


ICEM 2010  
The World Meets Emergency Medicine  
LONDON

International Conference on Emergency Medicine 2010  
June 9th, 2010

## EMS Safety – Current Issues or The Ride of Your Life: What You Can't Afford Not To Know About Ambulance Safety


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## 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?



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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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<http://www.objectivesafety.net>  
Your Handout and Additional Resources




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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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## Patient Safety- A routine healthcare concept...




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## But Patient Safety is just one part of this system

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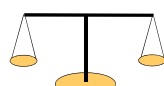
## EMS Transport Safety

- 'patient safety'  
**AND** also
- 'provider' and 'public safety'



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## Balance of concerns and risk during transport



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



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### Some odd facts

- Ambulances are generally not built by the automotive industry
- Intelligent Transportation Systems (ITS), transportation safety engineering is not generally integrated into EMS systems
- Although all EMS systems have medical direction and oversight, it is rare for there to be transportation expertise oversight

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

### Ambulance transport a serious transport safety problem...

In the USA

- the most lethal vehicle on the road both per mile travelled and per vehicle
- is exempt from commercial fleet safety oversight from Federal Motor Carrier Safety Administration (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

### ...and

- Is your ambulance crashworthy?
- Do you have a telematics monitoring and feedback system?
- Enhanced Stability Control (ESC) – Does your ambulance have it??
  - An estimated >16% decrease in vehicle crashes
- and what is your loading height??
  - ...is it less than 27 inches (68cm)??

### An interhospital transport ? "Do no harm..." ?

Date published: "Lexis", January 23, 11/16/2012

EMSSafety | LexisNexis | LexisNexis

Pa. ambulance involved in crash; patient pronounced dead at scene

By David W. Smith  
The York Daily Record  
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An Adams County ambulance, carrying a patient to York Hospital, rolled off a road at a dangerous rate of speed on Jan. 20 and killed the patient, a woman, in a crash that was pronounced dead at the scene.

York County Deputy Coroner Claude Stahley said the patient, a woman, was being transported from Gettysburg Hospital, because she was suffering a "significant" heart condition.

He said he will try to determine whether it was safe to continue with the transport prior to the crash, or whether she should have been taken to a local hospital because of or after the crash. Stahley said she suffered no significant traumatic injuries, but was

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

The screenshot shows a medical article with the following details:
 

- Title:** Effect of vehicle speed on the quality of closed-chest compression during ambulance transport
- Authors:** Lee Hwang Chung, Sun Young Kim, Young Hoon Cho, Sang Mi Chung, Michael Park
- Journal:** Resuscitation
- Abstract:** The purpose of this study was to evaluate the effect of vehicle speed on the quality of closed-chest compression during ambulance transport. The study was conducted in a controlled environment. The results showed that vehicle speed significantly affected the quality of chest compressions. Higher speeds resulted in lower quality compressions, which could be detrimental to the patient's survival.

### Golden Hour – not so hot

- March 2010 Annals EM

The screenshot shows a medical article with the following details:
 

- Title:** Emergency Medical Services Response and Survival in Trauma: Assessment of the "Golden Hour" in a North American Prospective Cohort
- Journal:** Annals of Emergency Medicine
- Abstract:** The "golden hour" concept suggests that early medical attention significantly improves survival in trauma patients. This study assessed the impact of EMS response time on survival. The findings indicate that while response time is important, it is not the sole determinant of survival. Other factors like patient condition and hospital care also play significant roles.

### 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.]

### Is response time really a meaningful measure of patient outcome??

- What are the confidence limits?
- What about demographics, population density?

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### Jan 2010 - Evaluating Trauma Management Performance in Europe

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

**Data Envelopment Analysis**

- # EMS Stations/**
  - 10,000 citizens
  - 100 km rural road length
  - 1000 km<sup>2</sup> area
- # Staff/**
  - 10,000 citizens
  - 100 km rural road length
  - 1000 km<sup>2</sup> area
- # EMS Transportation Units/**
  - 10,000 citizens
  - 100 km rural road length
  - 1000 km<sup>2</sup> area
- EMS response times/**

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### Firstly!

■ An accident?

■ or a predictable and preventable event

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### Predictable risks

- Fatal crashes more often at intersections, & with another vehicle ( $p < 0.001$ )\*
- 70% of fatal crashes EMS crashes during Emergency Use\*
- Most serious & fatal injuries occurred in rear (OR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)\*\*
- 82% of fatally injured EMS rear occupants unrestrained\*\*
- > 74% of EMT occupational fatalities are MVC related\*\*
- Serious head injury in >65% of fatal occupant injuries#
- More likely to crash at an intersection with traffic lights (37% vs 18%  $p=0.001$ ) & more people & injuries/crash than similar sized vehicles##

\*Gahrn CA, Pirralto RG, Kuhn EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9  
 \*\*Buckner, Ziskovitsky, Levin, LI, Miller, Ann Emerg Med 2003  
 \*\*\*Maguire, Hurling, Smith, Lewis, Annals Emerg Med Dec 2002  
 ##WOSH 2003  
 ##Ray AM, Kupac OF. Prehosp Emerg Care 2005 Dec; 9(4):412-415

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### 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

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### A tragic emergency health care intervention outcome

**Rollover Crash Kills Medical Technician**  
 Ambulance Rollover Kills and Injures Two Employees on a Patient

It does happen....

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### 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
- roadside and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

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### Transport Medicine

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### Key elements

- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

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## Impact biomechanics

- Crashworthiness
- Vehicle design
- Occupant protection

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## Transport Ergonomics

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

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## 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

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## 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?
- What policies offer the safest system?
- How do I get my team to address safety issues?
- Do I need a helmet, and if so which one?
- What data should I collect when something goes wrong, and how to analyze it?

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## Safety Management

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

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## Creating a Safety Culture

within a company must start with upper management's commitment to safety

- Awareness
- Training
- Incentive

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## 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

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## 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

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## 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

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**In the USA AND Canada there are more safety standards for moving cattle than for moving patients**

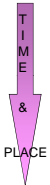


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**the EMS transport process**

- communications/dispatch
- the patient
- restraining device/seat
- transporting device/gurney
- paramedics/transport nurses, doctors & family
- patient monitoring equipment
- clinical care & interventions
- protective equipment
- the vehicle
- the driver/driving skill
- other road users
- the road

**TIME & PLACE**



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**The Emergency Department (ED)**



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**An ambulance is not an ED /ICU on wheels**



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**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

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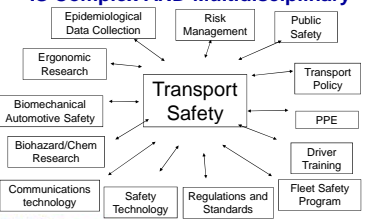
**Science behind Policy**

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

Richard P. Feynman 1988

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**Ground Ambulance Transport Safety IS Complex AND Multidisciplinary**



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



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### June 17<sup>th</sup> 2008 a paramedic and a patient killed



EMS CRASH KILLS PATIENT AND A SUSSEX COUNTY (DE) PARAMEDIC IN THE LINE OF DUTY Tuesday, June 17, 2008

We regret to advise you that a female Sussex County (DE) Paramedic was killed in the Line of Duty as was a patient killed in a horrific crash involving an ambulance in Sussex County (DE) this morning.

The single vehicle crash happened around 02:10 Hours on the John J. Williams Highway near the Lewes-Rehoboth joint fire company station in Angola.

The Mid-Sussex Rescue Squad ambulance was transporting to Beebe Medical Center with a patient, 2 MSES Squad members and the Sussex County Paramedic were on board when it struck a tree, which opened the side of the ambulance as seen on our home page. Tragically, the patient was killed as was the Sussex County EMS Paramedic, who was killed in the Line of Duty.

Sussex County EMS also suffered a close call last year when a Paramedic John Schmitt was seriously injured in a crash when a civilian struck the Millard Fire Company ambulance he was riding in, while returning from a run. Additional details on this morning's crash will follow.

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### In this vehicle...



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### October 31, 2008 - Kentucky



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### April 30, 2009 - Tennessee



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### August 2009 – Impaired...




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



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### January 14, 2010 WARREN COUNTY, N.J. NEWS



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### Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

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## Ambulance Safety Research: A New Field

Dan Berry  
Transport Canada, Ministry of Health

**engineering**

**ergonomic**

**epidemiology**

**issue**

1960 '70 '78 '86 '93 '95 '96 '98 2001 '02 '03 '04 '05 '06 '07 '08 '09 '10

non ? safe safer

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## and what is an EMS crash?

- Definition of an EMS crash
- Definition of Emergency Response Mode

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## Denominator ....?

- # vehicles
- # types of vehicles
- # runs
- # miles/kms
- Nature of patient
- Severity of patient

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## 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

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## We should use the best safety practices demonstrated in engineering

### Development of an Effective Ambulance Patient Restraint

2001-01-1773

Biomechanics of the patient compartment of ambulance vehicles under crash conditions: testing countermeasures to mitigate injury

Nadine Levick, Graham Li  
John Paramore

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## ...in automotive safety engineering

### Development of Proposed Crash Test Procedures for Ambulance Vehicles

2001-01-1812

Ambulance Vehicle Crashworthiness and Passive Safety Design: A Comparative Evaluation

Nadine Levick, Graham Li, John Paramore

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## and in operational ergonomics

### INDUSTRIAL ERGONOMICS

Ergonomics in the rescue service—Ergonomic evaluation of ambulance units

2001-01-1812

Reviewing ambulance design for clinical efficiency and paramedic safety

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

95th percentile  
5th percentile  
rotation pivot

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## Important...

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

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### Goals

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




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### And...

This is in a setting where

- transport safety is the major and most costly adverse event in EMS
- and many practices are in conflict with, or not supported by, existing technical engineering science



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### A survivable impact??




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### Which of these two vehicles would you want?

Sprinter v Ford Transit crash test

<http://www.youtube.com/watch?v=C3kN6WF5vAA&feature=related>

Sprinter V Transit Crash Test




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




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### And very Predictable...

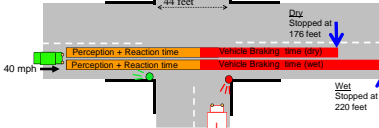
- Intersections are lethal environments




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### The real world

#### Intersection passenger car stopping distance\* at 40 mph dry and wet



\* Stopping distance:  
Perception time + Reaction time + Vehicle braking time  
(varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)



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## New Interdisciplinary Knowledge Transfer Platforms

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**TRB** TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES

### EMS/Medical Transport Safety Summit November 7, 2008 & October 29, 2009

- Bridging the gap between what we do and what is known
- Technical expertise in data capture, transportation safety, vehicle safety, fleet management, human factors, standards development and EMS
- Enhancing ambulance transport safety through shared knowledge of technical data

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**TRB** TRANSPORTATION RESEARCH BOARD  
OF THE NATIONAL ACADEMIES

### October 29, 2009 TRB EMS Summit

- 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
  - operations management – dispatch, congestion routing, deployment of resources, benchmarking
- Vehicle safety
  - occupant protection design and testing
  - vehicle performance safety
  - vehicle and personnel human factors issues
- Dissemination and Policy
  - knowledge transfer
  - standards, specifications and policy

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## Gratis public access to TRB Summit archives Its out there NOW

- [www.objectivesafety.net/TRBSummit2008.htm](http://www.objectivesafety.net/TRBSummit2008.htm)
- [www.objectivesafety.net/TRBSummit2009.htm](http://www.objectivesafety.net/TRBSummit2009.htm)

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## Independent Automotive Safety Technical Expertise

- The “kitchen design” is completely unacceptable and a failure in health care delivery, occupant protection and ergonomics.
- Independent technical expertise must be sought and involved

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## Safety is Good Business

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## A problem

2007 Insurance data –

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

2003 Insurance data –

- **10** fold more likely to have a claim based on transport than related to medical care

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## Safety saves time, lives AND money Canada, Nova Scotia

- Since 2000 working towards a goal of zero loss ratio with insurance provider
- 10 million kilometers per year
- 150 emergency response ambulance units
- Collision claim history measured in dollars per 100,000 kilometers traveled:
  - 2000/2001 \$ 1725.00
  - 2001/2002 \$ 1049.00
  - 2002/2003 \$ 751.00
  - 2003/2004 \$ 416.00
  - 2004/2005 \$ 229.00

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## Ambulance accidents down

System put in place | Ambulance NB says safety program works

Statistics provided by The Daily Observer show that the provincial ambulance service was involved in a total of 86 collisions and injuries in 2008.

The number declined to 68 accidents in 2009.

Daphne Cormier-Lambert, national communications officer for Ambulance NB, said the company introduced a comprehensive vehicle safety program in April 2008 and noticed results immediately.

"The total reduction in collisions from 2008 to 2009 is 23 per cent," she said.

"What's had a reduction in major collisions of 50 per cent - that means vehicles that are out of service as a result of a collision."

The program consists of two sections - Requiring components that cover both vehicle and practical skills.

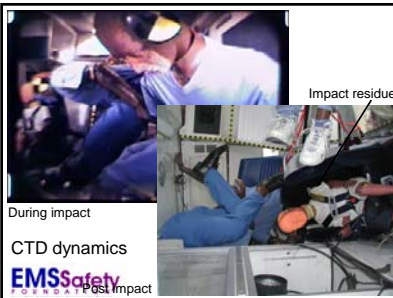
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### Testing the real world



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



### 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 stretcher patients, with the gurney in the upright position where medically feasible)
- All equipment should be locked down
- Some vehicle design features are beneficial – ESC, forward and rear facing seating
- Head protection??
- Electronic Driver monitoring/feedback systems appear to be highly effective

### Air EMS is a role model for safety initiatives and focus

### Air Safety Approach

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



**A few key words about restraint systems...**



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**Chest and thigh belts alone are inadequate to secure the patient**



*Levick NR, et al. Development and Application of a Dynamic Testing Procedure for Ambulance Pediatric Restraint Systems, SAE Australasia 1998;58:2:45-51*



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




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**Systems safety failure AND dangerous**

The innovative EVS HMR Harness System for Emergency Vehicles

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

WHAT'S THE PLUS IN THE MOBILITY??

The Belt Can Go With the Attendant!



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**NOT new technical data...**



*Richardson S.A., et al. Int. J. of Crash, 4:3, 239 - 259, 1999*

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



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



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**Being seated IN an automotive seat is what will protect you**

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



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




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**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



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### Global EMS Ground Safety Standards v Specifications and Guidelines

- EMS Vehicle Safety and Performance Standards
  - Australia & New Zealand 4535
  - Common European Community (CEN) EN1789
- Non EMS Specific Standards
  - Global
    - Road Traffic Safety Management - ISO 39001 (devel)
  - USA
    - Fleet vehicles - ASSE/ANSI Z15
  - USA EMS Vehicle Other
    - Purchase Specification: GSA - KKK
    - "Standards" - NTEA - AMD, ASTM F 20, NFPA (devel)
    - Guideline: EMSC Dos and Donts, and (ASTNA, CAAS and CAMTS)

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### Australia & New Zealand Ambulance restraint standard AS/NZS 4535:1999

- "Restraint systems shall apply to all equipment and people carried in an ambulance..."
- Dynamic Testing - 50th & 95th percentile manikins
- 24G in Forward and Rearward
- 10G in Transverse




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### Common European Community (CEN) EN 1789:1999/A1:2007

#### European Committee for Standardization

Medical vehicles and their equipment - Road Ambulances

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



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### ISO – 39001 Road-traffic Safety management systems



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### American National Standard ANSI/ASSE Z15.1-2006

#### Safe Practices for Fleet Motor Vehicle Operations



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### 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

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### Visibility and lighting issues



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### Here's the real world at 6 ft...



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### Policy and practice ignorant of existing technical safety data

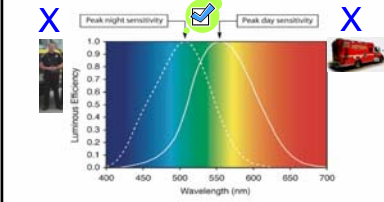
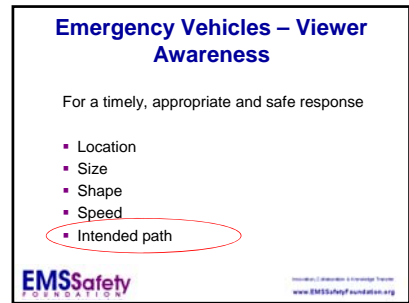


Figure 1. The scotopic (dashed line) and photopic (solid line) luminous efficiency functions, describing the spectral sensitivities of night and day vision, respectively.

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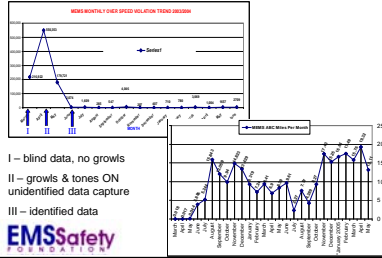


### In-vehicle telematics - A transportation safety monitoring and feedback device

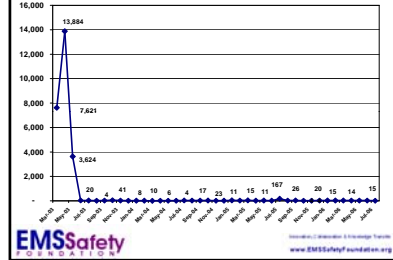
This technology is conceptually like a vehicle safety 'pulse oximeter' – that with auditory feedback - can save your life, your coworkers life, your patients life, and others on the road



### Demonstrated Effectiveness



### MEMS - Seatbelt Violations per Month



### 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

### Resource availability and allocation technologies to enhance system performance



### The jury is out on

- Opticon
- Simulators

### 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.

**RETTmobil 2010**  
Fulda · Messe-Gallery · 5th - 7th May 2010  
Europe's Leading Trade Show for Rescue and Mobility

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### 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

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### Vehicle Occupant Safety design

European design  
Safety technology  
is a key focus



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### Safe and Ergonomic design



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### Patient Transferring Slides



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### Ergonomic layout and equipment



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### Flexibility to manage two patients



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sharing interdisciplinary and  
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- Innovation
- Collaboration
- Knowledge transfer

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### Automotive engineers addressing the EMS Safety Foundation



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### EMS Ergonomist Chris Fitzgerald addressing the EMS Safety Foundation



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### Loading Patients Without Breaking EMT Backs



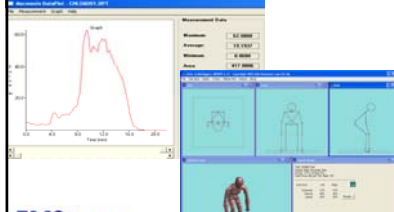
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### The science of stretcher lifting & loading



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### Stretcher Load - # 1 (CNLOAD01)



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### 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, ergonomists and industry standards that make sense – and
- Meaningful measures of outcome and performance

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### Texas - Careflite's new vehicle



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### Manitoba's new fleet



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Statenens vegvesen "Together for your safety"

### Ambulance Investigation - Norway

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Statenens vegvesen "Together for your safety"

### National analysis group

- National Health Authority  
Licensing health professionals
- National Vehicle & Roads Administration  
Approval and technical control of ambulances
- Paramedics from Oslo university hospital

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### 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

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### this vehicle is safety crash tested by automotive experts

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### Unlike this vehicle

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### 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?

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### Fleet Mix ?

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### Risk/Hazards

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

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### 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

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### What is the EMS Transport Safety Research Agenda?

- Shouldn't it be driven by data, and appropriate technical expertise

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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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### 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

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### Future

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

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### 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

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### 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

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Thank you!

### Any Questions??

Electronic handout and resources available online  
<http://www.objectivesafety.net>



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