

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



EMS Transport Safety – Trends and New Technologies?



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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

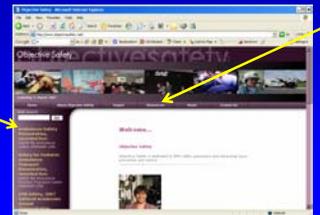
- I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS
- II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
- III. Highlight unacceptable mythology and challenges to advancing EMS transport 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?

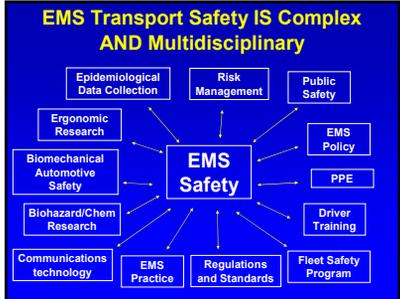
Some odd facts

- ▶ 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



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??

Topic	Description	Speaker	Specialist	Date
Opening Remarks		Warren	DOT	PCF
Keynote Speaker		David Daniels	DOT	PCF
5 Year Strategic Plan Overview		Greg McKinley	DOT	PCF
Research Accomplishments		Mark Walker	DOT	PCF
Technology Accomplishments		Greg McKinley	DOT	PCF
Large Truck Crash Causation Study		Alisa Cook	DOT	PCF
Study				
On-board Vehicle Recording		Danish Freund	DOT	PCF
Commercial Vehicle Safety		Joe DeLucente	DOT	PCF
Operational Safety and Security				
Operational Safety		Tom Johnson	DOT	PCF
Vehicle Infrastructure				
Management				
State Test of Fatigue Management Technologies		David Singer	DOT	PCF

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 seaircraft 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 interests 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 examining 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 engages its members. The recent NTSB report on the **selected transportation accidents in the interests of transportation safety** is a simple question. "How many EMS have been over these years of any more than the approximately 54 times that a single text is received EMS?"

When I have all been most fortunate to have just made the very positive side of the way in which the NTSB engages its members. The recent NTSB report on the **selected transportation accidents in the interests of transportation safety** is a simple question. "How many EMS have been over these years of any more than the approximately 54 times that a single text is received EMS?"

1960 to 2007

A passenger vehicle - sure

A 'laundry or mail truck' - ?

A passenger vehicle - yes!

UPS and Laundry trucks have very similar design and even more stringent safety requirements to EMS vehicles BUT very different cargo.....

People are passengers and NOT packages or parcels

The screenshot shows the JEMS.com website with a news report titled "Colorado ambulance safety thrust in spotlight". The article discusses a pair of ambulance crashes in Littleton that resulted in three deaths, prompting state health officials to plan to make ambulance safety a key issue in the coming weeks. It also mentions an article from the November 2003 issue of JEMS that detailed a common sense approach to staying safe while riding in an ambulance.

- ### Ambulance design & transport safety initiatives
- ▶ 1960's National Academies of Medicine - the Cadillac to the chassis and box truck, birth of the ambulance conversion industry (?? date of the FMVSS exemption)
 - ▶ 1970 - NTSB report and birth of EVOC
 - ▶ 1980 - Swedish barrier crash tests
 - ▶ 1987 - JAMA paper - Paul Auerbach
 - ▶ 1995 - First published text on Ambulance collisions - and by an optometrist
 - ▶ 1995 - EMC Pediatric Ambulance Transport Safety Grant
 - ▶ 1999 - ASA and CEN ambulance safety standard in Australia and Europe
 - ▶ 1999 - First ambulance rear compartment sled tests with instrumented dummies
 - ▶ 2000 - First peer reviewed engineering publication on ambulance crashworthiness
 - ▶ 2000 - First full vehicle ambulance crash tests
 - ▶ 2001 - First SAE Emergency Vehicle Safety Symposium
 - ▶ 2003 - Mobile Medical Transport Safety Task Force (MMTS) established
 - ▶ 2004 - NIOSH program
 - ▶ 2005 - First ambulance ergonomics paper
 - ▶ 2005 - First NAEEMSP ambulance safety keynote
 - ▶ 2006 - First EMS Chiefs of Canada ambulance safety Keynote
 - ▶ 2006 - AMBEX - research most likely to change practice
 - ▶ 2007 - Haugue TRB Ambulance Transport Safety Seminar
 - ▶ 2007 - First NHTSA Ambulance Safety Seminar - to be July 2007
 - ▶ 2008 - Second TRB Ambulance Transport Safety Seminar - to be January 2008
 - ▶ 2008 - First Ground EMS Transport Safety Summit - to be March 2008

NTSB 1979 Accident Report

Adopted: May 3, 1979
ROSS AMBULANCE SERVICE
AMBULANCE OVERTURN
STATE ROUTE 116
LITTLETON, NEW HAMPSHIRE
AUGUST 22, 1978

NTSB Number: MAR-79-01
 NTSB Number: PB-8-294

Publications

- EVOC
- LICENSE RECORDS

Recommendations

The National Transportation Safety Board determines that the probable cause of this accident was loss of control of the ambulance which had excessive characteristics, by an overloaded driver at a high rate of speed. Contributing to the cause of the accident was the driver's lack of training in the operation of the ambulance at high speeds.

During its investigation, the National Transportation Safety Board recommended on February 7, 1979, that the United States Highway Safety Administration:

- Modify Highway Safety Program (Standard No. 11, Emergency Medical Services, and the NHTSA Training Program for Operators of Emergency Vehicles) to provide additional instruction in the practices and techniques of high speed driving, and to require that a written test be administered to certify a driver with a license to operate an emergency vehicle as a licensed driver (Class C, Driver's License Act, 23 U.S.C. 32101).

For the States to monitor and make available, through the State driver licensing agency, the records of licensed emergency vehicle operators so that employers can determine the applicability of an emergency vehicle operator license to the operator of emergency vehicles (Class C, Driver's License Act, 23 U.S.C. 32101).

The first and only published scientific text on ambulance crashes (1995)

...and by an optometrist

The image shows the cover of the book "Emergency Vehicle Accidents: Procedures and Recommendations" and its Table of Contents. The cover features a photograph of an ambulance. The Table of Contents lists various chapters including Introduction, Chapter 1 through Chapter 10, and Appendixes.

The first and only technical symposium 2001

MILITARY AND EMERGENCY VEHICLES SAFETY

September 11-12, 2001

Hosted by: Police Research Institute, University of Limerick

The symposium was held at the University of Limerick, Ireland. It was the first and only technical symposium on military and emergency vehicles safety. The program included presentations, a keynote address, and a roundtable discussion. The symposium was organized by the Police Research Institute, University of Limerick, and was supported by the Department of Transport, Ireland.

- ### Key Issues
- ▶ **Mythology**
 - That Emergency Medical Service personnel are safe
 - ▶ **Injury Hazards**
 - Biohazard
 - Chemical/Radiation
 - Physical/Mechanical trauma - THE BIG PROBLEM
 - ▶ **Motor Vehicle Crashes are the highest cause of death at work - EMS has > 2X the mean national rate**
 - ▶ **An R & D and Regulatory Gap**
 - Occupational Health and Safety
 - the workplace is in a vehicle - exposure data are scant
 - Automotive Safety
 - a vehicle is the work place - exempt from automotive research and regulation

- ### What's missing
1. What data is collected nationally?
 - We have no denominator data
 - We have incomplete numerator data
 2. Absent population based national injury data or injury mechanics data
 3. Absent structured transportation safety engineering input
- 1+ 2 + 3 = resultant inability to design and evaluate efficacy of injury interventions
4. What oversight is there?
 5. Which organizations would determine policy?

- ### Challenges to Optimizing EMS Transport Safety
- ▶ Disparate and fragmented safety infrastructure
 - ▶ Lack of a centralized EMS Safety oversight or data
 - ▶ A large number of small groups of end users, with a mix of volunteers and professionals
 - ▶ Ambulances are hybrid non-standard vehicles, a truck chassis and an after market box or a modified van
 - ▶ EMS vehicle safety is not integrated as a part of the transport safety industry

Challenges to Optimizing EMS Transport Safety

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

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



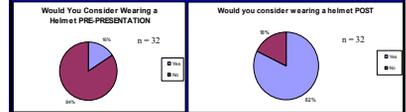


It does happen....

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...

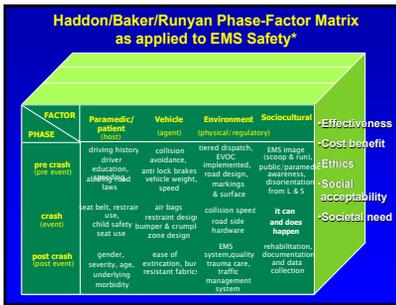


So why is it...

- ▶ 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





- ### 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
 - ▶ scene safety
 - ▶ the vehicle
 - ▶ the driver/driving skill
 - ▶ other road users
 - ▶ the road
- ↓
TIME
&
↓
PLACE



- ### This is not acceptable
- In the USA*
- ▶ ~ 5,000 crashes a year
 - ▶ ~ One fatality each week
 - ~ 2/3 pedestrians or occupants of other car
 - Approximately 4 child fatalities per year
 - ▶ ~10 serious injuries each day
 - ▶ Cost estimates > \$500 million annually
 - ▶ USA crash fatality rate/capita 35x higher than in Australia
- *NARS/ST 2005-6

Occupational Health and Safety.....?

▶ This IS an Automotive Safety issue



We should use the best safety practices demonstrated in engineering

Development of an Effective Ambulance Patient Restraint

Development and Application of a Dynamic Testing Procedure for Ambulance Paediatric Patient Restraint Systems

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

2001-01-1173

Madeline Leck, Guohua Li

Alpha Transportation

and in ergonomics

Ergonomics in the rescue service—Ergonomic evaluation of ambulance cots
Karin Klauß, Helmut Bressan^{a,*}
^aTechnische Universität München, School of Occupational Medicine, 85354 Munich, Germany
The Netherlands: School of Occupational Medicine, 85354 Munich, Germany

Reviewing ambulance design for clinical efficiency and paramedic safety
Jenny Ferrero, Sue Hignett^a
^aApplied Ergonomics and Patient Safety Unit (HEALTH), Dept. of Health Services, Southampton University, Southampton, UK
Received 10 April 2006; accepted 10 July 2006

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

RESEARCH & PROGRESS
Research Projects - Detailed View

RESEARCH & PROGRESS
Research Projects - Detailed View

RESEARCH & PROGRESS
Research Projects - Detailed View

Comprehensive data here too...

ELISA TOGO NASCAR wrecks
A look at the most recent accidents

ELISA TOGO NASCAR wrecks
A look at the most recent accidents

Accidents are down overall at tracks

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..

Occupational transportation fatalities/100,000 workers

Occupation	Fatalities/100,000 workers
EMS	~10
Police	~6
Fire	~5

▶ 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##

*Kuhn CA, Pivato RG, Kuhn 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, Kuhn 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



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3.0 Accreditation Standards

4.0 Accreditation Process

5.0 Accreditation Fees

6.0 Accreditation Renewal

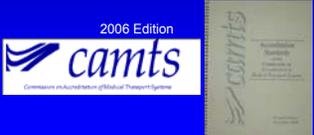
7.0 Accreditation Withdrawal

8.0 Accreditation Appeals

9.0 Accreditation Contact Information

Commission on Accreditation of Medical Transport Systems - CAMTS Accreditation Standards

2006 Edition



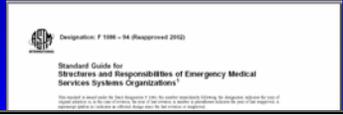
Commission on Accreditation of Ambulance Services - CAAS

Excellence Defined

COMMISSION ON ACCREDITATION OF AMBULANCE SERVICES



ASTM F 1086 - 94



Standard Guide for Structures and Responsibilities of Emergency Medical Services Systems Organizations

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:

$$\text{Incident rate} = \frac{\text{Number of incidents} \times 100}{\text{Number of vehicles}}$$
- Incident rate based on vehicle mileage:

$$\text{Incident rate} = \frac{\text{Number of incidents} \times 1,000,000}{\text{Vehicle mileage}}$$
- 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 Adele L. Abrams, Esq., CEMSP
Law Office of Adele 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.¹

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...

January 18 March 2006

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National Patient Safety Agency

Home | Public | Health professionals | Press/Media | Industry

Clear search
Advanced search
The NPSA Record
News
Events
Webinars
Specialist
Job opportunities
Frequently asked questions
Feedback

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

Public safety and ambulances

EMS Transport Safety

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

Section 21 Paramedic Health and Safety Committee

Home | Signatures | Set others

The purpose

Who, the undersigned, are regarding the Ministry of Labour to form a Section 21 Paramedic Representative Health and Safety Committee under the Occupational Health and Safety Act. One refers to one law more.

This position will be delivered and presented to the Ministry of Labour in 2007.

Information about the PHEMHSAC mandate is found in the table to the right or select the website link below.

Thank you in advance for your support.

Minister Spencer (Minister of Health) P.C. and Roy (Health) (Covers ACP)

1) Functions and Co-Chairs of PHEMHSAC.

PHEMHSAC is responsible for the best of its kind in North America a working specialty with EMS Health and Safety issues and research.

PHEMHSAC: PROVINCIAL EMS HEALTH AND SAFETY ADVISORY COMMITTEE
 Paramedic Representative Health and Safety
 25 Cedar Point Drive, Suite 204
 Paris, Ontario

2) PHEMHSAC's mandate.

3) PHEMHSAC's membership.

4) PHEMHSAC's structure.

5) PHEMHSAC's objectives.

6) PHEMHSAC's role.

7) PHEMHSAC's responsibilities.

8) PHEMHSAC's powers.

9) PHEMHSAC's functions.

10) PHEMHSAC's duties.

11) PHEMHSAC's powers and duties.

12) PHEMHSAC's powers and duties.

13) PHEMHSAC's powers and duties.

14) PHEMHSAC's powers and duties.

15) PHEMHSAC's powers and duties.

16) PHEMHSAC's powers and duties.

17) PHEMHSAC's powers and duties.

18) PHEMHSAC's powers and duties.

19) PHEMHSAC's powers and duties.

20) PHEMHSAC's powers and duties.

C45 - A criminal offence to not act in a way that protects the worker

Department of Justice Canada

Division de Justice Canada

THE DEPARTMENT

How does an organization become a party to a crime of negligence?

In offences based on negligence, the court must determine whether an individual acted in conformity or with such negligence for the safety of others as to constitute criminal negligence.

The Minister and Attorney General

The Department

Programs

Business and Law

For Youth

Search Canada's criminal justice system

With respect to the physical element of the crime, Bill C-45, paragraph 22.1 of the Criminal Code provides that an organization is responsible for the negligent acts or omissions of its representative. The Bill provides that the conduct of one or more representatives can be combined to constitute the offence, if it is not feasible or necessary that a single representative commit the offence.

<http://canada.justice.gc.ca/en/dept/pub/c45/section03.html>

NAEMT July 2006 Position Statement

NAEMT

National Association of Emergency Medical Technicians

Statement on Safety Restraint Use in Emergency Medical Services

Background

The National Association of Emergency Medical Technicians (NAEMT) strongly advocates the use of available safety seats and restraint systems to prevent injury to EMS personnel, patients, and all occupants of any emergency response vehicle.

The NAEMT strongly advocates the creation of a National EMS Safety Data Bank which can be used to identify all incidents in EMS vehicles involving an EMS service provider.

The NAEMT strongly advocates the development of standard protocols, studies to determine appropriate restraint and/or restraint systems for the EMS provider, patient and passengers of all emergency response vehicles.

What's new

- ▶ New automotive safety technologies
 - crashworthiness
 - EVS
 - ITS
 - Monitoring and feedback enhancements
- ▶ New expertise
 - TRB
 - ASSE
 - SAE
 - UTRC
 - Ergonomics
 - Industrial Design

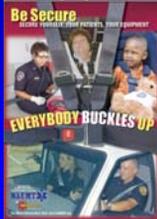
If we know this – and its published....



Why do we do this?



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



Vehicle Crashworthiness testing



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

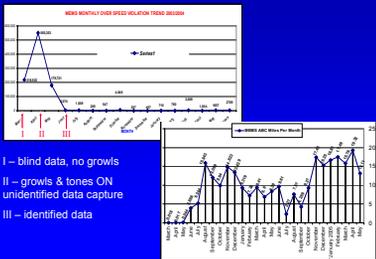


Driver behavior monitoring and feedback device

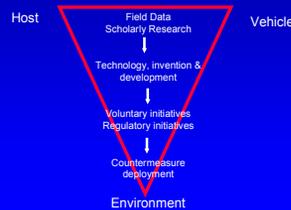


Levick NR, Swanson J, Proceedings - 49th Annual Conf. of the Assoc. for the Advancement of Automotive Med, September 2005
AMBEX-999 Research Forum 2006 – Research most likely to change practice award

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

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