EMS Transport Safety: How do we protect our most valuable resources

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CEO, Objective Safety
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To quote Steve “Sid” Caesar – Director EMS ES
“We want everyone to get home safely each day”

In a nutshell
Am here to try to save you Lives Time and Money

http://www.objectivesafety.net

Thursday July 5th 2007

Friday July 20th 2007
The worst ambulance crash in USA history

Paramedic critically injured November 7, 2007 – yes… yesterday…

To be continued…
Paramedic from Carmel left brain dead in ambulance crash

Today’s news…

http://www.objectivesafety.net
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......

Charged with Vehicular Homicide

...as he had been trained to do...??

2 killed, 3 injured.... September 23, 2007 - PA

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

November 5, 2007

Speeding, Alcohol Blamed In Fatal Ambulance Crash

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

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

“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

National EMS data

In the USA*

~ 50,000 vehicles
~ 5,000 crashes a year
~ One fatality each week
~ 2/3 pedestrian or occupants of other car
~ Approximately 4 child fatalities per year
~ 10 serious injuries each day
~ Cost estimates > $500 million annually
~ USA crash fatality rate/capita 35x higher than in Australia

*FARS/BTS 2005-6
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 life pack 10 struck James in the head.

Preventable...

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.

New EMS helmet prototypes for 2006-2007

EMS Transport Safety
- 'patient safety'
- AND also
- 'provider' and 'public safety'

the EMS transport process
- communications/dispatch
- the patient
- restraining device/bed
- 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
  - 15% 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 an ambulance crash

Occupational transportation fatalities:

- WE HAVE A BIG PROBLEM HERE


EMS provider injury events*

* Maguire, Hunting, Guidotti, Smith Occupational Injuries among Emergency Medical Services Personnel Pre-Hospital Emergency Care, Vol. 9:4 October 2005, pages 405 - 411
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

* Maguire, Hunting, Guidotti & Smith, Occupational Injuries among Emergency Medical Services Personnel, Prehospital and Emergency Care Oct/Dec 2005

What are the solutions?

- 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

“Ripoff and Duplicate”

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

EMS Best Practice, Sept 2006

Ambulance Safety Research: A New Field

- Non issue
- Safe
- Safer

DOT Funding for Reptiles and Road Kill

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….**


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**Why do we do this?**

**Full Vehicle Crash Testing**

Test 1 – Right side impact

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

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**EMS Transport General Concerns**

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- Design of interventions to mitigate injury is predicated on a valid testing model
- Complex both engineering and public health issues

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**Absence of standards and oversight**

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

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**What we need to consider, where is the ‘bang for buck’ in ambulance transport safety:**

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**Management Opportunities**

- Fleet Safety Management
  - Z-15
  - Driver monitoring and feedback
- Life Safety Initiatives
- Visibility and Conspicuity
- Resources and information
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.

Occupant protection......??
July 2007

Internationally there are standards for proper crash testing for safety performance

- Medical vehicles and their equipment - Road Ambulances
- “Without exception, all persons, medical devices, equipment, and objects normally carried on the road ambulance shall be maintained to prevent them from becoming a projectile when subject to a force…
- 50th percentile manikins - 10 G in Forward, Rearward, Transverse, & Vertical directions
- Certified by Notified Body and Ambulance Mfg.

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
KKK/AMD

- Ignorant of basic automotive safety principles -
  - Makes no reference to dynamic testing and YET makes reference to this standard providing protection in the setting of vehicle crash forces
  - The complete ABSENCE of any real world injury data applied to the determination of these test protocols

FMVSS exempt......

- 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)

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)

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

Valuable information… where are we??

- FMCSA - safety mandate
  - Develops and enforces data-driven regulations that balance motor carrier (truck and bus) companies’ safety with industry efficiency
  - Harnesses safety information systems to focus on higher risk carriers in enforcing the safety regulations
  - Targets educational messages to carriers, commercial drivers, and the public
  - Partners with stakeholders including Federal, State, and local enforcement agencies, the motor carrier industry, safety groups, and organized labor on efforts to reduce bus and truck-related crashes.

Motor Carrier Management Information System (MCMIS)

- FMCSA operates and maintains the MCMIS
- MCMIS contains information on the safety fitness of commercial motor carriers
- MCMIS is a collection of safety information including state-reported crashes, compliance reviews and roadside inspections results, enforcement data, and motor carrier census data
- The Crash Profiles use the National Governors’ Association (NGA) recommended data elements reported to FMCSA by states through the SAFETYNET computer reporting system
MCMIS - NGA reportable crash

Must involve:
- a truck (a vehicle designed, used, or maintained primarily for carrying property, with a gross vehicle weight rating or gross combination weight rating of more than 10,000 lbs.) or
- bus (a vehicle with seats for at least nine people, including the driver)

The crash must result in:
- at least one fatality
- one injury where the person injured is taken to a medical facility for immediate medical attention; or
- one vehicle having been towed from the scene as a result of disabling damage suffered in the crash.

FMCSA - Exceptions

Unless otherwise specifically provided, the rules do not apply to:
- (f)(1) All school bus operations as defined in §390.5;
- (f)(2) Transportation performed by the Federal government, a State, or any political subdivision of a State, or an agency established under a compact between States;
- (f)(3) The occasional transportation of personal property by individuals, not for compensation nor in the furtherance of a commercial enterprise;
- (f)(4) The transportation of human corpses or sick and injured persons;
- (f)(5) The operation of fire trucks and rescue vehicles while involved in emergency and related operations;

FMCSA - Hours of Service Regulations

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

Information we need...

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 4105
  - Common European Community (CEN) EN1788
- Non EMS Specific USA Standards
  - (Aviation - FAA/CAA/JAA)
  - (New ASSE/ANSI Z15 – fleet vehicles)
- USA Other
  - Purchase Specification: KKK & NTEA – AMD
  - Guideline: EMSC Dos and Don’ts, and (CAAS and CAMTS)

Commission on Accreditation of Ambulance Services - CAAS

Commission on Accreditation of Medical Transport Systems - CAMTS Accreditation Standards
January 2006

Transport Safety Guidelines EMSC/NHTSA fact sheet

Role of the NTSB

The National Transportation Safety Board (NTSB)

NTSB 1979 Accident Report

30 Years and 1,600 Fatalities later -
- NTSB 1979 Recommendations never implemented
  - To NTSB - Class I & II Priority Action
  - To DOT - Class I Priority Action
  - To DOT - Class I Priority Action
  - To DOT - Class I Priority Action
  - To DOT - Class I Priority Action
  - To DOT - Class I Priority Action
30 years later, ~1,600 fatalities and still the same problem

Why Isn't EMS on the NTSB's "Most Wanted List"??

A Simple Question....

Why isn't EMS ground transport data captured by FMCSA?

C45 - A criminal offence to not act in a way that protects the worker

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

New Information 2006-2008

Ground Transport Safety IS Complex AND Multidisciplinary

Safety Technology

Regulation and Standards

Risk Management

Transport Policy

PPR

Driver Safety

Communications Technology

Public Safety

Biomechanical Automotive Safety

Epidemiological Data Collection

Transport Safety

New Information 2006-2008

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASSAE), June 2006 & June 2007
- International Ergonomics Association (IEA), June 2006
- Transportation Research Board - EMS Safety address, Jan 2007
- AND Engineering Public Comments, July 2007
- MACEF, August 2007
- OSHA, September 15, 2007 Federal Register
- SAFETY LL, 2006
- State EMS Council Policies
- AHEA, Nov 2007
- OSHA EMS best practices late 2003
- Transportation Research Board - Inaugural EMS Safety
- 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...." John Russell MD, Advisory Panel, EMS Safety Foundation, 2007

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

concept vehicles I & II ??

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

Balance of concerns and risk during transport:
- Response and transport time
- Clinical care provision
- Occupant safety/protection
- Public Safety

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

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

"The best driver safety device is a rear view mirror with a cop in it"
Dudley Moore

Here's a good example of why you don't want this technology.....

Conclusion: "We are nowhere near to fully elaborate and understanding the role of 'having been in an ambulance accident within the past year' on significantly higher injury rates".

The current regulated system in the emergency is quite a distance from what we need.

Dr. Albin Boll, chief of the Warren County Emergency Medical Services, said the current system is not effective and that buses need a more advanced system to improve patient care.

"The current system is not adequate," Boll said. "We need to improve patient care and safety for our patients."

November 5, 2007
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!!!

Risk/Hazards

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

Innovation

What's new

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

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

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

Driver behavior monitoring and feedback device

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
What about changing driver behavior in the real world?

- Change driver behavior
- Carrot not stick
- Vehicle maintenance improvement
- Decreased administrative burden
- Insurance benefits

Demonstrated Effectiveness

- Change driver behavior
- Carrot not stick
- Vehicle maintenance improvement
- Decreased administrative burden
- Insurance benefits

Purpose of a real-time monitoring and auditory feedback 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

Crashes

- There were:
  - 19 vehicle incidents in 2004
  - 11 in 2005
  - no major vehicle crash during the fully implemented phase of the study period.

Auditory alarm warning thresholds

Pilot 2

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<td>69,779</td>
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<td>65,370</td>
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<td>High Cornering (HFCOUNT)</td>
<td>70,197</td>
<td>68,432</td>
<td>66,760</td>
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<td>Low Reverse Count (LRCOUNT)</td>
<td>79,682</td>
<td>77,931</td>
<td>76,263</td>
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<tr>
<td>High Reverse Count (HRCOUNT)</td>
<td>80,192</td>
<td>78,432</td>
<td>76,760</td>
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Results

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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.

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<td>September</td>
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<td>November</td>
<td>18,717</td>
<td>17,302</td>
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<tr>
<td>December</td>
<td>18,522</td>
<td>17,107</td>
<td>15,716</td>
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[MEMS MONTHLY SPEED VIOLATION TREND 2003/2004]
Direct Cost savings
- Decreased crashes
- Cost saving in vehicle maintenance expenses:
  - $221,091 in 2004
  - $242,965 in 2005
  - $237,193 in 2006

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
- 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 you tube??

Major events for innovation sharing
- but regional and often language isolation
Vehicle Occupant Safety design

Safety technology is a key focus

Ergonomic design

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

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???

September 11, 2007
Science not, next best guess

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

Being seen at the scene....

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

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**Day visibility**

**Night visibility**

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**A problem**

2007 Insurance data –

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

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**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/belittlement/lawsuit
  - medical/disability costs of injured EMTs
  - hiring of new employees to replace injured personnel
  - training and psychological counseling of personnel involved and others
  - increased insurance rates

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**June 2007**

**Indirect Costs**

- Estimated to be 10X direct costs!

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

Safety Management

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

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

September 2007, Its not magic.....

Valuable information from the transportation industry
These folks know what we need to know...

IAFC June 2007

The Effects of Sleep Deprivation on the Firefighter and EMS Suspender

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

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

July 2007

August 2007

Tips for Emergency Vehicle Operations

An excellent model

http://www.EveryoneGoesHome.com
Major crash investigation
NTSB has expertise to do this comprehensively

Who has read this information??..

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

July 2007 Report
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

Automotive Injury Triangle and Safety Development
- Host
  - Field Data
  - Scholarly Research
- Vehicle
  - Technology, invention & development
  - Countermeasure deployment
- Environment
  - Protective devices/concepts
    - To prevent a crash
      - Driver feedback
      - Driver monitoring
      - Driver training
      - Vehicle Intelligent Transportation System (ITS) technologies
      - Towed dispatch
      - Appropriate policies
    - In the event of a crash
      - Vehicle crashworthiness
      - Seatbelt seat systems
      - Equipment lock downs
      - Padding
      - Head protection

Intelligent Transport Safety Systems
Back up Camera….. Shouldn’t all vehicles have one of these?

Vehicle visibility and conspicuity

Policy Changes

Canadian EMS occupational safety leadership

Policy makes a difference…

CPR?

State Strategic Highway Safety Plans

Integration and Collaboration
Integration and Collaboration

Tips for Emergency Vehicle Operations

No need to reinvent the wheel...
USFA Emergency Vehicle Safety Initiative

New concepts out there now
- Black Boxes
- Tiered dispatch
- Helmets
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies - ITS
- New Safety Standards

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

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

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?

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

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
- 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

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