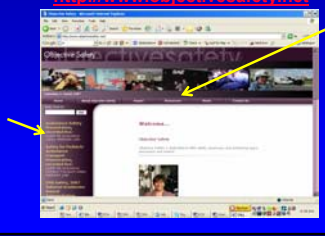
Your Interactive Handout awaits you online…

http://www.objectivesafety.net



New York Transportation Council,
Safety Advisory Working Group Meeting,
NYMTC, March 26th, 2007

Emergency Medical Service (EMS) Transport Safety: Where is the state of the art, and where SHOULD it be?

Nadine Levick, MD MPH
CEO, Research Director
EMS Safety Foundation
Objective Safety LLC

EMS

- Emergency Medical Services (EMS) - an important and unique aspect of the transportation system, it encompasses public safety, public health and an emergency service.
- What are the system wide transportation safety issues and challenges faced by the Emergency Medical Services?

Introduction

Emergency Medical Services – (EMS)

- Important interface between public health, transportation, public safety and emergency and acute care and the community
- Unique challenges - patient, provider and public safety and transportation safety
- Unique needs of this important part of our health care and transportation system

EMS Definition

- An Emergency Medical Services system is –
  - A coordinated arrangement of resources (including personnel, equipment, and facilities) which are organized to respond to medical emergencies, regardless of cause. (ASTM, 1988).
- EMS –
  - The services provided to accident victims and patients suffering from severe acute illness and psychiatric emergencies.
  - Detection and reporting of medical emergencies, initial care, transportation and care for patients in route to health care facilities, medical treatment for the acutely ill and severely injured within emergency departments, and the provision of linkages to continued care or rehabilitation services. (EMS Research Agenda 2001)

What is the scope of EMS?

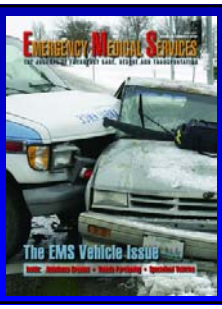
- Emergency care, public health, public safety and patient transport
- Bridge between the community and the hospital
- Volunteer – professional
- Urban – rural
- Disaster response
- Majority of transports NOT critical or life threatening

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

An important and unique system

- Public safety, public health and emergency service
- Is there to save lives
- A more recent service compared to Fire and Police



Transport related aspects of EMS

- dispatch of EMS vehicles
- transport policies and protocols
- vehicle fleets and vehicle design
- vehicle purchase standards
- Intelligent Transportation Systems technology
- driver training
- training simulation
- driver performance monitoring
- roadside and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

A tragic emergency health care intervention outcome

Rollover Crash Kills Medical Technician

It does happen….

Transport oversight?

- In contrast to the bus and truck industries, which have comprehensive safety oversight, and transportation safety interventions, as well as 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 service and largely outside of much of the other transportation oversight infrastructure that exists.
- This is an opportunity for transportation planners, engineers, and system operators to see a comprehensive overview some of the multidisciplinary transportation challenges faced by Emergency Medical Services.

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

What happened??

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

History of EMS

- EMS is a relatively new industry
- An unusual history of beginnings within the mortician industry.
  - Early ambulances were hearses, once motorized usually a Cadillac, a vehicle in which an occupant could be transported in the recumbent position
- Over the past 100 years, the sophistication of EMS medical care has advanced dramatically
- EMS communications and transportation technology have not kept up with that pace

Emergency Medical Service (EMS) 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 challenges

- No accepted national safety standards for -
  - EMS fleet management or safety practice
  - Ambulance vehicle rear compartment design and performance
  - Provider occupational injury protective equipment
- Yet convincing data for injury risk and hazard
- Need for patient, provider and public safety focus

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 estimates are - 7.66 - 41.93 fatalities per 100 million ambulance-miles

Scope

- Safety data on EMS transport and its oversight
- EMS vehicle crash rates are in excess of similar sized vehicles
- EMS worker transport fatality rates are above other emergency services
- Is a part of the transportation system that is largely exempt from most of the Federal Motor Vehicle Safety Standards (FMVSS), and not covered by other national transportation system safety oversight (ie. FMCSA)
- The findings of limited research conducted to date suggest EMS transportation safety is in need of urgent focus and has been left behind commercial truck and bus safety.

Scope

- A synthesis of the TRB research truck and bus conducted to date that applies to or could be applied to this field - has potential for substantively enhancing EMS transport safety.
  - Intelligent Transportation Systems (ITS), (interactive traffic signal technologies, in vehicle and in system driver performance improvement technologies);
  - Simulators for training and competencies;
  - Vehicle design and safety;
  - Safety and practice policies (Dispatch, shift length, safety oversight);
  - Interaction with other road users ('wake effect' and high density EMS traffic and hospital access road design) – may benefit EMS.
- EMS transport safety is a unique gap in the standards, oversight and coordination of the transport system.

Some recent adverse outcomes

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 laundry or packages

Fatalities and funerals

Funeral Services Held For Marble Falls Paramedic

Last week….

2 dead in Michigan ambulance crash

The Associated Press

A devastating tragedy…

- Medical care error may kill the 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 few weeks ago in New York

Ambulance Accident Injures Five

Major deal…

Firstly!

- An accident ?
- or
  a predictable and preventable event

What are the solutions?

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

What's missing

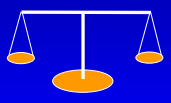
1. What data is collected nationally?
   - We have no denominator data
   - We have incomplete numerator data
2. Absent population based national injury data or injury mechanics data
3. Absent structured transportation safety engineering input

   1+ 2 +3 = resultant inability to design and evaluate efficacy of injury interventions
4. What oversight is there?
5. Which organizations would determine policy?

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)?

Balance of concerns and risk during transport



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

Goals

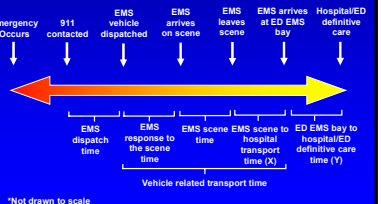
- Standards for safety
- Policy based on Science
- Databases to demonstrate outcome

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

911 Call to Hospital/ED Definitive Care Time Intervals*



*Not drawn to scale

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

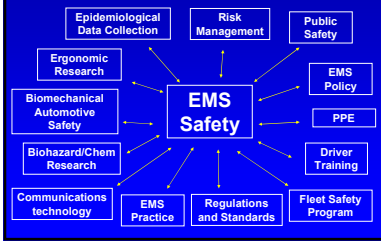
Challenges to Optimizing EMS Transport Safety

- 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

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

EMS Transport Safety IS Complex AND Multidisciplinary



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

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

*FARS/BTS 2004-5

Paramedic charged in crash that killed 2

By Tillie Fong, Rocky Mountain News
July 25, 2006

STERLING - A paramedic with MetroRural Ambulance has been charged with careless driving in connection with an accident in May that killed two people and injured two others.

Chris Larusso, 22, of Westminster, was issued a summons for two counts of careless driving resulting in death and two counts of careless driving resulting in serious bodily injury.

All are misdemeanor charges and carry possible sentences of 10 days to a year in jail and fines of $100 to $1,000.

Larusso was driving an ambulance May 9 on Interstate 76, about 15 miles west of Sterling, when he apparently rear-ended a semi-tractor truck.

Two passengers in the ambulance - nurse Karen Woods, 43, of Elizabeth, and ultrasound technician Vicky Thomas, 35, of Goodland, Kan. - were killed.

A patient, Kelsey Schlichenmayer, 43, of Burlington, was seriously injured, but hours after the accident, gave birth to a boy at Sterling Regional Medical Center.

Larusso and paramedic Dan Beza, 31, of Centennial, were treated for their injuries and released.

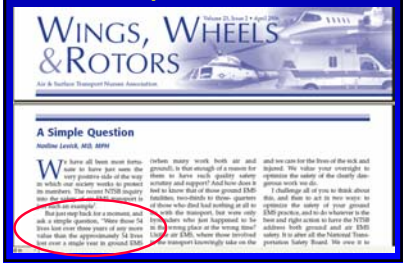
Key Issues

- 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

Safety oversight of what and by …. whom

- Transportation System Safety
- Vehicle Design
- Safety Equipment Design
- Vehicle and Safety Equipment Testing and Standard development
- Safety policies

A Simple Question….



WINGS, WHEELS & ROTORS

Air & Surface Transport Nurses Association

A Simple Question

Nadine Levitt, MD, MPH

We have all been most fortunate to have just seen the very positive side of the way in which our society works to protect its members. The recent NTSB inquiry into the [illegible] transport to [illegible] all tragically!

But just step back for a moment, and ask a simple question. "Were those 54 lives lost over those years of any more value than the approximately 54 lives lost over a single year in ground EMS [illegible] (when many work both air and ground), is that enough of a reason for them to have such quality safety scrutiny and support? And how does it feel to know that of those ground EMS fatalities, two-thirds to three-quarters of those who died had nothing at all to do with the transport, but were only in the wrong place at the wrong time? Unlike air EMS, where those involved [illegible] transport knowingly take on the [illegible] and we care for the lives of the sick and injured. We value your oversight to optimize the safety of the (hardly dangerous work we do.

I challenge all of you to think about this, and then to act in two ways: to optimize the safety of your ground EMS practice, and to do whatever is the best and right action to have the NTSB address both ground and air EMS safety. It is after all the National Transportation Safety Board. We owe it to

EMS Transport General Concerns

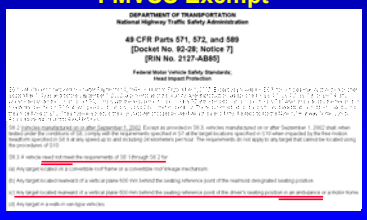
- Consequences can be predictable & likely preventable
- Costs of these adverse events are high in loss of life, financial burden and negative impact on delivery of EMS care
- Other high speed vehicles (eg. racing cars) and also passenger carriers such as trucks and buses have a different safety paradigm
- Design of interventions to mitigate injury is predicated on a valid testing model
- Complex both engineering and public health issues

and who's life was he racing to save?

NASCAR, Car of tomorrow ready to go

USA Today – March 23rd, 2007

USA Ambulances: FMVSS Exempt



DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589
[Docket No. 92-29; Notice 7]
[RIN No. 2127-AB85]

Federal Motor Vehicle Safety Standards;
Head Impact Protection

AMD Position Statement on Ambulance Safety and Occupant Protection

AMBULANCE MANUFACTURERS DIVISION

Ambulances must comply with some of the strictest safety and performance standards applicable to vehicles in the United States. All motor vehicles operated on public roads and highways must conform to Federal Motor Vehicle Safety Standards (FMVSS) contained in Title 49 of the Code of Federal Regulations Part 571. Ambulances are no exception. FMVSS are the most visible and vigorously enforced safety standards governing the design, engineering and production of such vehicles. Nearly all government purchased ambulances, and the overwhelming majority of those sold to the public, also must be certified to the safety requirements of the Federal Star of Life Specification for Ambulances, KKK-A-1822, promulgated by the federal government. These requirements are in addition to FMVSS.

Global EMS Vehicle Safety Standards v Specifications and Guidelines

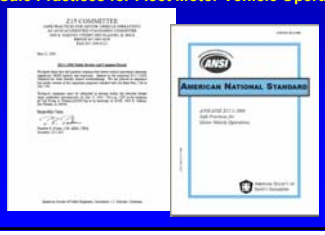
- EMS Safety and Performance Standards
  - Australia & New Zealand 4535
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - [Aviation - FAA/CAA/JAA]
  - Z15 – Fleet vehicles safety management
- USA EMS Specification & Guidelines
  - Purchase Specification: KKK & NTEA – AMD
  - Guideline: EMSC Dos and Donts
    ASTM, CAAS and CAMTS

USA ambulance purchase specifications GSA:KKK-A-1822E, 2002

- Static Pull test
- 2200 Lbs. (8G's) in Longitudinal and Lateral
- No dynamic test
- No definition to manikin mass
- No restraint for equipment
- Voluntary

American National Standard ANSI/ASSE Z15.1-2006

Safe Practices for Fleet Motor Vehicle Operations



Z15 COMMITTEE

ANSI

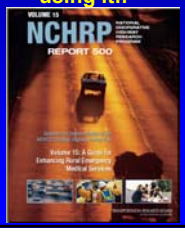
AMERICAN NATIONAL STANDARD

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

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

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



TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Active Projects

(all due early 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

Federal Highway Administration

February 2007

What about FMCSA's Mission

- Office of Research and Analysis is committed to reducing the large truck-related fatality rate from 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008.

Mission

- The mission of FMCSA's Office of Research and Analysis is to reduce the number and severity of commercial motor vehicle (CMV) crashes and enhance the efficiency of CMV operations by:
  - Conducting systematic studies directed toward fuller scientific discovery, knowledge, or understanding
  - Adopting, testing, and deploying innovative driver, carrier, vehicle, and roadside best practices and technologies
  - By expanding the knowledge and portfolio of deployable technology, the research and technology program will help FMCSA reduce crashes, injuries, and fatalities and will deliver a program that contributes to a safe and secure commercial transportation system.

FMCSA's Objectives

- Produce Safer Drivers:
- Improve Safety of Commercial Motor Vehicles:
- Produce Safer Carriers:
- Advance Safety Through Information-Based Initiatives:
- Improve Security Through Safety Initiatives:
- Enable and Motivate Internal Excellence:

What type of passenger carrier do you need ?

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 (REMAC) 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

Unique workplace

- In vehicles
- At roadside and other emergency scenes

The 'workplace' IS a vehicle

- EMT's often in vulnerable positions during transport.
  - Bench seat
  - Captains chair
  - Standing or kneeling

View of Ambulance interior from Rear

The 'workplace' is also a crash scene

News we don't want to see

Jan 22, 2007 6:39 am US/Eastern

Caught On Video: EMT Struck By Car

Lou Young
Reporting

(CBS) BRONX The car hit 46 year-old Capt. Steven Quirindongo so violently it smashed the vehicle's windshield and sent him flying through the air.

Quirindongo, a 19-year veteran of the city's emergency medical services, was on the scene of a fire on Riverdale Avenue in the Bronx Sunday afternoon when a civilian car moved past police barricades and caught him from behind. Chief Wayne McPartland was on the scene as the damaged health food store where his men had successfully put out the flames.

"We had two firefighter minor injuries," he told us, "and they were taking care of our men and when he (Quirindongo) was walking back to the ambulance he was struck by the civilian vehicle.

Very Predictable…

- Intersections are lethal environments

"Are our policies killing people?"

- 1991-2000, 302,969 Emergency vehicles were involved in MVCs - 1,565 involving fatalities*
- In PA 1997-2001, ambulances were more likely than similar sized vehicles to be involved in*:
  - 4 way intersection crashes (43% vs 23%, p=0.001)
  - Collisions at traffic signals (37% vs 18%, p=0.001)
  - MVCs with more people injured (76% vs 61%, p=0.001)

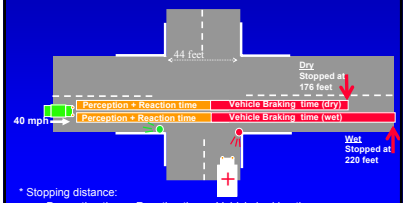
**Comparison of Crashes Involving Ambulances with those of similar sized vehicles – Adam Ray, Douglas Kupas, PEC Dec 2005;9:412-415*

So.. The real world for an EMS vehicle approaching a red light

- You think they heard you…
- You know they must have seen you..
- And maybe they did
- ….. But..
- There is NO way humanly possible that they could stop…..

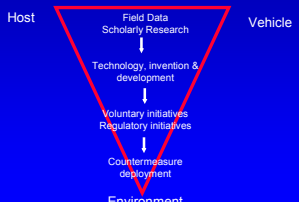
The real world

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

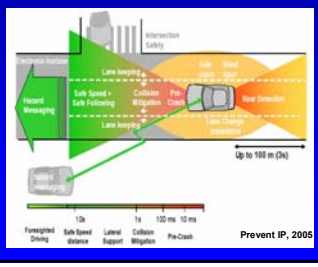


* Stopping distance:
Perception time + Reaction time + Vehicle braking time
(varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)

Automotive Injury Triangle and Safety Development



Intelligent Transport Safety Systems



Prevent IP, 2005

Is this a strategy that can work?

'Move Over' law takes effect on New Year's Day

By ROBIN BROWN, The News Journal
Posted Sunday, December 31, 2006 at 5:54 pm

A new state law takes effect Monday, aiming to protect emergency workers from road injury.

It's the "Move Over" law.

The new law requires drivers approaching stopped emergency vehicles with lights activated to move a lane away from the equipment or slow to a safe speed when such a lane change is impossible or unsafe.

The law covers all roads with two or more lanes in the same direction.

"Anyone who works alongside our highways is particularly vulnerable to being hurt by inattentive and careless drivers," said Trina Roberts, director of the Office of Highway Safety. "Sadly, dozens of law enforcement officers alone in Delaware have been injured and even killed by passing motorists while working outside of their vehicles."

Col. Thomas F. MacLeish, superintendent of Delaware State Police said emergency workers depend on motorists' attentiveness.

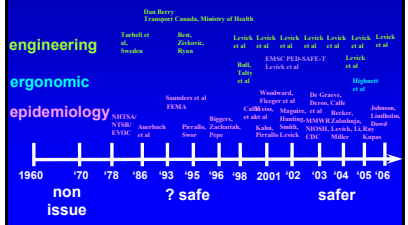
EMS Best Practice, Sept 2006

Best Practice…..? The technology described in your junk mail is far more advanced than that used in EMS

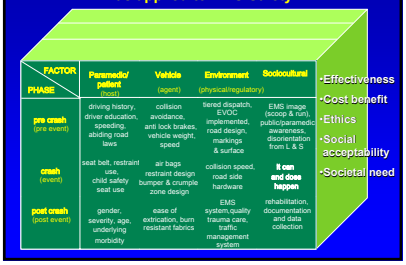
Data

- What national statistics are there for EMS transport safety
- What is known about 'wake effect'

Ambulance Safety Research: A New Field



Haddon/Baker/Runyan Phase-Factor Matrix as applied to EMS Safety*

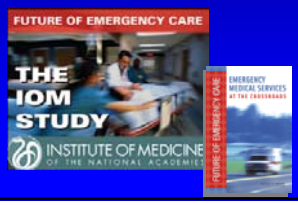


EMS Research /Data Vacuum

- ? total no. of ambulances
- ? total no. of medics
- ? total no. of runs (per age & severity)
- ? total pt. miles (per age & severity)
- ? true crash fatality rate per mile
- ? crash injury rate
- ? adverse events

National EMS Information System

"Nation's Emergency Care System is fragmented, unable to respond to disasters", *says Institute of Medicine, June 14, 2006*



Predictable risks

- More often at intersections, & with another vehicle (p < 0.001)*
- 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#
- 70% of fatal crashes EMS crashes during Emergency Use#
- More likely to crash at an intersection with traffic lights (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles##

**Kahn CA, Pirrallo RG, Kuhn EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9*
***Becker, Zaloshnja, Levick, Li, Miller, Acc Anal Prev 2003*
****Maguire, Hunting, Smith, Levick, Annals Emerg Med Dec 2002*
#NIOSH, 2003
##Ray AM, Kupas DF. Prehosp Emerg Care 2005 Dec; 9:412-415
###NHTSA, 49 CFR Parts 571, 572 & 589 Docket no. 92-28; notice 7.

EMS Provider Fatalities

- 12.7 fatalities/100,000 EMS workers
- Greater than 2 X the national average (5.0 fatalities/100,000)
- Similar to Police (14.2/100,000) and Fire Fighters (16.5/100,000)

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

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

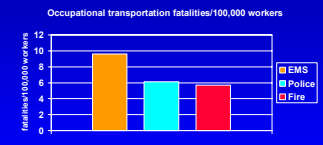
** Maguire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec 2002*

So does it make sense ?

- Gloves and universal precautions?...

  … good biohazard protection BUT aren't going to give much protection in a ambulance crash

A word about occupational transportation fatalities..



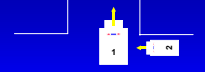
- WE HAVE A BIG PROBLEM HERE

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

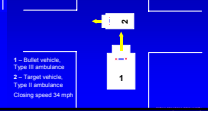
Fleet Mix ?

Full Vehicle Crash Tests

Test 1 – Right side impact



Test 2- Frontal



Air EMS is a role model for safety initiatives and focus

Safety Management

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

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

Tiered Dispatch

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

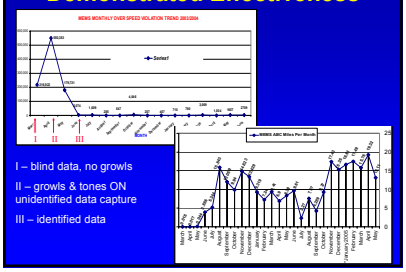
The "Black Box"

Driver behavior monitoring and feedback device

Purpose of 'Black box' Program

- Enhance Safety
- Improve Driver Performance
- Save Maintenance Dollars
- Aid Accident / Incident Investigation

Demonstrated Effectiveness



I – blind data, no growls

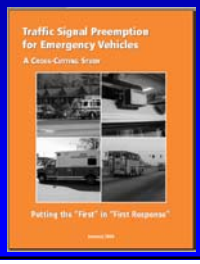
II – growls & tones ON unidentified data capture

III – identified data

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

Data, but is it generalizable



EMS is emerging in the transport safety arena

- First and only presentation of ambulance safety research at ESV Congress was 2001
- SAE Toptec on Military and Emergency Vehicles, USA , September 2001
- Emergency Vehicle Symposium, Australia, Melbourne, May 2003
- Sporadic Ambulance safety research presented at peer reviewed AAAM, ITMA, SAEM, Safe America, World Injury, Asia Pacific Injury Conferences 1999-2005
- Next week at inaugural meeting at 2007 TRB Congress in DC

EMS Risk/Hazards

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

What's new

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

Regional University Transportation Research Centers

FDNY a leader in safety

Future

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

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

Conclusion

- Major advances in EMS safety research, infrastructure and practice over the past 5 years
- New technologies for vehicle design, occupant PPE and equipment restraint and driver performance are now available
- Development of substantive EMS transport safety standards is a necessity and a reality
- Enhanced cross disciplinary collaboration in development of safety initiatives now exist
- EMS is still way behind the state of the art in transport and vehicle safety and occupant protection

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

Any Questions??

Electronic handout available online

http://www.objectivesafety.net