Ambulance Safety: Everything that you need to know!

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A tragic emergency health care intervention outcome

It does happen....

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......

Your Interactive Handout awaits you online...
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Outline
▶ Review of data on ambulance crashes and crash safety
▶ Identification of safety issues, hazards and areas of risk for EMS vehicles
▶ Review of safety standards and guidelines, and an update of the latest safety developments
▶ Strategies to enhance safety and reduce risks of EMS transport related crash and injury

Fatalities and funerals
An accident?

or

a predictable and preventable event

Firstly!

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##

and what is killing EMS?

EMS personnel fatalities*

- 74% transportation related
- 15% of ground transport fatalities were struck by moving vehicles
- 11% were cardiovascular
- 9% were homicide
- 4% needle sticks, electrocution, drowning and other


A word about occupational transportation fatalities...

- WE HAVE A BIG PROBLEM HERE

So does it make sense?

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

Unique workplace

- In vehicles
- At roadside and other emergency scenes
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

The Emergency Department (ED)

An ambulance is not an ED /ICU on wheels

EMS Transport Safety IS Complex AND Multidisciplinary

Vision Zero:
An ethical approach to safety and mobility

- Claes Tingvall

Vision Zero is a philosophy of road safety that eventually no one will be killed or seriously injured within the road transport system. Vision Zero describes the view that safety cannot be traded for mobility. Sweden’s Vision Zero is aimed at eliminating all deaths or long-term health losses arising from road crashes. The mobility in the road transport system should be a function of the safety and not vice versa.

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

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

Paramedic charged in crash that killed 2

- The Springfield News
- Dec 11, 2006
- A paramedic who was charged with vehicular manslaughter in a crash that killed two people was acquitted of the charge on Thursday.

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*FARS/BTS 2004-5

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Key Issues
- Myths
  - Emergency Medical Service personnel are safe
- Injury Hazards
  - Radiation
  - Chemical/Radiation
  - Physical/Mechanical trauma
  - 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
- Vehicle Safety
- Vehicle Design
- Safety Equipment Design
- Vehicle and Safety Equipment
- Testing and Standard development
- Safety policies

A Simple Question
- What safety practices do you use??
  - Seat belts?
  - EVOC training?
  - Equipment lock down?
  - Helmets?
  - "Black Box" technology?
  - Tiered dispatch?

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??

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) 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

Tips for Emergency Vehicle Operations
- Consequences can be predictable & likely preventable
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NAEMT July 2006 Position statement
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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 same 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 (49 CFR). However, Ambulances are considered exempt from Federal Motor Vehicle Safety Standards governing the design, engineering, and production of such vehicles because they are government purchased ambulances, and the overwhelming majority of those sold to the public also must be certified to the safety requirements of the federal dot specification for ambulances, while still, articulated by the motor vehicle safety standards. Federal Motor Vehicle Safety Standards (FMVSS) are the guidelines for motor vehicle safety in the United States. These standards are developed by NHTSA and are intended to ensure that all vehicles sold in the U.S. are safe for the public.

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, experience, vehicle type, tire pressure, road etc.)

What do we know now??

- 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 when 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??
No need to reinvent the wheel...

'Workplace' Hazards

Hmm...

It isn't like this outside of the USA

This looks cool AND SAFE!

Not rocket science...

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
The Crash Event - Crash Testing
- An introduction
- What one needs to know
- What do the tests really mean
- And, what tests are meaningful

Dynamic Safety Testing
- requires sophisticated, expensive equipment
- measurably demonstrates forces generated during collision
- accepted international standard for vehicle restraint systems

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

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

EMS Risk/Hazards
- Predictable risks
- Predictable fatal injuries
- Serious occupational hazard
- Public safety hazards

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

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
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

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

Any Questions??
Electronic handout available online http://www.objectivesafety.net