

Grand Rounds  
Department of Emergency Medicine, Johns Hopkins,  
Baltimore - EMS Week, May 25th, 2007



## EMS Transport Safety – Trends and New Technologies?



Nadine Levick, MD MPH  
Research Director  
EMS Safety Foundation  
New York, USA

### 'Kelen' Doctrine

- ▶ Less is more
- ▶ If you want to do important work, work on something important
- ▶ Finish one thing before you move onto the next

### Science behind Policy

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

Richard P. Feynman 1988

### Outline

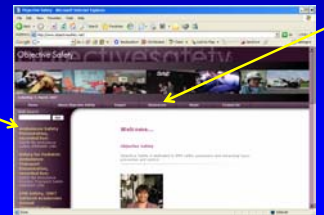
- I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS
- II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
- III. Highlight unacceptable mythology and challenges to advancing EMS transport safety
- IV. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

### In a nutshell

- ▶ Comprehensive perspective on:
  - + system wide data
  - + the challenges
  - + the cutting edge
  - + the gaps in knowledge and application of transportation systems safety in the big picture of Emergency Medical Services transportation

### Interactive handout

<http://www.objectivesafety.net>



### 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?

### Some odd facts

- ▶ Ambulances are generally not built by the automotive industry
- ▶ Intelligent Transportation Systems (ITS), transportation safety engineering and transport systems engineering are 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

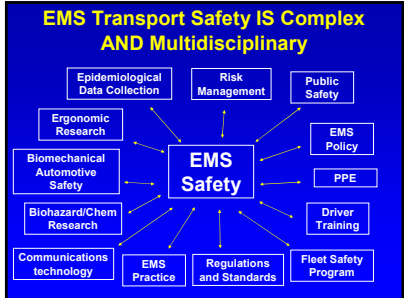
### A devastating tragedy...

- ▶ An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved
- ▶ BUT an EMS crash can kill all involved AND wipe out an EMS systems response capacity.....

### A tragic emergency health care intervention outcome

**Roller Crash Kills Medical Technician**  
Continuation from Page 1 of 200 The Agency News Supplement and 1/2000

**It does happen....**



### Balance of concerns and risk during transport

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

### Transport oversight?

- ▶ In contrast to the bus and truck industries, which have -
  - comprehensive safety oversight
  - transportation safety interventions
  - transportation safety data capture via the Federal Motor Carrier Safety Administration (FMCSA)
- ▶ EMS has been focused more as an acute health care delivery and emergency medical service and largely **outside** of much of the other transportation oversight infrastructure that exists

### What happened??

- ▶ Why is it that Emergency Medical Services have developed outside the umbrella of transportation safety infrastructure??

Federal Motor Carrier Safety Administration

Research and Technology Forum - January 6, 2005

Description	Speaker	Biographical Etc.	Related Links
Opening Remarks	Warren	FMV	FMCSA
Keynote Speaker	David Daniels	FMV	FMCSA
5 Year Strategic Plan Overview	Greg McKinley	FMV	FMCSA
Research Accomplishments	Mark Walker	FMV	FMCSA
Technology Accomplishments	Greg McKinley	FMV	FMCSA
Large Truck Crash Causation Study	Alisa Cook	FMV	FMCSA
Study			
On-board Vehicle Recording	Danish Freund	FMV	FMCSA
Conference			
National Safety and Security Operational Test	Joe DeLorenzo	FMV	FMCSA
Vehicle Infrastructure Management	Tom Johnson	FMV	FMCSA
State Test of Fatigue Management Technologies	David Singer	FMV	FMCSA

### A very serious gap in data, performance and oversight

- ▶ FMCSA Truck safety goals – to decrease the fatality rate of 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008
- ▶ EMS crash fatality rate estimates are – 7.66 - 41.93 fatalities per 100 million ambulance-miles

### The truck and bus industry is on the right track.... Where is EMS??

## Knowledge Transfer ?

**TRANSPORTATION RESEARCH BOARD**  
OF THE NATIONAL ACADEMIES

### Active Projects

(all due 2007)

- ▶ Commercial Motor Vehicle Driver Training Curricula and Delivery Methods and Their Effectiveness
- ▶ Commercial Motor Vehicle Carrier Safety Management Certification
- ▶ The Role of Safety Culture in Preventing Commercial Vehicle Crashes
- ▶ The Impact of Behavior-Based Safety Techniques on Commercial Motor Vehicle Drivers
- ▶ Health and Wellness Programs for Commercial Motor Vehicle Drivers

## What are the solutions?

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

## Transport related aspects of EMS

- ▶ dispatch of EMS vehicles
- ▶ transport policies and protocols
- ▶ vehicle fleets and vehicle design
- ▶ vehicle and fleet standards
- ▶ Intelligent Transportation Systems technology
- ▶ driver selection/training
- ▶ shift length and wellness
- ▶ driver performance monitoring and feedback
- ▶ roadside and road design
- ▶ integrated traffic safety technologies
- ▶ scene safety and visibility
- ▶ safety data capture
- ▶ safety oversight

## Unique workplace

- ▶ In vehicles
- ▶ At roadside and other emergency scenes

## 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

## 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

## The National Transportation Safety Board (NTSB)

**NTSB**  
OF THE NATIONAL ACADEMIES

### History and Mission

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in the other modes of transportation - railroad, highway, marine and pipeline - and issuing safety recommendations aimed at preventing future accidents. The Safety Board determines the probable cause of:

- all U.S. civil aviation accidents and certain public-use seaplane accidents;
- selected highway accidents;
- railroad accidents involving passenger trains or step train accidents that result in at least one fatality or major property damage;
- major marine accidents and any marine accident involving a public and a navigable vessel;
- pipeline accidents involving a fatality or substantial property damage;
- **selected transportation accidents in the interest of transportation safety.**

The Board derives its authority from [Title 49 of the United States Code, Chapter 11](#). The rules of the Board are located in [Chapter 1101, Title 49 of the Code of Federal Regulations](#).

The NTSB is responsible for maintaining the government's database of civil aviation accidents and also conducts special studies of transportation safety issues of national significance. The NTSB provides advisories to users in U.S. Accident Expenditures on

## A Simple Question....

**WINGS, WHEELS & ROTORS**  
AN AIR & TRAFFIC TRANSPORTATION ASSOCIATION

### A Simple Question

Andrew Lewis, MD, MPH

When I have all been most fortunate to have just made the very positive side of the way in which the NTSB operates its members. The recent NTSB report on the **laundry or mail truck** accident, however, is one of those who did not had nothing at all to do with the transport, but was only there who just happened to be in the wrong place at the wrong time. I challenge all of us to think about this and right action to have the NTSB address both ground and air EMS safety in a way all the National Transportation Safety Board. The case is in

## 1960 to 2007

A passenger vehicle - sure

A 'laundry or mail truck' - ?

A passenger vehicle - yes!



## Challenges to Optimizing EMS Transport Safety

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

## Buffalo, USA



## The inevitable bottom line...

## 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

## Very Scary insurance data

Year	Payroll \$million	Modified Premium \$1,000	Incurred Indemnity \$1,000	Incurred Medical \$1,000	Total Claims #
2003	14.1	540	885	9,925	93
2002	12.6	547	266	255	78
2001	11.3	454	88	128	55
2000	10.6	420	63	194	89
1999	10.1	405	115	117	56
1998	9.6	411	13	30	51

Workers Compensation Rate increased by 26.5 %  
Was \$5.86/\$100 payroll in 2005-2006  
Now it is \$7.41 for 2006-2007

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

## 'Workplace' Hazards



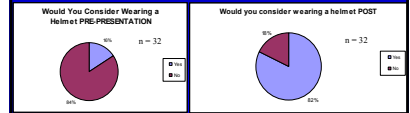


It does happen....

## But what about head protection?



## Attitudes to Head Protection in EMS



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

## Role of a head protective device

- ▶ A simple, immediate and inexpensive adjunct – a protective device -
- To protect occupants from hazardous interiors
- As vehicle crashworthiness design advances
- As driver training advances
- For when equipment becomes unsecured
- As EMS Safety Standards are developed, for both EMS vehicles and EMS occupational safety

## New EMS helmet prototypes for 2006-2007



## Goals

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

Hmm...



## So why is it...

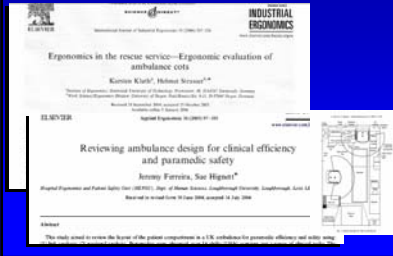
- ▶ That the EMS providers -
- Were wearing navy blue – one of the most difficult colors to see at night
- Had no head protection, when all other emergency personnel at the scene did
- Had no protective clothing, when other emergency personnel at the scene did???

## EMS Best Practice, Sept 2006





## and in ergonomics



## Research papers in the past 30 years

- ▶ EMS Safety
  - 40 papers - on ambulance safety
  - 1 paper - 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

## DOT Funding for Reptiles and Road Kill



## Comprehensive data here too...



## and what is killing EMS ?

### EMS personnel fatalities\*

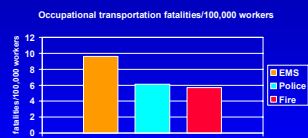
- ▶ 74% transportation related
  - 1/5 of ground transport fatalities were struck by moving vehicles
- ▶ 11% were cardiovascular
- ▶ 9% were homicide
- ▶ 4% needle sticks, electrocution, drowning and other

\* Maguire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec. 2002

## So does it make sense ?

- ▶ Gloves and universal precautions?...  
... good biohazard protection BUT aren't given to give much protection in a ambulance crash

## Occupational transportation fatalities..



▶ WE HAVE A BIG PROBLEM HERE

\* Maguire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec. 2002

## 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##

\*Kishi CA, Pivato RG, Kishi EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):261-4  
 \*\*Baker, Zaslavsky, Levick, Li, Miller, Acc Anal Prev 2003  
 \*\*\*Maguire, Hunting, Smith, Levick, Annals Emerg Med Dec 2002  
 #WOSDH, 2003  
 ##Wyer AM, Kishi DF. Prehosp Emerg Care 2005 Dec; 9:412-418

## And very Predictable...

- ▶ Intersections are lethal environments



## First Joint Commission International Accreditation Standards for Medical Transport Organizations – Jan 2003

New accreditation program for medical transport organizations, including:

- ▶ emergency treatment and transport
- ▶ non-emergency transport
- ▶ ambulance services
- ▶ land, air, and water medical transport
- ▶ fire brigade emergency services



**Table of Contents**

Part 1: Introduction
Part 2: Accreditation Standards
Part 3: Accreditation Process
Part 4: Accreditation Standards for Fire Brigades
Part 5: Accreditation Standards for Air and Water Medical Transport
Part 6: Accreditation Standards for Non-Emergency Transport
Part 7: Accreditation Standards for Emergency Treatment and Transport
Part 8: Accreditation Standards for Ambulance Services
Part 9: Accreditation Standards for Fire Brigades
Part 10: Accreditation Standards for Air and Water Medical Transport
Part 11: Accreditation Standards for Non-Emergency Transport
Part 12: Accreditation Standards for Emergency Treatment and Transport
Part 13: Accreditation Standards for Ambulance Services
Part 14: Accreditation Standards for Fire Brigades
Part 15: Accreditation Standards for Air and Water Medical Transport
Part 16: Accreditation Standards for Non-Emergency Transport
Part 17: Accreditation Standards for Emergency Treatment and Transport
Part 18: Accreditation Standards for Ambulance Services
Part 19: Accreditation Standards for Fire Brigades
Part 20: Accreditation Standards for Air and Water Medical Transport
Part 21: Accreditation Standards for Non-Emergency Transport
Part 22: Accreditation Standards for Emergency Treatment and Transport
Part 23: Accreditation Standards for Ambulance Services
Part 24: Accreditation Standards for Fire Brigades
Part 25: Accreditation Standards for Air and Water Medical Transport
Part 26: Accreditation Standards for Non-Emergency Transport
Part 27: Accreditation Standards for Emergency Treatment and Transport
Part 28: Accreditation Standards for Ambulance Services
Part 29: Accreditation Standards for Fire Brigades
Part 30: Accreditation Standards for Air and Water Medical Transport
Part 31: Accreditation Standards for Non-Emergency Transport
Part 32: Accreditation Standards for Emergency Treatment and Transport
Part 33: Accreditation Standards for Ambulance Services
Part 34: Accreditation Standards for Fire Brigades
Part 35: Accreditation Standards for Air and Water Medical Transport
Part 36: Accreditation Standards for Non-Emergency Transport
Part 37: Accreditation Standards for Emergency Treatment and Transport
Part 38: Accreditation Standards for Ambulance Services
Part 39: Accreditation Standards for Fire Brigades
Part 40: Accreditation Standards for Air and Water Medical Transport
Part 41: Accreditation Standards for Non-Emergency Transport
Part 42: Accreditation Standards for Emergency Treatment and Transport
Part 43: Accreditation Standards for Ambulance Services
Part 44: Accreditation Standards for Fire Brigades
Part 45: Accreditation Standards for Air and Water Medical Transport
Part 46: Accreditation Standards for Non-Emergency Transport
Part 47: Accreditation Standards for Emergency Treatment and Transport
Part 48: Accreditation Standards for Ambulance Services
Part 49: Accreditation Standards for Fire Brigades
Part 50: Accreditation Standards for Air and Water Medical Transport
Part 51: Accreditation Standards for Non-Emergency Transport
Part 52: Accreditation Standards for Emergency Treatment and Transport
Part 53: Accreditation Standards for Ambulance Services
Part 54: Accreditation Standards for Fire Brigades
Part 55: Accreditation Standards for Air and Water Medical Transport
Part 56: Accreditation Standards for Non-Emergency Transport
Part 57: Accreditation Standards for Emergency Treatment and Transport
Part 58: Accreditation Standards for Ambulance Services
Part 59: Accreditation Standards for Fire Brigades
Part 60: Accreditation Standards for Air and Water Medical Transport
Part 61: Accreditation Standards for Non-Emergency Transport
Part 62: Accreditation Standards for Emergency Treatment and Transport
Part 63: Accreditation Standards for Ambulance Services
Part 64: Accreditation Standards for Fire Brigades
Part 65: Accreditation Standards for Air and Water Medical Transport
Part 66: Accreditation Standards for Non-Emergency Transport
Part 67: Accreditation Standards for Emergency Treatment and Transport
Part 68: Accreditation Standards for Ambulance Services
Part 69: Accreditation Standards for Fire Brigades
Part 70: Accreditation Standards for Air and Water Medical Transport
Part 71: Accreditation Standards for Non-Emergency Transport
Part 72: Accreditation Standards for Emergency Treatment and Transport
Part 73: Accreditation Standards for Ambulance Services
Part 74: Accreditation Standards for Fire Brigades
Part 75: Accreditation Standards for Air and Water Medical Transport
Part 76: Accreditation Standards for Non-Emergency Transport
Part 77: Accreditation Standards for Emergency Treatment and Transport
Part 78: Accreditation Standards for Ambulance Services
Part 79: Accreditation Standards for Fire Brigades
Part 80: Accreditation Standards for Air and Water Medical Transport
Part 81: Accreditation Standards for Non-Emergency Transport
Part 82: Accreditation Standards for Emergency Treatment and Transport
Part 83: Accreditation Standards for Ambulance Services
Part 84: Accreditation Standards for Fire Brigades
Part 85: Accreditation Standards for Air and Water Medical Transport
Part 86: Accreditation Standards for Non-Emergency Transport
Part 87: Accreditation Standards for Emergency Treatment and Transport
Part 88: Accreditation Standards for Ambulance Services
Part 89: Accreditation Standards for Fire Brigades
Part 90: Accreditation Standards for Air and Water Medical Transport
Part 91: Accreditation Standards for Non-Emergency Transport
Part 92: Accreditation Standards for Emergency Treatment and Transport
Part 93: Accreditation Standards for Ambulance Services
Part 94: Accreditation Standards for Fire Brigades
Part 95: Accreditation Standards for Air and Water Medical Transport
Part 96: Accreditation Standards for Non-Emergency Transport
Part 97: Accreditation Standards for Emergency Treatment and Transport
Part 98: Accreditation Standards for Ambulance Services
Part 99: Accreditation Standards for Fire Brigades
Part 100: Accreditation Standards for Air and Water Medical Transport

## Commission on Accreditation of Medical Transport Systems - CAMTS Accreditation Standards

2006 Edition

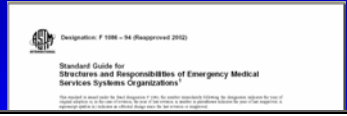


## Commission on Accreditation of Ambulance Services - CAAS

Excellence Defined  
COMMISSION ON ACCREDITATION OF AMBULANCE SERVICES

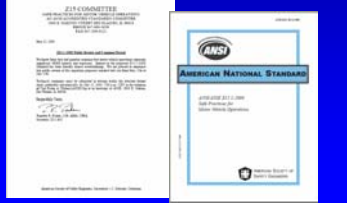


## ASTM F 1086 - 94



12.6 *Safety*—EMS system should ensure that standards for safety of rescuers, providers, patients, and bystanders are developed and enforced.

## American National Standard ANSI/ASSE Z15.1-2006 Safe Practices for Fleet Motor Vehicle Operations



## What Z15 encompasses

- ▶ Safety Program
- ▶ Safety Policy
- ▶ Responsibilities and Accountabilities
- ▶ Driver Recruitment, Selection and Assessment
- ▶ Organizational Safety Rules
- ▶ Orientation and Training
- ▶ Reporting Rates and Major Incidents to Executives
- ▶ Oversight

## Z15 Incident Rates

- ▶ Incident rate based on number of vehicles operated:  
Incident rate =  $\frac{\text{Number of incidents} \times 100}{\text{Number of vehicles}}$
- ▶ Incident rate based on vehicle mileage:  
Incident rate =  $\frac{\text{Number of incidents} \times 1,000,000}{\text{Vehicle mileage}}$
- ▶ Injury incident rate based on vehicle mileage:  
  - Injury incident rates, the most frequently used indicator of incident severity, are useful for tracking events that have the potential to affect financial or operational performance of the operating unit.
  - Injury incident rate =  $\frac{\text{Number of incidents with injury} \times 1,000,000}{\text{Vehicle mileage}}$
- ▶ Incident rates based on service activity:  
  - Motor vehicle operations that pose injury risks other than those associated with driving should also use the service activity as the basis of a safety performance rate. The number of deliveries, stops, or loads should be considered as appropriate indicators of performance.
  - Incidents per 10,000 transports =  $\frac{\text{Number of incidents} \times 10,000}{\text{Number of transports}}$
- ▶ Vehicle injury rates based on work hours:  
Vehicle incidents per 200,000 hours =  $\frac{\text{Number of incidents} \times 200,000}{\text{Number of hours worked}}$

## Legal Perspectives on Z.15

ANSI Z15.1 Standard: A Tool for Preventing Motor Vehicle Injuries and Minimizing Legal Liability  
By Adelle L. Abrams, Esq., C.M.S.P.  
Law Office of Adelle L. Abrams, P.C.

Motor vehicle crashes that occur on American roadways have historically been the leading cause of occupational fatalities in this country. In the decade between 1992 and 2001, more than 13,000 civilian workers died in such incidents – accounting for 22 percent of all injury-related deaths. According to the Occupational Safety and Health Administration (OSHA), every 12 minutes someone dies in a motor vehicle crash, every 10 seconds an injury occurs and every 5 seconds a crash occurs.<sup>1</sup>

Employers whose workers are involved in such crashes have tremendous liability exposure, especially if the individuals injured or killed are third parties (non-employees), where no worker's compensation liability shield exists as an exclusive legal remedy. They bear not only the worker's compensation costs for their employees, and the potential damage awards from third party tort claims, but also the costs of equipment replacement and the indirect costs of workforce disruption and lost productivity associated with such incidents.

## What a novel idea...



**Designing future ambulance transport for patient safety**

**Background**

In June 2005, the Department of Health (DH) set out a vision of how ambulance services can be transformed from a service focusing primarily on transportation, storage and acute care towards becoming the visible health resource for the whole NHS – taking health care to the patient in the community. The health article:

- patients will receive improved care by consistently receiving the right response first time, in time,
- more patients treated in the community
- general public satisfaction in care
- more efficient and effective use of patient resources
- improvements in staff care and health promotion

**Future safety and ambulances**



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



**Major events for innovation sharing – but regional and often language isolation**



**Vehicle Occupant Safety design**

2007 European design  
Safety technology is a key focus



**Ergonomic design**



**Ergonomic layout and equipment**

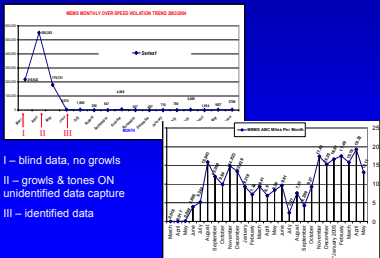


**Driver behavior monitoring and feedback device**

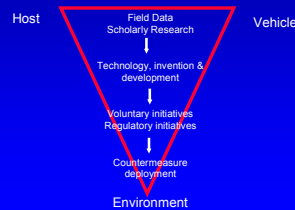


Levick NR, Swanson J, Proceedings - 49th Annual Conf. of the Assoc. for the Advancement of Automotive Med, September 2005  
AMBEX-999 Research Forum 2006 – Research most likely to change practice award

**Demonstrated Effectiveness**



**Automotive Injury Triangle and Safety Development**



**Protective devices/concepts**

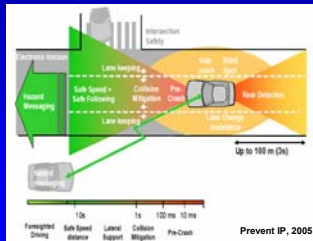
To prevent a crash

- ▶ Driver feedback
- ▶ Driver monitoring
- ▶ Driver training
- ▶ Vehicle Intelligent Transportation System (ITS) technologies
- ▶ Tiered dispatch
- ▶ Appropriate policies

In the event of a crash

- ▶ Vehicle crashworthiness
- ▶ Seat/seat belt systems
- ▶ Equipment lock downs
- ▶ Padding
- ▶ Head protection

## Intelligent Transport Safety Systems



## Back up Camera..... Shouldn't all vehicles have one of these?

**VRBCS300 - Backup Camera**

**Backup Camera**

- Complete with all accessories. Nothing else to buy
- 1.56m Horizontal Camera Viewing Angle
- 60cm Vertical Camera Viewing Angle
- Monitor Mounts on Dash or Visor
- For Use With 12 Volt DC Electrical Systems
- Great For Cars, SUVs, RVs and Delivery Vehicles!
- Helps Avoid Accidents & Injuries!

English product manual  
FAQs - English

## Vehicle visibility and conspicuity

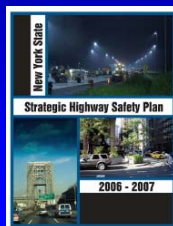
Australian paramedic praised for revolutionary ambulance design

Paramedic has designs on road safety

## Protective Equipment



## Integration and Collaboration



## EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- ▶ **EMERGENCY MEDICAL SERVICES DISPATCH SERVICES**
- ▶ **EMERGENCY MEDICAL SERVICES PARTNERSHIPS**
  - Increase the participation and role of Regional EMS Councils in local and regional highway traffic safety boards and/or organizations
- ▶ **PRE-HOSPITAL TRAINING PROGRAMS**
  - Train EMS providers in the use of the new medical protocols; provide funds and/or other support to certified EMS Course Sponsors to train EMS providers in the use of these protocols; and collaborate with Regional EMS Councils and/or Regional Emergency Medical Advisory Committees (REMAG) on the development and implementation of training programs
- ▶ **ROAD CONDITION AND INCIDENT RESPONSE**
  - Provide a placeholder for regional and/or county EMS representatives in municipal DOT emergency management plan development and implementation

## EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

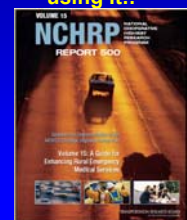
- ▶ **EMS RESPONDER CRASH PREVENTION**
  - Undertake a systematic review of other state actions and protocols on ambulance traffic safety measures to identify and prioritize those appropriate for the New York State pre-hospital system
  - Increase education and involvement of EMS providers in principles of appropriate traffic safety techniques
  - Develop and implement ambulance traffic safety protocols at state, regional and service level
  - Review treatment modalities and protocols to identify those that may contribute to injuries resulting from the impact of ambulance crashes
  - Identify methods to provide incentives for adoption by EMS services of protocols that enhance traffic safety
  - Partner with organizations that provide public driver awareness and education campaigns to improve driver awareness of driver responsibility and appropriate response to approaching emergency vehicles

## Tips for Emergency Vehicle Operations

**Alive on Arrival**  
Tips for Safe Emergency Vehicle Operations

FDMA

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



## USFA Emergency Vehicle Safety Initiative



## March 2007 - FHWA



## This IS a transportation safety issue

- ▶ Systems engineering
  - Where do ambulance crashes occur?
  - What transportation safety engineering interventions
  - ITS –
  - Does opticom work effectively in this environment given the traffic density and emergency vehicle density?
  - Merit of emergency vehicles being fitted with early warning technologies
  - Proper design of emergency vehicle traffic flow
  - Fleet mix to match anticipated transport environmental challenges (ie police model – bicycle, motorcycle, horse, three wheeled, cruiser, van, truck)?

## The squad bench??



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

and those rock climbing harnesses??

## 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 sidelifacing occupants are potentially lethal – and is in **NO WAY SUPPORTED BY ANY DATA OR AUTOMOTIVE SAFETY EXPERTISE**

## Vehicle design and safety

- ▶ The principles of automotive safety involve a complex science, engineering technical skill, expertise, training and knowledge
- ▶ “Give the engineers a working list of our needs and let them tell us how it should be built to accomplish those tasks.....”  
John Russell MD, Advisory Panel, EMS Safety Foundation, 2007

## Safety Management

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

## Creating a Safety Culture

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

- ▶ Awareness
- ▶ Training
- ▶ Incentive

## An excellent model



<http://www.EveryoneGoesHome.com>

### 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 and protection of EMS providers and the public from injury and death