Ambulance Transportation Safety: Separating Fact from Fiction

Who am I?
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- Chair, National Academies Subcommittee TRB EMS Transport Safety, USA
- Founder of EMS Safety Foundation
- Recipient, International Society of Automotive Engineers, Women’s Leadership Award for EMS Safety

Emergency Medical Service Transport
- What are the transport safety issues that pertain to this important public service and public safety industry?
- What do we know of the risks and hazards and how can we measure these?
- How can the safety of this transport system be optimized?

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

RFDS Innovations
- pedal wireless
- medical chests
- portable gurney/stretcher lift device
- customized features on medical equipment
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

Emergency Medical Services (EMS)
An important and unique transport system
- Public safety, public health and emergency service
- Is there to save lives

The Public Health Paradigm
1. Define the problem
2. Measure its magnitude
3. Understand the key determinants:
   a. Biologic etiology: host/agent/vector
   b. Environmental & biomechanic influences
   c. Social/behavioral practices of at risk pop.
4. Develop intervention/prevention strategies
5. Set policy/priorities
6. Implement and evaluate

Some odd USA 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

Unique workplace
- In vehicles
- At roadside and other emergency scenes

The ‘workplace’ IS a vehicle
- EMT’s often in vulnerable positions during transport.
  - Bench seat
  - Captain’s chair
  - Standing or kneeling
The ‘workplace’ is also a crash scene.

Absence of USA standards and oversight

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

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

Preventable...

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

EMS Transport General Concerns

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

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=0.015) & more people & injuries/crash than similar sized vehicles##

What do we know now??

- Intersection crashes are the most lethal
- There are documented hazards, some which can be avoided
- Occupant restraint with standard belts is effective. (Over the shoulder belts for patients should be used, with the gurney in the upright position where medically feasible)
- All equipment should be locked down
- Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- Electronic Driver monitoring/feedback systems appear to be highly effective
- Head protection??
Safety is Good Business

June 2007

The inevitable bottom line...

Safety saves time, lives AND money
Canada, Nova Scotia

A problem

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

2003 Insurance data –
- 10 fold more likely to have a claim based on transport than related to medical care
Expensive…

*The Huntsville Times*

**Ambulance suit gets $3.1 million**

*The Huntsville Times*

**EMS CANNOT Afford to keep paying out like this….**

Very Expensive

A “Fleet” to many in Emergency Medical care means….

- Transport Medicine
- Biomechanics
- Ergonomics
- Fleet Safety
- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

EMS Transport Safety

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

Golden Hour – not so hot

- March 2010
- Annals EM
Golden Hour – not so hot

This study suggests that in our current out-of-hospital and emergency care system time may be less crucial than once thought. Routine lights-and-sirens transport for trauma patients, with its inherent risks, may not be warranted. [Ann Emerg Med. 2010;55:247-248.]

Golden Hour Summary

- dispatch of EMS/Medical transport vehicles
- transport policies and protocols
- vehicle fleets and vehicle design
- vehicle purchase standards
- Intelligent Transportation Systems (ITS) technology
- driver training
- driver performance monitoring
- roadside and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

Transport related aspects -

- dispatch of EMS/Medical transport vehicles
- transport policies and protocols
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Key Issues

- Mythology
  - That Emergency Medical Service personnel are safe
- Injury Hazards
  - Biohazard
  - Chemical/Radiation
  - Physical/Mechanical trauma – THE BIG PROBLEM

Motor Vehicle Crashes are the highest cause of death at work – EMS has > 2X the mean national rate

An R & D and Regulatory Gap

- Occupational Health and Safety
- the workplace is in a vehicle
- exposure data are scant
- Automotive Safety
- a vehicle is the workplace
- 'exempt' from automotive research and regulation

What's missing

1. What data is collected nationally?
   - We have no denominator data
   - We have incomplete numerator data
2. Absent population based national injury data or injury mechanics data
3. Absent structured transportation safety engineering input
4. What oversight is there?
5. Which organizations would determine policy?

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 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
Challenges to Optimizing EMS Transport Safety

- Rear compartment exempt from FMVSS
- Complex automotive safety area bridging acute clinical care, public health, public safety and automotive safety
- Very recent history as a research issue
- Limited fiscal support for cross disciplinary EMS transport safety research

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

A tragic emergency health care intervention outcome

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

Negative impact on system performance...
- BUT an EMS crash can kill all those involved AND wipe out a rural EMS system AND negatively impact a region's response capacity......

Ambulance Transport Safety
- Emergency care, public health, public safety, and patient transportation.
- Important Principle: Ambulance transport safety is part of a system; the overall balance of risk involves the safety of all occupants and the public
- All get home safely

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

USA EMS
- EMS Systems - ~15,000
- Personnel - ~1 million (~30% F/T professional & 70% volunteer)
- Vehicles - ~50,000 (Type I, Type II, Type III, Freightliners, motorcycles)
- Transports - ~50 million (to Emergency Depts ~ 50%, < 1/3 emergent)
- Cost - ~$8 Billion annually

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
In the USA there are more safety standards for moving cattle than for moving patients.

Creating a Safety Culture:
- Awareness
- Training
- Incentive

The EMS transport process:
- communications/dispatch
- the patient
- restraining 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.

Ground Ambulance Transport Safety IS Complex AND Multidisciplinary:
- Risk Management
- Public Safety
- Transport Policy
- Driver Training
- PPE
- Fleet Safety Program
- Regulations and Standards
- Safety Technology
- Communications Technology
- Biomechanical Research
- Behavioral/Chem Research
- Ergonomics Research
- Epidemiological Data Collection

Do we ask vehicle builders to write cardiac arrest protocols…?
Vehicle design and safety is not what we are trained to do!!!
What is a survivable impact?

E = \frac{1}{2} mv^2
v^2 = 2as

~ 12 mph (20 km/hr)

~ 30 mph - survivable

~ 60 mph – not survivable

A survivable impact??

A serious problem...

Tragedy you don’t want to be involved in

Thursday July 5th 2007……
Paramedic Allan Parson’s killed

"...I’d like to know what can be done so this never happens again...."

2 weeks later… Friday July 20th 2007
The worst ambulance crash in USA history

Five Killed in Crash of Ambulance and Semi

The National Highway Traffic Safety Administration, with its research, testing, and deployment of life-saving technology, is addressing the challenge of improving safety for everyone on our nation’s roads. The tragedy in Edmonton, which killed emergency medical technician Paramedic Allan Parson, has raised the need for action.

For more information, visit www.nhtsa.gov
January 10, 2008

**County News**

**AMBULANCE ROLLS, INJURING 4**

**January 28th, 2008**

**1 dead, others injured in Sussex crash involving ambulance**

**April 14th, 2008**

**1 dead, others injured in Sussex crash involving ambulance**

**April 20, 2008..??**

**June 17th 2008**

**a paramedic and a patient killed**
In this vehicle...

October 31, 2008 - Kentucky

April 30, 2009 - Tennessee

Minnesota - June 20, 2009

August 2009 – Impaired...

October 22, 2009, TN
Patient and Provider killed, Attendant Critical

October 22, 2009
Provider and Patient Killed

Monday November 30, 2009
Smithfield
Last week’s New York Times!
…but the fine print is policies protect

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

How bad is the problem

How are we counting these events?
WhatWhere are the relevant data bases?
– FARS
– NASS/CDS
– GES
– State Traffic Records
– FMCSA
– BLS
– NEMSIS
– Other

USA Emergency Vehicles
Minimum Annual Fatalities 1995-2007

FARS – A National Data Set?
Small numbers – but NO data captured from 20% of the nation in 10 years
Total Fatalities Per 10 Million Population 1999-2006
USA EMS transport safety data estimates
- ~ 50,000 vehicles
- ~ 9,000 crashes a year
- One fatality each week
- ~23 pedestrians or occupants of other car
- ~10 serious injuries each day
- Cost estimates > $500 million annually

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

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

Ambulance transport a serious USA transport safety problem...
- the most lethal vehicle on the road both per mile travelled and per vehicle
- is exempt from federal commercial fleet safety oversight (FMCSA)
- 2/3 fatalities not in the ambulance
- Exempt from most FMVSS standards

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

Data...
- What is your transport safety record in your service?
- How can you improve if you don’t have a meaningful measure of safety performance?
- Transport safety is not guesswork, it is a science
The laws of physics prevail...
- and they don’t care what your job title is or if you are a patient, a provider or a member of the public

Science behind Policy
- “For successful technology, reality must take precedence over public relations, for Nature cannot be fooled.”
  Richard P. Feynman 1988

Safety is a tool to save
- Lives
- Time
- Money
- must be evidenced based

Firstly, the DANGER...
- The state of EMS transport safety research is an EMBARRASSMENT
- Lags at least 30 years behind general automotive and transportation safety research
- EMS safety research is NOT EVEN ON THE PLAYING FIELD of state of the art automotive safety research
- ‘Reinventing the wheel’ – should be avoided at all costs

Then, The OPPORTUNITY
- This is vehicles, and this is transportation safety
- Vehicle and transportation safety technology and research infrastructure exists
- Ditto drivers, and driver/fleet safety technology
- Collaboration, and the multidisciplinary model is key
- Optimal use of very scarce resource

And...
This is in a setting where
- transport safety is the major and most costly adverse event in EMS
- And there have been all sorts of major technical and informational developments since Jan 2006

New Information/Technical Developments Jan 2006- Jan 2010
- SAFFETEA-LU, 2006 – EMS identified as one of the 4 E’s
- National Academies TRB – Inaugural EMS Safety Subcommittee meeting Jan 2008
- National Academies TRB EMS Safety Foundation established – Dec 2007
- National Academies TRB EMS Safety Summit, Jan 2008
- NEMSAC established – April 2007
- Transportation Safety Advancement Group (TSAG) – Feb 2008
- American Society Safety Engineers (ASSE) – publications June 2006, 2007
- International Ergonomists Association (IEA) – publication June 2006

Science behind Policy: A New Field
- …is that there is a major problem with the present approach and what is being done currently
- and many practices are in conflict with, or not supported by, existing technical engineering science

Ambulance Safety Research: A New Field
- ergonomic
- epidemiology
- engineering
We should use the best safety practices demonstrated in engineering...

...in automotive safety engineering

2 most recent publications
ESV July 2009

October SAE – October 2009

and in ergonomics

Range of reach... This is a well defined technical science

‘Workplace’ Hazards

Bigger is not necessarily better......
• “Ambulance transport has a death toll….“
  
  Carl Craigle EMT-P, Chief, Platte Valley Ambulance

‘Real world’ head-on post crash

It does happen....

But what about head protection?
Attitudes to Head Protection in EMS

Would You Consider Wearing a Helmet PRESENTATION

16%

Would you consider wearing a helmet POST

18%

\( n = 32 \)

Levick NR, Garigan M, A Solution to Head Injury Protection for Emergency Medical Service Providers, International Association for Ergonomics (IAE), July 2006

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

What is known

- Ambulance transport is part of a system of integrated elements, as is an ambulance vehicle a microcosm safety system of interrelated occupant and safety issues
- The laws of physics prevail

Would we...?

Seeing that we are health care providers – lets look at it this way –
- Would we use medical equipment that was built by folks who were not technically qualified or trained biomedical engineers and who just said – "this device is safe"?
- Or would we expect them to be qualified in this field and that their products were tested in a meaningful way to ensure that they were safe?

Patient Safety- A routine concept...

EMS Safety

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

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

This IS a Transportation and Automotive Safety issue
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

Important...

- Ergonomics and automotive safety issues are interrelated
- Crashworthiness priorities override the ergonomic issues

Air EMS is a role model for safety initiatives and focus
Duke Risk Assessment Approach

Integrating Risk Assessment and Operational Practice!!

- Green
- Blue
- Yellow
- Red

1995 - Deceleration Sled test (upon impact) 24 G, 30mph


Why do we do this?
Vehicle Crashworthiness testing

Vehicle Crashworthiness testing

USA - 2000 research

Europe - 2007 to meet CEN

Immobilization board

Choose the Best Option

Test 1 - Right side impact

Test 2 - Frontal

Foldable

Johns Hopkins University

Test 1 - Right side impact

34 mph

Test 2 - Frontal

Johns Hopkins University

Test 1 - Right side impact

34 mph
Pre-impact CTD positioning

2000 Full Vehicle Crash Testing
Pre-impact CTD positioning

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

Impact residue

Which of these two vehicles would you want?

Sprinter v Ford Transit crash test
http://www.youtube.com/watch?v=CNbX1V7vAA&feature=related

And now for some MYTH BUSTING

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

And now for some MYTH BUSTING

http://www.youtube.com/watch?v=CNbX1V7vAA&feature=related
‘Safety’ approaches being driven by manufacturers claims and sales rather than by science and data

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

A few key words about restraint systems…

PPE from the stationary environment can be highly hazardous in the automotive setting

Not new technical data…

Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds

Yes, the ride of your life….

- Anything that allows or encourages you to get up out of your seat will also encourage you to be injured or killed – it is potentially lethal to be out of your seat in any fashion
- 4 or 5 point harnesses over both shoulders for sidefacing occupants are potentially lethal – and in NO WAY SUPPORTED BY ANY DATA OR INDEPENDENT AUTOMOTIVE SAFETY EXPERTISE

Ambulance Vehicle Standards??

- KKK?
- AMD?
- FMVSS?
- NFPA?
- SAE…?
- ASTM…?
- International –ASA –CEN

Being seated IN an automotive seat is what will protect you

Sure… these vehicles all parade around the EMS and Fire shows BUT…

NOT ONE of these vehicles has been to the automotive safety shows or scrutinized by the automotive safety industry


Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds
Global EMS Vehicle Safety Standards
Specifications and Guidelines

- EMS Safety and Performance Standards
  - Australia & New Zealand 4535
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - (Aviation - FAA/CAAA)
  - (Fire - ASSE/ANSI Z15)
- USA Other
  - Purchase Specification: KKK
    - “Standards” - NTEA – AMD, ASTM F 20
    - Guideline: EMSC Dos and Don’ts, and (ASTNA, CAAS and CAMTS)

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

NTSB 1979… and 30 years later and still the same problem

USA Ambulances: FMVSS Exempt

USA KKK ambulance purchase specifications
- Specifications for the purchase of a Star of Life Ambulance
  - Static Pull test
  - 2200 Lbs. static stretcher test in longitudinal, lateral & vertical
  - No dynamic test for vehicle, occupants or equipment
  - No automotive test mankin
  - Mandatory

USA Ambulance Manufacturing Division (AMD)
Ambulance Standards – August 2007
- No dynamic or impact test
- No automotive test mankin
- Mandates NO ‘crumple zone’
- No impact tested anchorages for occupant restraint or equipment
- Internal, not independent

October 2008 JEMS Article
“Rig Safety – 911”

What KKK-A-1822F, AMD and FMVSS state and don’t state…
Occupant protection……??
July 2007

KKK/AMD – static ‘safety testing’
- Ignorant of automotive safety principles – and specifies -
  - 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.

No ‘a’… then NO ‘F’ !!!!!

F = ma

where:
F – force
m – mass
a – acceleration

FMVSS exempt……

Standards Development Update
- NFPA – Meetings March 2010
- SAE – x2 standards underdevelopment
  - General vehicle crashworthiness and occupant safety standard
  - Specific equipment and occupant restraint standard
- ISO - ISO/AWI 39001 - Road-traffic Safety Management systems
  - Recent update meeting in Canada

Visibility and lighting issues

KKK Specification and AMD Standards both default to the FMVSS for safety – however…
- FMVSS has a specific exemption for ambulance vehicles once you are 600mm or 2 feet positioned rearward of the driver
- KKK require a ‘national test lab’ to conduct AMD ‘tests’ BUT NOT an automotive test lab!
- No dynamic impact tests AT ALL
- No crashworthiness tests

Ridiculous current 2009 USA ambulance ‘safety testing’ !?? – Is NOT consistent with accepted automotive safety practice…
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
differentiate personnel at the scene did???

It isn’t like this outside of the
USA

News we don’t want to see

Caught On Video: EMT Struck
By Car

Worker visibility Act:
November 24th 2008

Day visibility

Night visibility

Here’s the real world at 6 ft…

August 2009 – Visibility review
Policy and practice ignorant of existing technical safety data

This addresses some very real risks, very creatively – and currently ONLY available in London Ontario!

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response:

- Location
- Size
- Shape
- Speed
- Intended path

Having access to that technical knowledge supports changes to improve safety practice.
But whatever color…. If you run a red light someone will be killed

What about changing driver behavior in the real world??

This technology is conceptually like a vehicle safety ‘pulse oximeter’ – that with auditory feedback - can save your life, your coworker's life, your patient's 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

MEMS - Seatbelt Violations per Month

MEMS - Overspeed Violations per Month
**Unit 302 Accident**

- 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 in-service or retraining after the initial introduction period.

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**Monitoring and feedback devices**

- The system works
- Objectively improved performance
- No increase in response times
- At fault accidents reduced
- Accepted into the culture

**Feedback box Summary**

- The system requires monitoring
- Must be reinforced by management
- Must be incentives for good performance
- Must be consequences for poor performance

**And when a rare crash happens…**

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**A key to safe ambulance transport**

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**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

**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?

The jury is out on

- Opticon
- Simulators

Resource availability and allocation technologies

Technical information available

Innovation

What's new

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

Safety concepts out there now

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

What the independent technically expert occupant protection and automotive safety engineers say about our current ambulances and ‘safety’ approaches:

- “The rear compartment Death Vault”
- “The Kitchen Design must go”
- “The Kill, Kill, Kill (KKK) spec”
- “The organ donor harness system”

Independent Technical Expertise

- The “kitchen design” is completely unacceptable and a failure in health care delivery, occupant protection and ergonomics.
- Independent technical expertise must be here and involved
National Academies Transportation Research Board
Ambulance Transport Safety Summit –
October 29, 2009

October 29, 2009
This is where the technical experts were, operational EMS providers and the government agencies too.

What could you learn from the National Academies – right NOW and gratis

The realm of burden and benefit
• measuring the safety of the system
• determining the economic, ethical and risk benefit challenges

Transport System Management
• fleet safety and oversight technologies and policies
• logistics management - objects, congestion routing, deployment of resources, benchmarking

Vehicle safety
• occupant protection design and testing
• vehicle performance safety

Dissemination and Policy
• knowledge transfer
• standards, specifications and policy

2009 TRB Summit Participants

http://www.objectivesafety.net/TRBSummit2009.htm

Please do go and access this information, it comes from technical and operational experts and it is gratis.

Its out there NOW

TRB 2009 Summit – addressed the key and interdisciplinary issues, in one day – please seek that information out.

There have been two TRB Summits held, 2008, 2009 and both with vehicle engineering and transportation systems technical expertise

See www.trb.org, and for the Summit archives: www.objectivesafety.net/TRBSummit2008.htm
www.objectivesafety.net/TRBSummit2009.htm

International approaches

The state of the art non-USA vehicles have NO squad bench nor the aftermarket structural vehicle modifications that can potentially decrease crashworthiness integrity that were seen in study vehicles.

The EMS Safety Foundation: A practical and functional model

Interdisciplinary and Operational
• Innovation
• Collaboration
• Knowledge transfer
The EMS Safety Foundation
November 2009 Webinar for Public Access
www.EMSSafetyFoundation.org and www.objectivesafety.net

Background:
- EMS Safety Foundation has been established to fill a gap in
  - technical knowledge transfer
  - practical interdisciplinary R & D
  - evaluation and implementation of system safety enhancements for EMS and Medical Transport
- It is a not-for-profit institute

Mission
- This is a team of like-minded innovators across EMS Medical Transport and a number of technical disciplines, who share the common mission of enhancing the safety of EMS delivery for all involved.

In a nutshell
- EMS Safety Foundation is a not-for-profit multidisciplinary virtual think – tank and test bed for safety innovation and knowledge transfer
- It is a virtual network integrating the end users and the technical experts
- A tool to enhance the safety of delivery of EMS services

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

Ambulance Vehicle & Ergonomics Workshop, October 2009

Automotive engineers addressing EMS Safety Foundation Workshop

EMS Safety Foundation Delegation bringing International Innovation to you!
Vehicle Occupant Safety design

Safe and Ergonomic design

European design

Safety technology is a key focus

Patient Transferring Slides

Ergonomic layout and equipment

Flexibility to manage two patients

Collaboration and Outcomes

- Interdisciplinary Collaboration is what is key – not orthopedic folks talking to cardiologists – BUT collaboration between the health care folks appropriate automotive and occupant protection engineers and transportation system design and industry standards that make sense – and
- Meaningful measures of outcome and performance

Texas’ Careflite’s new vehicles
Careflite’s new vehicle

Manitoba’s new fleet

Technical Collaboration is key

- We are NOT the experts in this science
- We cannot afford to play the silo game here, it is costing lives, time and money
- We MUST have a meaningful evidenced based approach to operations and policy
- We must be outcomes driven
- We MUST cease to be a fiefdom in a discipline we have no technical background or expertise in

this vehicle is safety crash tested by automotive experts

Unlike this vehicle

Is this acceptable...?

- There are ambulances rolling out of the show room on a daily basis – as we speak – being designed by health care providers and built by after market retrofitters, who are not at all governed as are other passenger vehicle manufacturers by the standards set by the society for automotive engineers
So what do we need to do??

- Reach out to the appropriate experts – they sure do want to help us
- STOP being philistines and be the scientists we are trained to be and at least seek a scientific approach
- Get your heads out of the sand – there is plenty of valid technical information – FMCSA, TRB, SAE
- Make policy and purchase decisions on technically sound data, not a marketing brochure
- HAVE MEANINGFUL AND TRANSLATABLE OUTCOME MEASURES FOR YOUR SERVICES SAFETY PERFORMANCE

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

Goals

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

Were we safer in the Cadillac???

Creating a Safety Culture

- Awareness
  - Training
  - Incentive

Safety Management

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

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

Future

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

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 transportation, automotive 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