

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

FMCSA - Hours of Service Regulations

- Requires sophisticated, expensive equipment
- Measurably demonstrates forces generated during collision
- Accepted international standard for vehicle restraint systems

Dynamic Safety Testing
The Crash Event - Crash Testing

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

Intrusion vs Deceleration

- Intrusion
  - vehicle to vehicle or vehicle to fixed narrow object

- Deceleration
  - sudden stop – ie. sled test

Dynamic Safety Testing

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

Why do we do this?

Johns Hopkins University

Test 1 – Right side impact

Closing speed 44 mph

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

In the absence of safety standards...

Choose the Best Option

Foldable

Risk/Hazards

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

EMS Best Practice, Sept 2006

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

Use proven safety tools

NAEMT July 2006 Position statement

Policy makes a difference...

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?

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???

Education

- Where does ambulance safety feature in EMS education programs – we do know now that it is biggest threat to a medics life and wellbeing

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

There are grants to assist you..

- Stopping distance at 60mph is 260 ft
- A driver will first see a pedestrian wearing retro reflective material safely at 500ft

Day visibility

Night visibility

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

Policy and practice ignorant of existing technical safety data

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

Technical information that drives changes in practice

From this..... to this

Another excellent example - From this to ... this!

Visibility day and night

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

Not rocket science..

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

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

USA Ambulances: FMVSS Exempt

Propaganda that kills...

'Occupant protection......??
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

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

Most trucks, SUVs do poorly in whiplash test

It’s not magic… what is safe is known and understood

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
Increasing awareness …

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

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

Safety concepts out there now

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.

Major events for innovation sharing
- but regional and often language isolation
  http://www.rettmobil.org/

Vehicle Occupant Safety design
- 2007 European design
- Safety technology is a key form
NSW Australian vehicles

Flexibility to manage two patients

Australia, Melbourne

UK Ambulance vehicles

Clear safety message

Sweden initiatives

Norway initiatives
Other successful models

Fleet Mix?

Ergonomic design

Securing equipment

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
  - Ergonomics
  - Safety oversight

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?

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

Creating a Safety Culture
- Awareness within a company must start with upper management’s commitment to safety
- 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’
- 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)

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

Be ready for..
- New Infrastructure
- New information
- New collaborations
- New events
- Innovation in safety technologies, strategies and policy
- Knowledge transfer
- Unacceptable mythology
- Challenges to advancing EMS transport safety

What do we know works...
- Policy
- Lap seat belts
- Over the shoulder harnesses
- Securing equipment
- Forward and rear facing seating
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need
- Injury data
- Coordinated initiatives to promote safety (with strings attached)
- Input from science and technical data
- Knowledge transfer
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