November 13, 2010, Poughkeepsie, New York

**Bridging the Gap between Personal Safety and Patient Care**

Nadine Levick, MD, MPH
- Emergency Medicine Physician and Public Health Academic
- 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

**Who am I?**

- Nadine Levick MD, MPH
- Emergency Medicine Physician and Public Health Academic, USA-Hopkins, Harlem, Maimonides, Brockdale & Australia – Royal Melbourne, Royal Childrens Hospitals, Royal Australian Flying Doctor Service
- 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?
- What can we learn from international colleagues

**Outline**

I. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
II. Highlight unacceptable mythology and challenges to advancing EMS transport safety
III. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

**Things can go wrong – but when there are sound safety policies and technologies in place, and the system is well prepared, you can minimize harm**

**Your Interactive Handout awaits you online at…**

- www.objectivesafety.net
  - This WILL be FAST!
  - No need to take any notes – all text slides will be awaiting you in your online Handout

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

**Your Handout and Additional Resources**

**Emergency Medical Services (EMS)**

- An important and unique transport system
  - Public safety, public health and emergency service
  - Is there to save lives
Tragedy you don’t want to be involved in

Thursday July 5th......
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
July 21, 2007 09:20 AM EDT

The highway patrol says three Death Valley residents and a driver with the California Highway Patrol were killed when the ambulance and semi truck collided. One paramedic was flown to the hospital but died there.

Provider
Public
Patient

Safety of the...

And ...

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
But Patient Safety is just one part of this system

Ontario EMS Occupant Safety
30 August 2010

EMS Transport Safety

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

Where is our Safety leadership coming from...??

Balance of concerns and risk during transport

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

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

Ambulance transport a serious 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

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
ESC – Does your ambulance have it??

- Transport Canada announced that effective August 31, 2011, automakers must install Electronic Stability Control (ESC) technology in Canadian vehicles.
- ESC helps drivers stay in control when they need to swerve or brake suddenly to avoid an obstacle or turn corners on slippery roads.
- Vehicles equipped with ESC are involved in fewer severe collisions caused by loss of control, resulting in significantly fewer deaths and injuries.

ESC – Does your ambulance have it??

- Does your ambulance have ESC?

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

- EMS Safety

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

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 (GR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)**
- 8% of fatally injured EMS rear occupants unrestrained***
- 74% of EMS occupational fatalities are MVC related***
- Serious head injury in 85% 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 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

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 - ? Disparate

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

Jan 2010 - Evaluating Trauma Management Performance in Europe

Yongjun Shen, Elke Hermans, Da Ruan, Geert Wets, Tom Brijs and Koen Vanhoof

USA EMS transport safety data estimates

- WE HAVE A BIG PROBLEM HERE

Occupational transportation fatalities...

- WE HAVE A BIG PROBLEM HERE
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 an ambulance crash

Current accepted safety design and transport system technologies are being ignored, and worse...

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

Some new dimensions

- Vehicles – smarter, sleeker, safer – CHEAPER!
- Operations – new technology tools
- Interdisciplinary infrastructure – new global platforms

Systems safety of:

- Getting you, your patient and equipment in and out of the vehicle
- Providing patient care inside the vehicle
- Occupant protection in crash and near miss situations

A challenge we know now...

- ...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

Safety Performance

- Measurement
- Outcomes
- Technical expertise

New Information/Technical Developments Jan 2006- Jan 2010

- SAFETEA-LU, 2006 – EMS identified as one of the 4 E’s (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)
- International Ergonomists Association (IEA) - publication June 2006
- Enhanced Safety of Vehicles (ESV) - publications June 2007, 2009
- American Society Safety Engineers (ASSE) - publications June 2006, 2007
- National Academies TRB - SmartGov EMS Safety Address, Jan 2007
- NHTSA - webcast – Nov 2007
- MASH Engineering EMS, Congress, July 2007
- CDRH Draft Planning for Involvement 2007
- CMS Draft planning for Involvement 2007
- CDC Draft planning for Involvement 2007
- FDA Draft planning for Involvement 2007
- EMS Safety Foundation established – Nov 2007
- National Academies TRB – Inaugural EMS Safety Subcommittee meeting Jan 2008
- Transportation Safety Advancement Group (TSAG) – Feb 2008
- Society for Automotive Engineers (SAE) – publications Oct 2007, 2008, 2009
- Worker visibility Act - Nov 2008
- SAE Ambulance Standards development – April 2009
- NFPA Ambulance Standards Committee – June 2009
**When is it safe to do what...?**

- What are your policies???
  - If your patient is pink, warm and talking?
  - Are you required to notify the driver if you are out of your seat belt?
  - Are ‘routine procedures’ putting you at risk?

**What is a safe speed and how do we identify that?**

\[ E = \frac{1}{2} m v^2 \quad v^2 = 2as \]

- ~ 30 mph - survivable
- ~ 60 mph - not survivable

**What is a survivable impact?**

A survivable impact??

**A serious problem...**

Transport related aspects -
- 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
- roadsides and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

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

**Impact biomechanics**

- Crashworthiness
- Vehicle design
- Occupant protection

**Transport Ergonomics**

- Operational tasks
- Human factors analysis
- Range of reach
- Patient loading and unloading

**Fleet safety**

- Operational policies – dispatch, safety
- Fleet mix
- Vehicle selection – safety, ESC, loading height
- Driver performance and monitoring
- Scene safety
- Visibility and conspicuity
- Safety measurement and management

**Firstly!**

- **An accident?**
  - or
  - a predictable and preventable event

**A tragic emergency health care intervention outcome**

**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 regions 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

**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
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?

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

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

Creating a Safety Culture
within a company must have leadership and support of upper management:
• Awareness
• Training
• Incentive

the EMS transport process
• communications/dispatch
• the patient
• restraining device/seat
• transporting device/journey
• paramedics/transport nurses, doctors & family
• patient monitoring equipment
• clinical care & interventions
• protective equipment
• the vehicle
• the driver/driver 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

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

Would we....?
Seeing that we are health care providers – let’s 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?

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

In this vehicle...

June 17th 2008
A paramedic and a patient killed

April 14th, 2008
A medical worker killed in an accident

October 31, 2008 - Kentucky
A paramedic and patient killed in a vehicle crash...
April 30, 2009 - Tennessee

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

January 14, 2010

February 1, 2010

April 28, 2010

Sept 16, 2010

EMS

EMS

EMS

EMS

EMS

EMS
This IS a Transportation and Automotive Safety issue

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.

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

Golden Hour – not so hot
- March 2010 Annals EM

Golden Hour Summary
- 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.]

April 2010, Resuscitation – Going fast can hurt your patient clinically!

CPR?

New York too…
Important changes underway

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

Important...
• Ergonomics and automotive safety issues are interrelated
• Crashworthiness priorities override the ergonomic issues

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

Policies? – is pull over to the right really safer...?

May 13, 2010...

MedStar Ambulances Will No Longer "Run Hot" When Transporting Cardiac Arrest Patients (4/21/2010)
• "MedStar ambulances will no longer ‘run hot’ - when paramedics inside are giving chest compressions to patients in cardiac arrest, officials say." This “policy, which took effect Friday, will affect about 1,400 of the more than 100,000 calls to which MedStar responds annually in the 15 Tarrant County cities it serves."
Policy makes a difference…

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

Safety is Good Business

Are you self insured???

Very Scary insurance data – the $10 million dollar EMT

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Workers Compensation Rate increased by 27%

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…
Very Expensive

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

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

Testing the real world
And this all takes place in 60 milliseconds – the blink of an eye.

Impact residue

During impact

CTD dynamics

A few key words about restraint systems...

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

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


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 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

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, 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
- Head protection??
- Electronic Driver monitoring/feedback systems appear to be highly effective

Electronic Driver monitoring/feedback systems appear to be highly effective
Air EMS is a role model for safety initiatives and focus

An Aviation Safety Plan
- Safety Program Planning
- Evaluating
- Analysis of Safety Performance
- Analysis of Safety Information and Data
- Analysis of Risk Profiles and Plans

Air Safety Approach

Ambulance Safety Research: A New Field

Priorities...... Research papers in the past 30 years
- EMS Safety
  - 42 papers - on ambulance safety
  - 2 papers - on ambulance ergonomics
  - 1 paper - on stretcher ergonomics
- Computer Workstations
  - 30,000 papers - on ergonomics of computer workstations
- Erectile Dysfunction
  - 100,000 papers - on Erectile Dysfunction

We should use the best safety practices demonstrated in engineering

...in automotive safety engineering

and in ergonomics

Tort Claims from Adverse Events in Emergency Medical Services
- Henry H. Wang, Nuth J. Renton, Mark H. Blum, Donald E. Yealy, University of Pittsburgh, Pittsburgh, Pennsylvania, Jan 2007
- Methods: 2003-2004 liability claim records that resulted in injury to patients or other individuals.
- 275 cases, with emergency response in 46% and nonemergency response in 39%.
- Ground ambulances (67%) and wheelchair vans (19%).
- Adverse event categories included:
  - patient handling (40%),
  - emergency vehicle movement or collision (31%),
  - medical management (11%),
  - EMS response or transport (8%),
  - lack or failure of equipment (4%),
  - other errors (9%)
- Conclusions: Patient handling errors and emergency vehicle movement/collisions are the most common adverse events resulting in tort claims against EMS. Other incidents are less frequent but incur higher individual costs. These findings highlight key areas for improving EMS patient safety.
Moving Patients

Your back… – 1880’s

2010… but these can really hurt your back too!

EMS Ergonomist Chris Fitzgerald addressing the EMS Safety Foundation Workshop

The science of Stretcher lifting & loading

So what’s important…

- A stretcher system that doesn’t harm your back… and your services wallet
- A 27 inch loading height

And what is the loading height of your ambulance??

Size matters… Less than 27 inches will save your back!!!!

2011…..
Range of reach.. This is a well defined technical science

‘Workplace’ Hazards

Bigger is not necessarily better.....

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?

It does happen.....

But what about head protection?

New EMS helmet prototypes
Which of these two vehicles would you want?
Sprinter v Ford Transit crash test
http://www.youtube.com/watch?v=C3kN6WF5vAA&feature=related
High speed crash, rolled and the occupants (patient and medics) had only minor scratches

"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

Yet another potentially lethal example marketed as a 'safety innovation' YET outside of automotive safety practice

Airbags in the back....?? Hazardous for this environment
Absent safety testing standards, any meaningful crash or injury mechanism data or effective occupant positioning – as per the automotive engineers, rear compartment airbags are likely to be highly hazardous

Yes, the ride of your life....
- 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

October 2008 JEMS Article “Rig Safety – 911”
http://www.objectivesafety.net/JEMS/RigSafety911.pdf
Ambulance Vehicle Standards?

- KKK?
- AMD?
- FMVSS?
- CMVSS?
- NFPAs?
- SAE…?
- ASTM…?
- International
- ASA
- CEN

Global EMS Vehicle Safety Standards & Specifications and Guidelines

- EMS Safety and Performance Standards
  - Australia & New Zealand 4536
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - (Aviation - FAA/CAA/FAA)
- (Fleet vehicles - ASSE/ANSI Z15)
- USA Other
  - Purchase Specification: KKK
  - Standards - NTEA - AMD, ASTM F 20, NFPAs (deal)
- Guidelines: EMSC Dos and Don’ts, and (ASTNA, CAAAs and CAMTS)

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

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 manikin

USA Ambulance Manufacturing Division (AMD)
Ambulance Standards – August 2007

- No dynamic or impact test
- No automotive test manikin
- Mandates NO ‘crumple zone’
- No impact tested anchorages for occupant restraint or equipment
- Internal, not independent

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

Hmm...

It isn't like this in the rest of the world
Worker visibility Act: November 24th 2008

Here’s the real world at 6 ft...

Policy and practice ignorant of existing technical safety data

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

Day visibility

Night visibility

August 2009 – Visibility review

“The multicolored (patterned) ambulance while distinctive, may suffer decreased conspicuity because of the effects of camouflage” De Lorenzo & Eilers Annals EM 1991
Color-blindness affects 10% of the population

Emergency Vehicles – Viewer Awareness
For a timely, appropriate and safe response
- Location
- Size
- Shape
- Speed
- Intended path

Color blindness
- As seen with normal vision
- As seen with color blind vision

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

Muskoka EMS - Canada
Old design
New design

But whatever color .... If you run a red light someone will be killed

Innovation
- Driver feedback technologies
- Tiered dispatch
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies – ITS
- New platforms for interdisciplinary exchange
- New Safety Standards
Transport performance
- Driver training?
- Real time safety performance outcomes?

What about changing driver behavior in the real world??

Invehicle technologies to enhance transport safety
- Aftermarket in vehicle electronic e-safety devices with monitoring and feedback

Human Interface approaches
- Hardware fitted to the vehicle
- Non hardware App Driven cellular technology

The “Feedback box”
Driver behavior monitoring and feedback device

Optimizing driver performance monitoring and feedback: An innovative approach utilizing a global mobile interactive e-platform

A smart phone App that is a safety tool

Driver’s individual performance against company set performance targets in the system
- Needle points to individual driver performance against targets
- Green area represents the difference between standard and stretch targets
- Goals can be varied by region, market, team as required
- Performance is updated and presented in real time.
How did the UK pilot drivers perform??

<table>
<thead>
<tr>
<th>Driver</th>
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Harsh Braking per 100 trips

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](http://www.trb.org) and for the Summit archives: [www.objectivesafety.net/TRBSummit2008.htm](http://www.objectivesafety.net/TRBSummit2008.htm) [www.objectivesafety.net/TRBSummit2009.htm](http://www.objectivesafety.net/TRBSummit2009.htm)

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

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
  - real safety and oversight technologies and policies
  - operations management – dispatch, congestion routing, deployment of resources, benchmarking
- Vehicle safety
  - occupant protection design and testing
  - vehicle performance safety
  - vehicle and pedestrian humans factors issues
- Dissemination and Policy
  - knowledge transfer
  - standards, specifications and policy

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”

The EMS Safety Foundation

- Established in 2008 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.

**The EMS Safety Foundation: A practical and functional model**

Interdisciplinary and Operational and International

- Innovation
- Collaboration
- Knowledge transfer

**R & D “Ripoff and Duplicate”**

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

**EMS Safety Foundation Ambulance Vehicle & Ergonomics Workshop, October 2009**

**Automotive engineers addressing EMS Safety Foundation Workshop**

**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.

**EMS Safety Foundation Delegation seeking out International Innovation**

**RETTmobil 2010**

- A major European Emergency Rescue Congress, Trade show and Symposium
- Held in Fulda, Germany
- Established in 2001
- Attended by ~ 20,000 attendees
- Brainchild of Prof Peter Sefrin

**RETTmobil is -**

- **Feld & Österreich 5th - 7th May 2010**
- Europe’s Largest Trade Fair for Rescue and Mobility
Patient Transferring Slides

Ergonomic layout and equipment

Flexibility to manage two patients

Texas - Careflite's new vehicle

Careflite’s new vehicle
Manitoba’s new fleet

Tips for Emergency Vehicle Operations

USFA Emergency Vehicle Safety Initiative

Traffic Incident Management Systems (TIMS)
- Released April 2008
- FEMA, USFA, IFSTA
- Covers setting up safe roadway incident work areas and using unified command at these incidents

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 design, operations and policy
- We must be outcomes driven

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

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this vehicle is safety crash tested by automotive experts

Unlike this vehicle

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?

Fleet Mix?

Were we safer in the Cadillac???

What do we know works…
• Vehicle Operations Safety Policies
• Squad bench lap seat belts
• Patient over the shoulder belts
• Securing equipment
• Forward and rear facing seating
• Some electronic technical devices
• Safety awareness
• Cultural change

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

Goals
• Standards for safety
• Policy based on Science
• Databases to demonstrate outcome
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 and resources available online
http://www.objectivesafety.net