To quote Steve “Sid” Caesar –
Director IHS ES
“We want everyone to get home safely each day”

EMS Transport Safety
► ‘patient safety’
AND also
► ‘provider’ and ‘public safety’

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......
Objectives

- To identify the safety issues that are key regarding pediatric patient transport for the patient, the provider and the public
- To describe safety innovation and dispel safety myths
- To instruct providers on strategies for preventing crashes and for reducing risk of injury to patients, providers and the public during transport

Outline

I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ambulance transport
II. Identification of 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 ambulance transport

http://www.objectivesafety.net

January 10, 2008

This is not a crashworthy environment

Jan 28th, 2008

… Nov 8th's Fatality

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1 dead, others injured in Sussex crash involving ambulance
April 13th….

EMS workers check by car at scene of an accident - New York

At a press conference late Wednesday, an official from the Department of Health said a car accident was at fault for the death of a pedestrian.

The accident occurred early Wednesday morning on the West Side of Manhattan when a car collided with a bicycle, killing the cyclist and injuring the driver.

April 14th, 2008

A press conference was held on the steps of City Hall to announce the policy change.

April 20, 2008..??

May 19th, 2008

Firstly!

An accident?

or a predictable and preventable event

Clinical Care?

Omninational Health and Safety…..?

This IS a Transportation and Automotive Safety issue

This is a Systems safety issue

USA Peds Transports

~One in ten (~ 6 million) ambulance transports involves a child

~Only ~1.4 million are children <5 yrs

~Ambulances & standard passenger vehicles

~Pediatric patients in ambulances = children in passenger cars

~Standard automotive safety practices cannot be applied directly to ambulances

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
Collisions/crashes among pediatric transport teams are unusual and have resulted in deaths, injuries, and disability. They appear to be caused by the actions of a team member and/or those of third parties. Specific safety policies on the part of the team and/or the vehicle owner may prevent or decrease collisions/crashes. Collision-free teams attributed their safety record to specific policies of the team and/or the vehicle owner and to luck. Specific safety policies on the part of the team and/or vehicle owner or provider may prevent or decrease collisions/crashes. * Pediatric critical care transport—the safety of the journey: a five-year review of vehicular collisions involving pediatric and neonatal transport teams: GA Woodward, EW Fleegler - Pediatr Emerg Care, 2002

The continuous process of critical incident reporting and review can reduce the number of adverse events during the transfer of critically ill infants. * Towards safer neonatal transfer: the importance of critical incident review: Moss SJ, D Embleton N, Fenton AC Archives of Disease In Childhood 90 (7): 729-732 JUL 2005

Goals

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

Thursday July 5th 2007...... Paramedic Allan Parson’s killed

"...I’d like to know what can be done so this never happens again....."

Friday July 20th 2007

The worst ambulance crash in USA history

Two weeks later... Friday July 20th 2007

The worst ambulance crash in USA history

Five Killed in Crash of Ambulance and Semi

July 21, 2007 09:20 AEDT

The deadly crash, involving an ambulance carrying two paramedics and a semi-trailer truck, occurred on a highway in rural New South Wales on Thursday. The crash killed five people and injured others. The ambulance was on its way to a medical emergency when it collided with the semi-trailer. The driver of the semi-trailer has been arrested on suspicion of causing the crash.
2 counts of vehicular homicide…
November 5, 2007 - PA

In this case, the vehicle was driven by the defendant, who was convicted of vehicular homicide. The case involved several fatalities and was a significant public health issue.

An interhospital transport
? “Do no harm…”?

In this case, the patient was transported from one hospital to another. The issue of interhospital transport is a critical aspect of emergency medical services (EMS).

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.

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
  - Captain’s chair
  - Standing or kneeling

The ‘workplace’ is also a crash scene

Absence of standards and oversight

- Challenges in identifying best practice
- Hybird of unregulated commercial products
- No safety performance standards
- Absent national safety oversight

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
Some odd facts

- Ambulances are generally not built by the automotive industry
- Intelligent Transportation Systems (ITS), transportation safety engineering is 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

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) 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

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National EMS data

In the USA*
- ~ 50,000 vehicles
- ~ 5,000 crashes a year
- One fatality each week
- ~23 pedestrians or occupants of other car
- Approximately 4 crash fatalities per year
- ~10 serious injuries each day
- Cost estimates > $500 million annually
- USA crash fatality rate/capita 35x higher than in Australia

Is it your service’s tragic year?

- ~ 50 fatalities a year
- 15,000 EMS services
- Each year one in 300 services experiences a fatality
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
- 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

‘Workplace’ Hazards

- 74% transportation related
- 11% were cardiovascular
- 9% were homicide
- 4% needle sticks, electrocution, drowning and other

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

‘Real world’ head-on post crash

- Paramedic injured in crash is recovering

What are the solutions?

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

The Driver

- Driver selection
- Driver monitoring and feedback
- Driver Impairment
- Driver training
Driver issues

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

Policy makes a difference...

Use proven safety tools

NAEMT July 2006 Position statement

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

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

Intrusion vs Deceleration

- Intrusion = vehicle to vehicle or vehicle to fixed narrow object
- Deceleration = sudden stop – i.e. sled test

The Crash Event - Crash Testing

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

If we know this – and its published...


Why do we do this?

in a collision at 35 mph (60 km/hr), an unrestrained 15 kg child is exposed to the same forces* as in falling from a 4th story window

*550 lbf/force in 0.03 sec

Full Vehicle Crash Testing

Test 1 – Right side impact

- Target vehicle, Type I ambulance
- Bullet vehicle, Type II ambulance
- Closing speed 44 mph
And this all takes place in 60 milliseconds – the blink of an eye

Choose the Best Option

Immobilization board

Foldable

A few key words about restraint systems...

NOT new technical data...

‘Safety’ approaches being driven by manufacturers claims and sales rather than by science and data

Dangerous failures of both occupant protection and systems engineering

Yes, the ride of your life....

- Sure... these vehicles all parade around the EMS and Fire shows BUT...
- NOT ONE of these vehicles has been to the automotive safety shows or scrutinized by the automotive safety industry
What you can do now
- Have a written and implemented ‘safety program’
- Secure all equipment
- Secure occupants with standard belts
- Don’t drive through red lights/stop signs
- Use properly implemented “Feedback Boxes”
- Monitor crash events with common denominators (i.e. per 100,000 miles and per trip)

Important Principles!
1. Ambulances are NOT standard passenger vehicles
2. Pediatric patients in ambulances have needs which differ from children in passenger cars

Important Principles!
3. Design, performance and practice policy should be based on properly conducted science

Important Principles!

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

Very 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

Important Principles!

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

Conclusions
- Prevention is key - The pediatric ambulance transport environment includes predictable and preventable
- Unrestrained occupants and equipment are a potential injury risk to all occupants
- Every member of a pediatric transport program must play a role to actively manage risk and to avoid taking unnecessary risk
- Focus on safety of ALL aspects of the transport environment
- Safe patient transport practices exist & should be used
- New technologies for vehicle design, occupant PPE and equipment restraint and driver performance are now available; be ready to integrate them into your practice
- There is a need for a defined pathway for transition of problem identification to resolution and policy implementation

PREDICTABLE PREVENTABLE and NO ‘ACCIDENT’
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.

Thank you!
Any Questions??

an electronic recording and a .pdf handout of this presentation awaits you online
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