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Trends and Concepts in EMS Safety?

Safety Trend Setter!

NAOSH 2007 – Theme “All Modes of Transportation”

Safety Trend Setter!

This week’s NAOSH events in Canada

A few months ago in Canada

Objectives

1. Educate on the risks to patients, transport and emergency medical service providers and the public from ambulance crashes.
2. Explore factors related to ambulance crashes and identify potential mechanisms of injury to patients and transport providers
3. Explain new transport safety technologies and innovations, and describe the new concepts that are underdevelopment
4. Instruct providers on strategies for enhancing transport safety and reducing risk of injury to patients and providers during transport

Your interactive Handout awaits you online…

http://www.objectivesafety.net

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……
Some questions for you all:
- Have you ever been in a EMS crash?
- How many times?
  - 1?
  - 2?
  - More?
- Have you ever been hurt in an EMS crash?
- Do you know any one who has ever been hurt in an EMS crash?
- Do you know of anyone who has been killed in an EMS crash?

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

Emergency Medical Service (EMS) vehicles - Ambulances
- 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?

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

Two days ago...

Last Week

Two weeks ago ....

This week....

Last month....
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 packages or parcels

An interhospital transport ? “Do no harm…..”? 

August 16th...

August 22, 2005....

Firstly!

An ‘Accident’…. ? 

So....

On their way TO the hospital

With a patient who was not in cardiac arrest or in a life threatening situation

All 5 in the ambulance critically injured
EMS Best Practice, Sept 2006

1970 to 2006

Ambulance Safety Research: A New Field

We should use the best safety practices demonstrated in engineering

and in ergonomics

Predictable risks

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


So does it make sense?

Gloves and universal precautions?...
... good biohazard protection BUT aren’t going to give much protection in an ambulance crash

A word about occupational transportation fatalities...

WE HAVE A BIG PROBLEM HERE

CPR?

Safety oversight of what and by .... whom
- Vehicle Safety
- Vehicle Design
- Safety Equipment Design
- Vehicle and Safety Equipment Testing and Standard development
- Safety policies

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 drive/driving skill
- other road users
- the road

The Emergency Department (ED)

An ambulance is not an ED/ICU on wheels

This is not acceptable
In the USA
- ~ 5,000 crashes a year
- ~ One fatality each week
  - ~ 20 pedestrians or occupants of other car
  - ~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

Occupational Health and Safety.....?
- This IS an Automotive Safety issue

Is It your services tragic year?
- ~ 50 fatalities a year
- 15,000 EMS services
- Each year one in 300 services experiences a fatality
Balance of concerns and risk during transport

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

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

This is about you and your safety

- What safety practices do you use??
  - Seat belts?
  - EVOC training?
  - Equipment lock down?
  - Helmets?
  - “Black Box” technology?
  - Tiered dispatch?

EMS Transport Safety IS Complex AND Multidisciplinary

- Epidemiological Data Collection
- Ergonomic Research
- Biomechanical Automotive Safety
- Communications technology
- EMS Practice
- Regulations and Standards
- Fleet Safety Program
- EMS Policy
- EMS Training
- Risk Management
- Public Safety
- EMS Safety

Background: USA Problems

- No reporting system or database specifically for identifying ambulance crash related injury
- No occupational and health safety standards to protect providers from injury
- Rear passenger compartment, > 60cm behind driver - exempt from Federal Motor Vehicle Safety Standards (FMVSS)

USA Ambulances: FMVSS Exempt

Ambulances must comply with some of the most severe and performance standards applicable to vehicles in the United States. All motor vehicles operated on public roads and highways must comply with Federal Vehicle Safety Standards derived from the United States Department of Transportation (DOT). Ambulances are not only subject to these standards but also additional standards governing the design, engineering and production of such vehicles. For example, government purchase ambulances, and the emergency medical care of those added to the public, also must be certified to the safety requirements of the National Automotive Medical Care Guide, while 1995, promulgated by the National Highway Traffic Safety Administration (NHTSA) to ensure patient safety.
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 (e.g., racing cars) have a different safety paradigm
- Design of interventions to mitigate injury is predicated on a valid testing model
- Complex both engineering and public health issues

NAEMT July 2006 Position statement

Tips for Emergency Vehicle Operations

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!!

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


- EMERGENCY MEDICAL SERVICES DISPATCH SERVICES
- EMERGENCY MEDICAL SERVICES PARTNERSHIPS
- PRE-HOSPITAL TRAINING PROGRAMS
- ROAD CONDITION AND INCIDENT RESPONSE


- EMS RESPONDER CRASH PREVENTION
- 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
- Increase education and involvement of EMS providers in principles of appropriate traffic safety techniques
- Identify methods to provide incentives for adoption by EMS services of protocols that enhance traffic safety

Sit Down for EMS Safety!
FDNY a leader in safety

And very Predictable…

- Intersections are lethal environments

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)

Increasing awareness …

But what about head protection?
New EMS helmet prototypes for 2006-2007

News we don’t want to see...

Caught On Video: EMT Struck By Car

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???

It isn’t like this outside of North America

cool AND remember this guy?

NOW Very cool AND very safe!!!

Safety leadership... from the IAFc and USFA

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

Automotive Injury Triangle and Safety Development

- Host
- Field Data
- Vehicle
- Final Data
- Solution Research
- Technology
-腕to development
- Environment

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
- Restraint belt systems
- Equipment lock downs
- Paddings
- Head protection

Intelligent Transport Safety Systems

Driver behavior monitoring and feedback device

The "Black Box"

Program

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

Purpose of 'Black box' Program

- Intersection crashes are the most lethal
- There are documented hazards, some which can be avoided
- Occupant and equipment restraint with standard belts is effective. (Over the shoulder harnesses for patients should be used, with the gurney in the upright position where medically feasible)
- Some vehicle design features are beneficial - automotive grade padding in head strike areas, seats that can slide toward the patient
- Electronic Driver monitoring/feedback systems appear to be highly effective
- Head protection??

What do we know now??

Demonstrated Effectiveness

A key to safe ambulance transport

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MEMS ABC Miles Per Month

MEMS MONTHLY OVER SPEED VIOLATION TREND 2003/2004

Series 1

I – blind data, no growls
II – growls & tones ON, unidentified data capture
III – identified data
Dynamic Safety Testing

- Requires sophisticated, expensive equipment
- Measurably demonstrates forces generated during collision
- Accepted international standard for vehicle restraint systems

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

Full Vehicle Crash Tests

Test 1 – Right side impact

Test 2 – Frontal

Johns Hopkins University

Test 1 – Right side impact

1 – Target vehicle, Type I ambulance
2 – Bullet vehicle, Type II ambulance
Closing speed 44 mph

Test 2 – Frontal

1 – Bullet vehicle, Type III ambulance
2 – Target vehicle, Type II ambulance
Closing speed 34 mph

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....”

Were we safer in the Cadillac???

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 side-facing occupants are potentially lethal – and is in NO WAY SUPPORTED BY ANY DATA OR AUTOMOTIVE SAFETY EXPERTISE

- "Give the engineers a working list of our needs and let them tell us how it should be built to accomplish those tasks...."
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

16 Firefighter Life Safety Initiatives

www.EveryoneGoesHome.com
1. Define and advocate the need for a cultural change relating to safety; incorporating leadership, management, supervision, accountability and personal responsibility.
2. Enhance the personal and organizational accountability for health and safety.
3. Focus greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.
4. All must be empowered to stop unsafe practices.
5. Develop and implement national standards for training, qualifications, and certification based on the duties expected to perform.
6. Develop and implement national performance related medical and physical fitness standards.
7. Create a national research agenda and data collection system.
8. Utilize available technology to produce higher levels of health and safety.
9. Thoroughly investigate all fatalities, injuries, and near misses.
10. Develop programs to improve the representation of safe practices and to maintain those practices in all aspects of your operation.
11. Provide antidote treatments for injury to workers and customers.
12. Must have access to counseling and psychological services.
13. Public information must be made available for the enhancement of safety.
14. Safety must be a primary consideration in the design of apparatus and equipment.

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

Important Principles!
1. A culture of safety
2. Drive cautiously
3. Wear your belts & restrain all occupants
4. Secure all equipment
5. Integrate scientific data into your policies and procedures
- Unrestrained occupants and equipment are a potential injury risk to all occupants

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.
small changes can make a BIG DIFFERENCE

PREPARE – TEACH – REACH – RESPOND
• Look at your own safety record
• Teach safety and hazard awareness
• Reach out with safety information to all your EMS providers
• Respond with the best safety practices

PREDICTABLE PREVENTABLE and NO ACCIDENT

Conclusion
• EMS transport has serious hazards and safety issues
• 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 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