How Safe Is Your Ambulance Fleet? Optimizing Safety Practice and Innovation

Dallas, Texas, 2010

Optimizing Safety Practice and Innovation

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CEO, Objective Safety
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Emergency Medical Service 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?
- What can we learn from international colleagues?

Outline
I. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
II. Highlight unacceptable mythology and challenges to advancing EMS transport safety
III. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

Things can go wrong – but when there are sound safety policies and technologies in place, and the system is well prepared, you can minimize harm

Your Interactive Handout awaits you online at...
- www.objectivesafety.net

This WILL be FAST!!
No need to take any notes – all text slides will be awaiting you in your online Handout

http://www.objectivesafety.net
Your Handout and Additional Resources

23 September 2010
Emergency Medical Services (EMS)
An important and unique transport system
- Public safety, public health, and emergency service
- Is there to save lives

Tragedy you don’t want to be involved in

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

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

2 weeks later... Friday July 20th 2007
The worst ambulance crash in USA history
Five Killed In Crash of Ambulance and Semi

Very Important Principle

But Patient Safety is just one part of this system

Patient Safety UK- A routine concept...
Ontario EMS Occupant Safety

30 August 2010

EMS Transport Safety

• 'patient safety'
  AND also
  • 'provider' and 'public safety'

Balance of concerns and risk during transport

• Response and transport time
• Clinical care provision
• Occupant safety/protection

Public Safety

Some odd USA 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

Ambulance transport a serious transport safety problem...

• the most lethal vehicle on the road both per mile travelled and per vehicle
• is exempt from federal commercial fleet safety oversight (FMCSA)
• 2/3 fatalities not in the ambulance
• Exempt from most FMVSS standards

Data...

• What is your transport safety record in your service?
• How can you improve if you don’t have a meaningful measure of safety performance?
• Transport safety is not guesswork, it is a science

ESC – Does your ambulance have it??

• Transport Canada announced that effective August 31, 2011, automakers must install Electronic Stability Control (ESC) technology in Canadian vehicles.
• ESC helps drivers stay in control when they need to swerve or brake suddenly to avoid an obstacle or turn corners on slippery roads.
• Vehicles equipped with ESC are involved in fewer severe collisions caused by loss of control, resulting in significantly fewer deaths and injuries

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

Is there an acceptable rate of morbidity and mortality for pre-hospital transport systems??
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)**
- 42% of fatally injured EMS rear occupants unrestrained***
- Serious head injury in >85% 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##

*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
#NIOSH, 2003
##Ray AM, Kupas DF, Prehosp Emerg Care 2005 Dec; 9:412-415

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

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 Deps ~ 50%, < 1/3 emergent)
- Cost - ~$8 Billion annually
- Safety Oversight - ? Disparate

USA Emergency Vehicles

Minimum Annual Fatalities 1995-2007

FARS – A National Data Set?
Small numbers – but NO data captured from 20% of the nation in 10 years

USA EMS transport safety data estimates

- ~ 50,000 vehicles
- ~ 9,000 crashes a year
- One fatality each week
  ~ 23 pedestrian or occupants of other car
- ~10 serious injuries each day
- Cost estimates > $500 million annually

Denominator ….?

- # vehicles
- # types of vehicles
- # runs
- # miles/kms
- Nature of patient
- Severity of patient

Moose crash data….? – not EMS crash data
Jan 2010 - Evaluating Trauma Management Performance in Europe

Yongjun Shen, Elke Hermans, Da Ruan, Geert Wets, Tom Brijs and Koen Vanhoof

Data Envelopment Analysis

EMS Stations/
- 10,000 citizens
- 100 km rural road length
- 1000 km2 area

EMS response times/

WE HAVE A BIG PROBLEM HERE


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
- 5% 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 challenge we know now...

...is that there is a major problem with the present approach and what is being done currently
...and many practices are in conflict with, or not supported by, existing technical engineering science

New Information/Technical Developments Jan 2006- Jan 2010

- SAFETEA-LU, 2006 – EMS identified as one of the 4 E's
  (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users)
- International Ergonomists Association (IEA) - publication June 2006
- Enhanced Safety of Vehicles (ESV) - publications June 2007, 2009
- American Society Safety Engineers (ASSE) - publications June 2006, 2007
- National Academies TRB – Inaugural EMS Safety address, Jan 2007
- MIDAC, Annual - April 2006, July 2007
- WFM - August 2007
- 2007 September 11, 2007 9/11 safety in Federal Register
- State Strategic Highway Safety Plans, October 2007
- 2008 National EMS Conference, Annual - June 2008
- National EMS Council established - Dec 2007
- National Academies TRB - Inaugural EMS Safety Subcommittee meeting Jan 2008
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- AMD Engineering Public Comments, July 2007
- KKK-F, August 2007
- OSHA September 11, 2007 EMS safety in Federal Register
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Current accepted safety design and transport system technologies are being ignored, and worse...

Operations – new technology tools

And...

This is in a setting where

transport safety is the major and most costly adverse event in EMS
And there have been all sorts of major technical and informational developments since Jan 2006

Some new dimensions

Vehicles – smarter, sleeker, safer – CHEAPER!
Operations – new technology tools
Interdisciplinary infrastructure – new global platforms

S di S EMS C il T S f P li i

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Getting you, your patient and equipment in and out of the vehicle
Providing patient care inside the vehicle
Occupant protection in crash and near miss situations

Safety Performance
- Measurement
- Outcomes
- Technical expertise

What is a survivable impact?
E = \frac{1}{2} mv^2 \quad v^2 = 2as

~ 30 mph - survivable

What is a safe speed and how do we identify that?

What is a survivable impact?
E = \frac{1}{2} mv^2 \quad v^2 = 2as

~ 60 mph - not survivable

A survivable impact??

A serious problem...
Transport related aspects -
- dispatch of EMS/Medical transport vehicles
- transport policies and protocols
- vehicle fleets and vehicle design
- vehicle purchase standards
- Intelligent Transportation Systems (ITS) technology
- driver training
- driver performance monitoring
- roadside and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

Transport Medicine

- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

A “Fleet” to many in Emergency Medical care means….

Impact biomechanics
- Crashworthiness
- Vehicle design
- Occupant protection

Transport Ergonomics
- Operational tasks
- Human factors analysis
- Range of reach
- Patient loading and unloading

Fleet safety
- Operational policies – dispatch, safety
- Fleet mix
- Vehicle selection – safety, ESC, loading height
- Driver performance and monitoring
- Scene safety
- Visibility and conspicuity
- Safety measurement and management

Firstly!
- An accident?
- or a predictable and preventable event

A tragic emergency health care intervention outcome
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

Negative impact on system performance...

- BUT an EMS crash can kill all those involved AND wipe out a rural EMS system AND negatively impact a regions response capacity……

Ambulance Transport Safety

- Emergency care, public health, public safety, and patient transportation.
- Important Principle: Ambulance transport safety is part of a system, the overall balance of risk involves the safety of all occupants and the public
- All get home safely

Real world answers to real world questions -

- What features will enhance safety of my new vehicle purchase?
- What color scheme do I want on my vehicle to make it safest?
- Do I need a helmet, and if so which one?
- What policies offer the safest system?
- How do I get my team to address safety issues?
- What data should I collect when something goes wrong, and how to analyze it?

Safety oversight of what and …. by whom

- Vehicle Safety
- Vehicle Design
- Transportation systems safety
- Safety Equipment Design
- Vehicle and Safety Equipment Testing and Standard development
- Safety policies

In the USA there are more safety standards for moving cattle than for moving patients

Absence of standards and oversight

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

Creating a Safety Culture

- What we need to consider, where is the ‘bang for buck’ in ambulance transport safety:
- Awareness
- Training
- Incentive
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 driving/driver skill
- other road users
- the road

The Emergency Department (ED)

An ambulance is not an ED/ICU on wheels

Ground Ambulance Transport Safety IS Complex AND Multidisciplinary
- Epidemiological Data Collection
- Risk Management
- Public Safety
- Transport Policy
- Ergonomic Research
- Biomechanical Automotive Safety
- Driver Training
- PPE
- Regulations and Standards
- Safety Technology
- Biomedical/Chem Research
- Communications Technology

Would we…? Seeing that we are health care providers – let's look at it this way –
- Would we use medical equipment that was built by folks who were not technically qualified or trained biomedical engineers and who just said – “this device is safe”?
- Or would we expect them to be qualified in this field and that their products were tested in a meaningful way to ensure that they were safe?

October 31, 2008 - Kentucky

April 30, 2009 - Tennessee

Do we ask vehicle builders to write cardiac arrest protocols…?
Vehicle design and safety is not what we are trained to do!!!
August 2009 – Impaired…

October 22, 2009, TN
Patient and Provider killed, Attendant Critical

December 2009

January 14, 2010

February 1, 2010

Sept 16, 2010

This IS a Transportation and Automotive Safety issue
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.

Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

Golden Hour – not so hot

- March 2010 Annals EM

Golden Hour Summary

- This study suggests that in our current out-of-hospital and emergency care system time may be less crucial than once thought. Routine lights-and-sirens transport for trauma patients, with its inherent risks, may not be warranted. [Ann Emerg Med. 2010;55:247-248.]

April 2010, Resuscitation – Going fast can hurt your patient clinically!

- Ergonomics and automotive safety issues are interrelated
- Crashworthiness priorities override the ergonomic issues

The laws of physics prevail...

- and they don’t care what your job title is or if you are a patient, a provider or a member of the public

Science behind Policy

- “For successful technology, reality must take precedence over public relations, for Nature cannot be fooled.”

Richard P. Feynman 1988

Important...

- Ergonomics and automotive safety issues are interrelated
- Crashworthiness priorities override the ergonomic issues
**Goals**

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

**Policies? – is pull over to the right really safer…?**

**May 13, 2010…**

MedStar Ambulances Will No Longer “Run Hot” When Transporting Cardiac Arrest Patients (4/21/2010)

- “MedStar ambulances will no longer ‘run hot’ – when paramedics inside are giving chest compressions to patients in cardiac arrest, officials say.” This “policy, which took effect Friday, will affect about 1,400 of the more than 100,000 calls to which MedStar responds annually in the 15 Tarrant County cities it serves.”

**NAEMT July 2006 Position statement**

Policy makes a difference…

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

Conclusion: When contacting the real riders and motorists in time, the side of having free in a suitable manner within the not may were respectively scaffold for enough. EMS Patient make should investigate the effects of varying automation such as a searching gap in litter intake having program as the limiting professional of disease.
Safety is Good Business

Are you self insured???

Very Scary insurance data – the $10 million dollar EMT Year Payroll

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<th>Year</th>
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</table>

Workers Compensation Rate increased by 27%

A problem

2007 Insurance data –
- 27 fold more likely to have a claim based on transport than related to medical care

2003 Insurance data –
- 10 fold more likely to have a claim based on transport than related to medical care

Expensive….

Very Expensive

EMS CANNOT Afford to keep paying out like this….

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, vehicle type, tire pressure, road etc)
Testing the real world

And this all takes place in 60 millisecs – the blink of an eye

Impact residue

CTD dynamics

During impact

A few key words about restraint systems…

Systems safety failure AND dangerous

Overwhelming existing evidence these practices are HIGHLY dangerous.

NO evidence whatsoever that these practices are NOT dangerous, let alone safe.

Deceleration Sled test (upon impact) 24 G, 30mph

PPE from the stationary environment can be highly hazardous in the automotive setting


PPE from the stationary environment can be highly hazardous in the automotive setting.
NOT new technical data…


Side facing 4-point harnesses demonstrated to be lethal, even at slow ground vehicle speeds

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 over both shoulders for side facing occupants are potentially lethal – and in NO WAY SUPPORTED BY ANY DATA OR INDEPENDENT AUTOMOTIVE SAFETY EXPERTISE

What do we know now??

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

Air EMS is a role model for safety initiatives and focus

Air EMS is a role model for safety initiatives and focus

An Aviation Safety Plan

Air Safety Approach

• Safety Program Planning
• Evaluating
• Analysis of Safety Performance
• Analysis of Safety Information and Data
• Analysis of Risk Profiles and Plans

Ambulance Safety Research: A New Field

Priorities…… Research papers in the past 30 years

• EMS Safety
  – 42 papers - on ambulance safety
  – 2 papers - on ambulance ergonomics
  – 1 paper - on stretcher/ergonomics

• Computer Workstations
  – 30,000 papers – on ergonomics of computer work stations

• Erectile Dysfunction
  – 100,000 papers – on Erectile Dysfunction
We should use the best safety practices demonstrated in engineering...in automotive safety engineering...and in ergonomics.

Range of reach.. This is a well defined technical science.

‘Workplace’ Hazards

Bigger is not necessarily better......

But what about head protection?

New EMS helmet prototypes
Which of these two vehicles would you want? Sprinter v Ford Transit crash test
http://www.youtube.com/watch?v=C3kN6WF5vAA&feature=related

High speed crash, rolled and the occupants (patient and medics) had only minor scratches

And now for some MYTH BUSTING

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

Rash of “Safety Concept” vehicles….. Devoid of substantive automotive safety engineering input or testing

Yet another potentially lethal example marketed as a ‘safety innovation’ YET outside of automotive safety practice

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

October 2008 JEMS Article “Rig Safety – 911”
http://www.objectivesafety.net/JEMSRigSafety911.pdf
Ambulance Vehicle Standards??
- KKK?
- AMD?
- FMVSS?
- CMVSS?
- NFPAS?
- SAE...?
- ASTM...?
- International
  - ASA
  - CEN

Global EMS Vehicle Safety Standards
v Specifications and Guidelines
- EMS Safety and Performance Standards
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - Aviation - FAA/CAUAA
  - [Fixed vehicles - ASSE/ANSI Z15 ]
- USA Other
  - Purchase Specification: KKK
  - “Standards” - NTEA – AMD, ASTM F 20, NFPAS (devel)
  - Guideline: EMSC Dos and Don'ts, and (ASTNA, CAAS and CAMTS)

Australian National Standard
ANSI/ASSE Z15.1-2006
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

Australia & New Zealand
Ambulance restraint standard AS/NZS 4535:1999
- "Restraint systems shall apply to all equipment and people carried in an ambulance…"
- Dynamic Testing - 50th & 95th percentile manikins
- 24G in Forward and Rearward
- 10G in Transverse

Common European Community
European Committee for Standardization
Medical vehicles and their equipment - Road Ambulances
- "Without exception, all persons, medical devices, equipment, and objects normally carried on the road ambulance shall be maintained to prevent them from becoming a projectile when subject to a force…"
- 50th percentile manikins - 10G in Forward, Rearward, Transverse, & Vertical directions
- Certified by Notified Body and Ambulance Mfg.

USA KKK ambulance purchase specifications
- Specifications for the purchase of a Star of Life Ambulance
- Static Pull test
- 2200 Lbs. static stretcher test in longitudinal, lateral & vertical
- No dynamic test for vehicle, occupants or equipment
- No automotive test manikin

USA Ambulance Manufacturing Division (AMD)
Ambulance Standards – August 2007
- No dynamic or impact test
- No automotive test manikin
- Mandates NO ‘crumple zone’
- No impact tested anchorages for occupant restraint or equipment
- Internal, not independent

ISO – 39001
Road-traffic Safety management systems

USA WHO ambulance purchase specifications
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Voluntary

18
NTSB 1979... and 30 years later and still the same problem

What KKK-A-1822F, AMD and FMVSS state and don't state...

USA Ambulances: FMVSS Exempt

Occupant protection......??

May 13, 2010

KKK/AMD – static ‘safety testing’

• Ignorant of automotive safety principles – and specifies:
  • No structural damage to any load bearing or supporting members, i.e., torn or broken rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

KKK Specification and AMD Standards both default to the FMVSS for safety – however...

• FMVSS has a specific exemption for ambulance vehicles once you are 600mm or 2 feet positioned rearward of the driver
• KKK require a ‘national test lab’ to conduct AMD ‘tests’ BUT NOT an automotive test lab!
• No dynamic impact tests AT ALL
• No crashworthiness tests

Ridiculous current 2009 USA ambulance ‘safety testing’!? – IS NOT consistent with accepted automotive safety practice...

No ‘a’... then NO ‘F’ !!!!!

F = ma

where

F – force
m – mass
a – acceleration
Yes a “nationally recognized testing lab” – BUT - NOT an automotive/occupant safety crash test lab!!

May 2010

Visibility and lighting issues

Hmm…

It isn’t like this in the rest of the world

Worker visibility Act: November 24th 2008

Day visibility

Night visibility

Here’s the real world at 6 ft…
August 2009 – Visibility review

Policy and practice ignorant of existing technical safety data

This addresses some very real risks, very creatively – and currently ONLY available in London Ontario!

Color-blindness affects 10% of the population

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response

- Location
- Size
- Shape
- Speed
- Intended path

Having access to that technical knowledge supports changes to improve safety practice
Innovation

Safety concepts out there now
• Driver feedback technologies
• Tiered dispatch
• Enhanced ambulance vehicle design
• Intelligent Transport Technologies – ITS
• New platforms for interdisciplinary exchange
• New Safety Standards

Transport performance
• Driver training?
• Real time safety performance outcomes?

What about changing driver behavior in the real world??

Invehicle technologies to enhance transport safety
• Aftermarket in vehicle electronic e-safety devices with monitoring and feedback

Human Interface approaches
• Hardware fitted to the vehicle
• Non hardware App Driven cellular technology
Optimizing driver performance monitoring and feedback: An innovative approach utilizing a global mobile interactive e-platform

An innovative approach utilizing a global mobile interactive e-platform

Nadine Levick, MD MPH
Research Director, EMS Safety Foundation
CEO, Objective Safety, New York, NY

Simon Ralphs
Global Green Drivers, Telematicus, London, UK

The analysed system data that sits behind each Trace Assessment

Realtime mapping from London for 2.5hr of a trip of attempting to park in NYC after a snow storm and whilst ‘Law and Order’ filming was underway

How did the UK pilot drivers perform??

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Episodes of Harsh Braking

Harsh Braking per 100 trips
What could you learn from the National Academies – right NOW and gratis

- The realm of burden and benefit
  - measuring the safety of the system
  - determining the economic, ethical and risk benefit challenges

- Transport System Management
  - fleet safety and oversight technologies and policies
  - operations management – deployment, congestion routing, deployment of resources, benchmarking

- Vehicle safety
  - occupant protection design and testing
  - vehicle performance safety
  - vehicle and personal function failure issues

- Dissemination and Policy
  - Standards, specifications and policy

It's out there NOW

- TRB 2009 Summit – addressed the key and interdisciplinary issues, in one day – please seek that information out.

- There have been two TRB Summits held, 2008, 2009 and both with vehicle engineering and transportation systems technical expertise

See www.trb.org, and for the Summit archives:
www.objectivesafety.net/TRBSummit2008.htm
www.objectivesafety.net/TRBSummit2009.htm

Independent Technical Expertise

- The “kitchen design” is completely unacceptable and a failure in health care delivery, occupant protection and ergonomics.
- Independent technical expertise must be here and involved

What the independent technically expert occupant protection and automotive safety engineers say about our current ambulances and ‘safety’ approaches:

- “The rear compartment Death Vault”
- “The Kitchen Design must go”
- “The Kill, Kill, Kill (KKK) spec”
- “The organ donor harness system”

International approaches

- The state of the art non-USA vehicles have NO squad bench nor the after market structural vehicle modifications that can potentially decrease crashworthiness integrity that were seen in study vehicles.

The EMS Safety Foundation

www.EMSSafetyFoundation.org

- Established in 2008 to fill a gap in technical knowledge transfer – practical interdisciplinary R & D
- Evaluation and implementation of system safety enhancements for EMS and Medical Transport
- It is a not-for-profit Institute

Mission

- This is a team of like-minded innovators across EMS Medical Transport and a number of technical disciplines, who share the common mission of enhancing the safety of EMS delivery for all involved.
The EMS Safety Foundation: A practical and functional model
Interdisciplinary and Operational and International
- Innovation
- Collaboration
- Knowledge transfer

R & D “Ripoff and Duplicate”
- Avoid reinventing the wheel at all costs
- Where are the best practices that we need to transfer knowledge from

Special Opportunity
- Spend a day with the EMS Safety Foundations Innovation Consortium and Technical Experts
- Join in unique interdisciplinary hands on Ambulance Innovation Workshop and Design Clinic
- Being held in Dallas tomorrow

EMS Safety Foundation Ambulance Vehicle & Ergonomics Workshop, October 2009

Automotive engineers addressing EMS Safety Foundation Workshop

EMS Ergonomist Chris Fitzgerald addressing the EMS Safety Foundation Workshop

The science of Stretcher lifting & loading

EMS Safety Foundation Workshop participants working on designs
Stretcher Load - # 1 (CNLOAD01)

EMS Safety Foundation Delegation seeking out International Innovation

RETTmobil is -

- A major European Emergency Rescue Congress, Trade show and Symposium
- Held in Fulda, Germany
- Established in 2001
- Attended by ~20,000 attendees
- Brainchild of Prof Peter Sefrin

EMS Responder Rettmobil 2010 Delegation
http://www.emsresponder.com/web/online/Safety/Live-From-RETTmobil/25$13137

Vehicle Occupant Safety design
European design
Safety technology is a key focus
Ergonomic layout and equipment

Flexibility to manage two patients

Ambulance Investigation - Norway

“Together for your safety”

National analysis group

• National Health Authority
• Licensing health professionals

• National Vehicle & Roads Administration
• Approval and technical control of ambulances

• Paramedics from Oslo university hospital

Accidents involving an ambulance with injury or death
Accidents involving an ambulance with major damage to property
Accidents where equipment inside the ambulance cause injury / danger of injury

Texas - Careflite’s new vehicle

Careflite’s new vehicle
Manitoba’s new fleet

Technical Collaboration is key
- We are NOT the experts in this science
- We cannot afford to play the silo game here, it is costing lives, time and money
- We MUST have a meaningful evidenced based approach to design, operations and policy
- We must be outcomes driven

Science behind Policy
- “For successful technology, reality must take precedence over public relations, for Nature cannot be fooled.”
  Richard P. Feynman 1988

this vehicle is safety crash tested by automotive experts
Unlike this vehicle

So...
- Which vehicle do you want to be in?
- Which vehicle is the best for efficient, and effective patient care?
- Which vehicle provides optimal risk management?
- What is the optimal fleet mix?

Fleet Mix?

Were we safer in the Cadillac??

Is this acceptable...?
- There are ambulances rolling out of the show room on a daily basis – as we speak – being designed by health care providers and built by after market retrofitters, who are not at all governed as are other passenger vehicle manufacturers by the standards set by the society for automotive engineers.

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

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

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

**Future**

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

**What do we know works…**

- Vehicle Operations Safety Policies
- Squad bench lap seat belts
- Patient over the shoulder belts
- Securing equipment
- Forward and rear facing seating
- Some electronic technical devices
- Safety awareness
- Cultural change

**Conclusion**

- EMS transport has serious hazards and safety issues
- Major advances in EMS safety research, infrastructure and practice over the past 5 years
- Development of substantive EMS safety standards is a necessity and a reality
- Multidisciplinary safety issue that EMS cannot solve internally
- Failure to transfer knowledge from transportation and automotive safety is unacceptable and dangerous
- EMS is still way behind the state of the art in vehicle, transportation and occupational safety

**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

**Thank you! Any Questions??**

Electronic handout and resources available online http://www.objectivesafety.net