

January 2006 Presentation to
EMS State Advisory Board

New initiatives in EMS Transport Safety: Where is the State-of-the-Art?

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This morning's Scope

- ▶ **Key Issues**
 - Crash and Safety Data
 - Oversight
- ▶ **Guidelines – standards**
 - Existing plus Draft Z19
- ▶ **Transport safety management**
 - Protective devices/programs
 - In the event of a crash
 - To prevent a crash
 - Safety Culture
- ▶ **Future**
 - Goals
 - New Safety Seminar
 - New vehicles
 - New technologies
 - Futuristic vehicles
 - New policies
 - New practices
 - New Standards

A tragic emergency health care intervention outcome

Emergency crew find one of their own killed in crash

Rollover Crash Kills Medical Technician
Ambulance from 07 killed Tech, the driving the Department's fleet

It does happen....

The New York Times
Report Faults Rules and Judgment in Crashes of Air Ambulances

By MATTHEW HERD
Published January 26, 2006

WASHINGTON, Jan. 25 — Air ambulance crashes killed 54 people, most of them pilots, paramedics and nurses, in a three-year period ending in early 2005, according to a special study by the National Transportation Safety Board.

The report, which was approved by the board on Wednesday, concluded that pilots were not good at reading rules and that the rules are too lenient when carrying a patient or a disabled organ.

Pilots and planes need an ambulance by under other rules when carrying a patient or organ. But if there are no three ways to a parking, they by under rules that apply to private planes, which do not have many hours a pilot can work and allow pilots to receive weather. Three-quarter of the accidents occurred under those rules.

"It seems like a ridiculous paper airplane that needs to be closed," said one member of the board, Debbie Henson. "I've got one, two or three are local personnel on board, and they have organ in their bodies. They're not as important organ as an organ for transport."

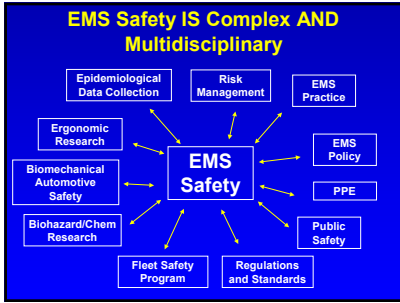
Investigators also reported a flawed program of "flight risk evaluation," in which the pilot and possibly a second expert would independently score each mission, based on weather conditions, size of day and other factors. Of the 57 accidents, 13 might not have occurred if such evaluation had been done, they said.

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

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** - ~30 million patients
- ▶ **Cost** - ~\$5 Billion annually
- ▶ **Safety Oversight** - ? Disparate



Ideally Who, What and Where ?

- ▶ **Occupational Health and Safety**
 - Epidemiology, Bio/Chem Hazards and Ergonomics
 - Regulation and Research
- ▶ **Automotive Safety**
 - Epidemiology, Engineering and Impact Biomechanics
 - Regulation and Research
- ▶ **EMS Industry**
 - Occ. Health, Automotive, Technical, Clinical & Fiscal data
 - Practice Policy, Risk Management and Fleet Safety
- ▶ **Academia**
 - Independent and collaborative
 - R & D and evaluation of all of the above

Goals

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

Balance of concerns and risk during transport



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

Firstly!

▶ An accident ?

- ▶ or
- ▶ a predictable and preventable event

“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.....

Protective devices/concepts

In the event of a crash

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

To prevent a crash

- ▶ Driver feedback
- ▶ Driver monitoring
- ▶ Driver training
- ▶ Vehicle technologies
- ▶ Tiered dispatch
- ▶ Appropriate policies

This is where automotive safety is happening – where is EMS???



Enhanced Safety of Vehicles (ESV) – The Definitive Vehicle Safety Forum

Ambulance vehicle safety has only been presented at one ESV meeting, the 17th ESV in 2001

Arizona, September 11th 2001



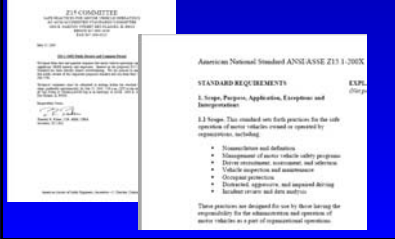
Crash Occupant Protection

- ▶ collision speed
- ▶ direction of impact
- ▶ vehicle stiffness and mass
- ▶ compartment size & projectiles
- ▶ intelligent vehicle technology
- ▶ passive protection
- ▶ head protection
- ▶ occupant restraint/belts

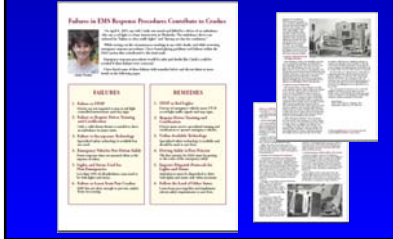
Global EMS Standards

- ▶ Australia & New Zealand ASA 4535
- ▶ Common European Community EN1789
- ▶ ‘USA KKK & NTEA – AMD’
- ▶ [Aviation - FAA/CAA/JAA]
- ▶ CAMTS
- ▶ CASS
- ▶ International Joint Commission on Medical Transport
- ▶ Draft ANSI/ASSE Z15

American National Standard Draft ANSI/ASSE Z15.1-200X



Gregg Theunes Appeal to his Senator, December 29, 2005



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

The 'workplace' IS a vehicle

- ▶ Providers often in vulnerable positions during transport.
 - Bench seat
 - Captain's chair
 - Standing or kneeling



Hazards



But what about head protection?



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

The difference having data makes?



Head protection developments

- ▶ Head protection is an accepted, standard and standardized aspect of PPE for all Emergency Services, except for ground EMS personnel
- ▶ In a setting of new enhancements to ambulance transport safety – and a realistic understanding of time frames for such changes to fleet vehicles – head protection is a simple and cost effective initiative
- ▶ As a result of this study a collaborative relationship has been established with International Safety Equipment Association (ISEA) to support the development of a standard for ground EMS head protection

Crash Prevention

- ▶ EVOC
- ▶ Tiered Dispatch
- ▶ The “Black Box”
- ▶ Intelligent vehicle design
- ▶ Appropriate policy

The “Black Box”

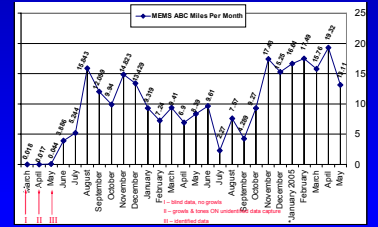
Driver behavior monitoring and feedback device



Implementing Black box technology in Pinellas

- ▶ Introduced by Chuck Kearns, Pinellas County EMS/Fire Exec Director
- ▶ Paid for itself in 8 months in reduced maintenance costs alone
- ▶ Reduced crash rate by 90%

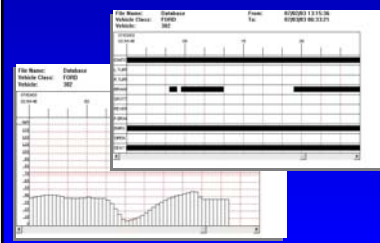
MEMS Road Safety Average Between Count Miles 2003/2005



302 Accident 3 July, 2003



Unit 302 Accident



Improved safety, performance and decreased costs

- ▶ No increase in response times
- ▶ Pays for itself in 6 months in reduced maintenance costs alone
- ▶ Improved safety proxies by orders of magnitude and sustained with no in-service
- ▶ Reduced crash rate by up to 90%
- ▶ Well accepted
- ▶ Is it ethical NOT to have these devices in all vehicles now?

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

Safety for EMS Transport Goals

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

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

Creating a Safety Culture

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

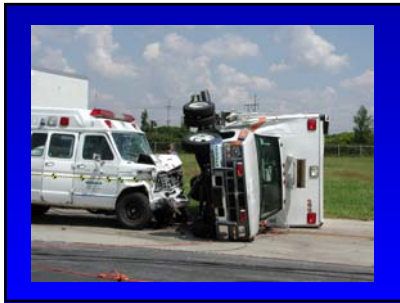
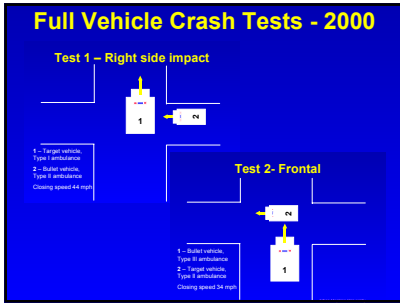
- ▶ Awareness
- ▶ Training
- ▶ Incentive

USA EMS Risk/Hazards

- ▶ Predictable risks
- ▶ Serious occupational hazard
- ▶ Predictable fatal injuries

Multidisciplinary collaboration and the way forward

- ▶ Development of interdisciplinary teams
 - healthcare professionals
 - safety engineering expertise
 - regulatory bodies
 - manufacturers
- ▶ Safer practices save lives, time and money





- ### Current and Future Research
- ▶ Epidemiology
 - ▶ Ergonomic hazards
 - ▶ Bio/Chem/Radiation hazard
 - ▶ PPE & Head protection
 - ▶ Transport
 - Vehicle/Occupant automotive testing
 - Vehicle design innovation
 - Driver behavior (Real time and Simulated)
 - Intelligent Transportation Systems
 - ▶ Operations tracking
 - ▶ Data systems/reporting systems
 - ▶ Enhanced Practice policies

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

PREDICTABLE PREVENTABLE and NO ACCIDENT

- ### Conclusion
- ▶ Major advances in EMS transport 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 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 vehicle safety and occupant protection

And....

- ▶ It is no longer acceptable for EMS to be functioning outside of automotive safety and PPE safety standards for prevention of and protection of EMS providers and the public from injury and death.

