North Shore LIJ July 10, 2013, Long Island, NY

The Ride of your life?
Ambulance Transport Safety Essentials

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CEO, Objective Safety, New York, USA
Chair, TRB, EMS Subcommittee, National Academies

Saturday, August 27, 2012 - NYC
Paramedic David Restuccio killed

Friday September 7, 2012
NYC Funeral of Paramedic David Restuccio

Goals and Learning Objectives
- Educate on the risks to patients, transport and emergency medical service providers and the public from ambulance transport adverse events
- Identify and explore factors related to ambulance crashes and identify potential mechanisms of injury to EMS transport providers, patients and the public and expose safety myths
- Instruct providers on strategies for enhancing transport safety and reducing risk of injury to patients and providers and the public during transport

Emergency Medical Service
- What are the transport and other 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 and share with our international colleagues

Safety Dimensions
- Safe systems – CRM / transport system safety
- Fleet an operations management
- Vehicle safety
- Scene safety
- Patient Handling
- Risk perception
- Health and wellness

What are we going to cover today?
- Key principles of ambulance transport safety
- Ambulance safety research and data
- National and Regional Standards and Guidelines
- How to make your ambulance transport environment safer right now
- Future goals for Ambulance transport safety
Your electronic Handout awaits you online at...

- [www.objectivesafety.net](http://www.objectivesafety.net)

*This WILL be FAST!!*  
No need to take any notes – all text slides will be awaiting you in your online Handout

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**Who am I?**

- Nadine Levick MD, MPH
- Emergency Medicine Physician and Public Health Academic, USA-Hopkins, Columbia SUNY & 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

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**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

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**Emergency Medical Services (EMS)**

An important and unique transport system

- Public safety, public health and emergency service
- Is there to save lives

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**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

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**You may not like all I have to say...**

- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling

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**A lot is now possible and for less!**

- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling
Goals

- Cheaper
- Better
- Safer

EMS Transport Safety

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

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

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

April 2, 2013

June 6, 2013

June 6, 2013

Georgia EMTs and Patient Killed in Crash Involving Semi

Cobb County EMTs and a展厅 patient died in crash involving a tractor trailer on Interstate 75, one of the deadliest roads in the United States. The incident is part of a nationwide trend of increasing numbers of crashes involving commercial vehicles.

Mercedes-Benz adds QR codes to save car crash victims
Science behind Policy

“For successful technology, reality must take precedence over public relations, for Nature cannot be fooled.”

Richard P. Feynman 1988
Seat Belt and Restraint Use:
Seat belts or restraints will be securely fastened to the following individuals when the vehicle is in motion:
- 1) All EMS vehicle operators
- 2) All patients
- 3) All non-EMS passengers (cab and patient compartment)
- 4) All EMS practitioners (when patient care allows)
- 5) All infants and toddlers (these children should be transported in an age appropriate child seat if their condition allows). Children should not be placed in cab passenger seat with airbag.

e. Avoid Distracted EMSVOs
- 1) Distracted driving is responsible for many MVCs, and EMS agencies should assure that policies reduce the risk of a distracted driving accident.
- a) EMSVOs should not view pagers, cell phone screens, text messages, or mobile data terminals or enter data into GPS devices while an EMS vehicle is in motion.

Safety Event reporting

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

Communicating risk

Which image of October 26th communicates better risk perception

October 28, 2012

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?
What is a survivable impact?

12 mph (20 km/hr)?

What is a survivable impact?

$E = \frac{1}{2} mv^2$

$v^2 = 2as$

~30 mph - survivable

What is a survivable impact?

~60 mph – not survivable

A survivable impact??

A serious problem...

Safe Systems Approach

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
- Public safety

Occupant Systems Safety

- Occupant Safety in EMS is driven by both operational and biomechanical systems.
- Systems Safety integrating these two issues is key
- There is interaction of occupants with the system, with each other and with available seating options and vehicle interior, equipment and operational tasks.

Safety Performance

- Measurement
- Outcomes
- Technical expertise
Some new dimensions

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

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

Safety of the...

- Provider
- Public
- Patient

Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

An ambulance is not an ED /ICU on wheels

The Emergency Department (ED)

Firstly!

- An accident?
- or a predictable and preventable event
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

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

Ground Ambulance Transport Safety

IS Complex AND Multidisciplinary

Epidemiological Data Collection
Risk Management
Public Safety
Transport Policy
Transport
Safety

Transport Technology
Safety

PPE

Biomechanical
Research

Communications Technology

Safety
Technology

Regulations and Standards

Driver Training

Fleet Safety Program

Ambulance Transport Safety

Ground Ambulance Transport Safety

So

• What’s important
• What’s not important

What’s going to save your life
What might take your life

What’s going to hurt you
What’s going to protect you

What is factual
What is garbage
• What is new
• What is not new

USA 1980’s Then….

And

USA 1980’s Then….

NOW!…

And now…

Equipment hard to reach

Innovation Now…

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?

• What we need to consider, where is the ‘bang for buck’ in ambulance transport safety
• Where is the low hanging fruit?
WE DO HAVE TECHNICAL DATA!!!

Ambulance Safety Research: No longer such a New Field

Levick et al
Gilad et al
EMSC PED-SAFE-T
Levick et al
Best, Zivkovic, Ryan
Levick et al
designing and applications of dynamic testing facilities for emergency medical systems

Dan Berry
Transport Canada, Ministry of Health

Bull, Talty et al
Turbell et al, Sweden

Levick et al
ergonomic engineering

NHTSA/NTSB/EVOC
epidemiology

Biggers, Zachariah, Pepe
Saunders et al
Pirrallo, Swor
Auerbach et al
FEMA
Kahn, Pirrallo
Maguire, Hunting, Smith, Levick
Becker, Zaloshnja, Levick, Li, Miller
Weiss, et al
MMWR
NIOSH, CDC
De Graeve, Deroo, Calle et al
Ray, et al
Kupas
Woodward, Fleeger et al
Johnson, Lindholm, Dowd

'96'93'70 '981960 '78 '02
'86 '95
2001
'03
'04
'05
'06
'07
'08
'09

Chung et all
Newgard et all
'11

We should use the best safety practices demonstrated in engineering

Development and applications of dynamic testing facilities for emergency medical systems

Bemerkungen der patienten dekretieren von ambulanz

As well as epidemiological injury data
August, 2011

TRB TRANSPORTATION RESEARCH BOARD
2012 EMS Safety Systems, Strategies and Solutions Summit
One Day event, 30 presentations
Held in Washington DC, Keck Center
Simulcast Live to EMS Today
Live Webinar Access - globally
Over 100 participants live across 3 continents
Greater than 10,000 downloads of handouts within the first week!!

TRB TRANSPORTATION RESEARCH BOARD
2012 EMS Safety Systems, Strategies and Solutions Summit

The 2012 TRB EMS Safety Summit
print this page & your smart phone will play the 8 sessions from the eTags! (even in B&W)
• Opening Address: A.J. Heightman
• Safety Developments Update – N. Levick
• Research needs assessment forms explained – E. Frazer
1: Data and Recent Initiatives
2: Transport, Human Factors - Bridging Diverse Disciplines
3: Testing and Standards
4: New systems safety technology solutions & telematics
5: Fleet management strategies
6: Innovative Vehicle Design
7: Operationalizing Safety
8: Panel: How to optimize the safety of your existing fleet
Wrap-up – from Prof. Art Cooper

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Wrap-up – from Prof. Art Cooper
TRB 2012 Summit – addressed the key and interdisciplinary applied solutions issues, in one day – please seek that information out. www.objectivesafety.net/TRBSummit2012.htm
There have been two prior 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

Talking increases crash risk 5x
Texting is COMPLETELY UNACCEPTABLE
23X increase in crash risk

The science of Stretcher lifting & loading
• Impairment
  – Illness
  – Exhaustion
  – Substance
  – Emotion
  – Distraction
  • CELL PHONE !!! (A MAJOR HAZARD)
  • Other technology

And what is the loading height of your ambulance??

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

Stretcher Load - # 1 (CNL08446)
USA Ambulance Standards & Testing

- KKK A 1822F: Purchasing Guideline
  - "Minimum Specification and performance parameters"
- AMD-001-025: Manufacturing Guideline
- ASTM F2020-02a: Standard Practice

Ambulance Standards and Testing

- Interrelated – mostly paraphrasing each other’s requirements
- Self certified

International Ambulance Design Safety and Occupant Protection Standards

- In existence since 1999
  - Australia – ASA
  - Europe - CEN

AMD ambulance ‘safety testing’? – Is NOT consistent with accepted automotive safety practice...

Yes a “nationally recognized testing lab” – BUT - NOT an automotive/occupant safety crash test lab!!

The Laws of Physics Prevail..

Philosophiæ Naturalis Principia Mathematica, July 1687

NFPA 1917 - Test Methods

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

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

- EMS Systems - >19,000
- Personnel - ~1 million
  (~30% F/T professional & 70% volunteer)
- Vehicles - ~80,000
  (Type I, Type II, Type III, Freightliners, motorcycles)
- Transports - ~30 million
  (to Emergency Deps ~ 50%, < 1/3 emergent)
- Cost - ~$8 Billion annually
- Safety Oversight - ? Disparate

USA EMS transport safety data estimates

- ~ 80,000 vehicles
- ~ 9,000 crashes a year
- ~ One fatality each week
- ~ 2/3 pedestrians or occupants of other car
- ~10 serious injuries each day
- Cost estimates > $500 million annually

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)
- 62% 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)

USA Occupational transportation fatalities...

- WE HAVE A BIG PROBLEM HERE

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

August 2009 – Impaired...

- EMT Indicted On Murder Charges
  - Tammy Brewer Driving Ambulance Involved in Fatal 2009 Crash
  - Tammy Brewer Driving Ambulance Involved in Fatal 2009 Crash

and what is killing EMS?

USA 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

September 25, 2012

A few key words about restraint systems...

Training... effectiveness...??

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

Testing the real world

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

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


Testing the real world

Impact residue

During impact

CTD dynamics
Systems safety failure AND dangerous

Overwhelming existing evidence these practices are HIGHLY dangerous

NO evidence whatsoever that these practices are NOT dangerous, let alone safe

NOT new technical data...


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

Beware some provider restraint systems are dangerous


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

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

‘Workplace’ Hazards

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

Bigger is not necessarily better……

But what about head protection?
New EMS helmet prototypes

Head protection @ EMS Expo 2012

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

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/RigSafety/911.pdf

Ambulance Vehicle Standards??

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

Transporting kids?

- DON’T put child in the front seat
- DON’T put the child on the rear facing captains chair
- Just about anywhere else is OK!
- Use a child seat when medically appropriate and size fits, well secured

Basically…

NASEMSO MRAVD initiative

http://www.nasemso.org/Projects/AgencyAndVehicleLicensure/AmbulanceVehicleDesignProject.asp
Golden Hour – not so hot

- March 2010
- Annals EM

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.


Golden Hour Summary

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

Data Envelopment Analysis

- # EMS Stations/
- # EMS Transportation Units/
- # Staff/
- # EMS response times/

GAO-13-6


GAO findings

- Transports for all Medicare fee-for-service beneficiaries grew 33% 2004 to 2010
- Transports nationwide grew most in super-rural areas (41%) relative to urban & rural areas
- 59% increase in basic life support (BLS) nonemergency transports
- BLS nonemergency transports in super-rural areas grew the most—by 82%

Safety is Good Business

- Cost components
- Safety is Good Business

May vary by location.
What are the solutions?

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

EMS SAFETY COURSE
National Association of Emergency Medical Technicians

EMS SAFETY COURSE

- Crew Resource Management
- Emergency Vehicle Safety
- Scene Operations
- Patient Handling
- Provider, Patient & Bystander Safety
- Personal Health

Are you self insured???

Very Scary Insurance data – the $10 million dollar EMT

<table>
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<th>Year</th>
<th>Premium</th>
<th>Disability</th>
<th>Medical</th>
<th>Total</th>
<th>Claims</th>
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<td>465</td>
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<td>117</td>
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<td>1998</td>
<td>9.6</td>
<td>411</td>
<td>13</td>
<td>30</td>
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</tr>
</tbody>
</table>

Workers Compensation Rate increased by 27%-

Expensive....

A problem

2011 Insurance data –
- 35 fold more likely to have a claim based on transport than related to medical care

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

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

- Perception + Reaction time + Vehicle braking time
  - (varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)

40 mph* Stopping distance: Perception time + Reaction time + Vehicle braking time

- Dry
  - Stopped at 176 feet
- Wet
  - Stopped at 220 feet

Key elements to safety
- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

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

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

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

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 over both shoulders for side-facing occupants are potentially lethal – and in NO WAY SUPPORTED BY ANY DATA OR INDEPENDENT AUTOMOTIVE SAFETY EXPERTISE

Rules/Policies Addressing Known Hazards
- Federal Motor Carrier Safety Administration (FMCSA)
  - Cell phone use – November 2011
  - Hours of Service – December 2011

Federal Motor Carrier Safety Administration - FMCSA
- http://www.fmcsa.dot.gov/

Safe Practices for Motor Vehicle Operations
ASSE/ANSI Z15.1 2012
https://www.asse.org/imagespector/215_1_2012/index.htm
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

Newly Revised ANSI/ASSE Z15.1-2012 Standard is now available.
- These practices are designed for use by those having the responsibility for the administration and operation of motor vehicles as a part of organizational operations.

New Safety Data
- TRB 2012
- 2011 National EMS Assessment
- 2011 NFPA
- TZD EMS
- NCHRP 17-51
- FARS/MMUCC
- NEMSIS
- BLS

Increasing focus
- TRB - ANB10(5)
- RITA/ITS/DOT
- Traffic Records Forum
- OSHA/NIST/NIOSH
- TIMS
- ASSE
- SAE
- EMS Safety Foundation

A lot is now possible and for less!
- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling

Fleet Management technologies
- ACETech/Ferno
- FleetEyes – Intermedix
- Zoll rescuenet and road safety fleet management systems
- MarvIIS
- Telematics
- Optima
- Northrop Grumman

Spectrum of dimensions
- CAD
- Resource allocation
- Fleet performance –
  - Monitoring: System that gives management data of vehicle efficiency and use
  - Feedback: Directly to drivers at the wheel
- Public Alerts

Telematics
- 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

Creating a Safety Culture

- This IS a Transportation and Automotive Safety issue
- Awareness
- Training
- Incentive

Key elements to transport safety policies

- Vehicle/Fleet Safety
- Occupant protection
- Driver performance monitoring and feedback
- Hours of service
- Driver/provider wellness and fitness
- Driver/provider impairment
- Public safety

What MUST we do?

- We MUST stop pretending that this is not an automotive safety occupant protection impact engineering issue
- We MUST stop writing ‘consensus’ policies on disciplines we are not trained in
- We MUST reach out to the technical experts in this field
- We MUST engage the existing technical and safety transport arenas with EMS transport
Which of these two vehicles would you want?
Sprinter v Ford Transit crash test
http://www.youtube.com/watch?v=C3kN6WF5vAA&feature=related

Innovation

Safety concepts out there now

- Driver feedback technologies
- Tiered dispatch
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies – ITS
- New platforms for interdisciplinary exchange
- New Safety Standards

Interdisciplinary Innovation Consortium

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

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 by promoting and advancing EMS safety innovation, collaboration, research, knowledge transfer, education and safety information dissemination

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
So What is RETTmobil??

RETTmobil is -

- 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
- Over 460 exhibitors, 19 Countries!

- Advisory Board and Technical Expert Panel
  - EMS Safety Foundation, Director of Human Factors and Ergonomics
  - Chris Fitzgerald, Injury and Risk Management
The newest Oslo Ambulance

Based on technically sound scientific principles

User friendly
- All necessary equipment should be reach from the seats without losing the seat belt
• The stretcher platform can be moved into 3 different positions.
Ergonomic layout and equipment

Flexibility to manage two patients

ESC – Does your ambulance have it??

- 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
Based on technically sound scientific principles and here at Expo

Ambulance Sparing

- In almost \(\frac{1}{4}\) (23.5%) of all motorcycle missions ambulance use was avoided!


Areas of need

- Improvement in use of occupant restraint systems
- Improvement in use of equipment restraint systems
- Policies to minimize transport risks

Live from Rettmobil 2013
Public Access – www.EMSSafetyFoundation.org

EMS Safety Foundation’s
Live @Rettmobil 2013 on YouTube!!
Click here
https://www.youtube.com/watch?v=kJw9_PylIR0

The ambulance response vehicle of the future?
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

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

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

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response
- Location
- Size
- Shape
- Speed
- Intended path

Policy and practice ignorant of existing technical safety data

But whatever color .... If you run a red light someone will be killed
June 17th 2008
a paramedic and a patient killed

In this vehicle…

April 30, 2009 - Tennessee

Caution!!!

- Just because it has been 'Tested' does not necessarily mean it has been crash tested – nor that it is crashworthy and/or going to protect you
- Even if it has been 'Crash tested' – it depends upon to which standard, whether or not it is actually safe under real world crash conditions
- Appropriate technical expertise is key!!

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

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?

this vehicle is safety crash tested by automotive experts

Unlike this vehicle
**Fleet Mix?**

**What do we know works...**
- Tiered dispatch
- Vehicle Operations Safety Policies
- Ideally, forward and rear facing seating
- If not, use squad bench lap seat belts
- Patient over the shoulder belts
- Securing equipment
- Fleet management 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
  - To prevent a crash
  - In the event of 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 directions**
- Meaningful Goals
- New policies
- New practices
- New standards
- New vehicles
- New technologies

**Key future focus**
- Data and Recent Initiatives
- Transport Technical science
- Human Factors
- Bridging Diverse Disciplines
- Testing and Standards
- New systems safety technology solutions
- Fleet management strategies
- Innovative Vehicle Design
- Operationalizing Safety

**Innovation**
- Collaboration
- Knowledge transfer
**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

Your handouts etag page

for those on one r or gg generation!

- if you have a smart phone
- and you have downloaded free Tag Reader
- point your phone and capture this etag to get today’s handout on your phone.