The Ride of Your Life: Ambulance Transport Safety – Key Issues

February 26, 2011, Columbus, Ohio

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To quote Steve “Sid” Caesar – Director IHS ES

“We want everyone to get home safely each day”

Who am I?

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Emergency Medicine Physician and Public Health Academic, (USA-Hopkins, Harlem, Maimonides, Brookdale & Australia – Royal Melbourne, Royal Children’s Hospitals, Royal Australian Flying Doctor Service)

Chair, National Academies Subcommittee TRB EMS Transport Safety, USA

Founder of EMS Safety Foundation

Recipient, International Society of Automotive Engineers, Women’s Leadership Award for EMS Safety

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

Safety of the...

• Provider

• Public

• Patient
Some questions for you all:

- Have you ever been in a EMS crash?
- How many times?
  - 1?
  - More?
- Have you ever been hurt in an EMS crash?
- Do you know anyone who has ever been hurt in an EMS crash?
- Do you know of anyone who has been killed in an EMS crash?

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

Already this year, Jan 8, 2011

January 13, 2011
Patient dies after ambulance, car collide

February 7, 2011

February 8, 2011

February 16, 2011

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

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 heath, 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

What we need to consider, where is the ‘bang for buck’ in ambulance transport safety:

Is there an acceptable rate of morbidity and mortality for pre-hospital transport systems??

USA EMS data

In the USA*
- ~50,000 vehicles
- ~9,000 crashes a year
- ~One fatality each week
  - ~23 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
*FARS/BTS 2005-6

Is it your service’s tragic year?

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

Creating a Safety Culture

within a company must have leadership and support of upper management:

- Awareness
- Training
- Incentive

Key elements to transport safety policies

- Vehicle/Fleet Safety
- Occupant protection
- Driver performance monitoring and feedback
- Hours of service
- Driver/provider wellness and fitness
- Driver/provider impairment
- Public safety
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/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
- Driver Training
- PPE
- Safety Technology
- Regulations and Standards

Do we ask vehicle builders to write cardiac arrest protocols...?
Vehicle design and safety is not what we are trained to do!!!

Would we....?
Seeing that we are health care providers – lets 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?

And..

- In the vehicle
- At the scene
- During transport

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
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

1980’s Then….

And NOW….
1980’s Then…. And NOW!!…

Is there an acceptable rate of morbidity and mortality for pre-hospital transport systems??

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

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***
- > 74% of EMT occupational fatalities are MVC related****
- 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##

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

Occupational transportation fatalities...

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

Current accepted safety design and transport system technologies are being ignored, and worse...

** Maguire, Hunting, Smith & Levick, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec 2002
## Ray AM, Kupas DF, Prehosp Emerg Care 2005 Dec; 9:412-415
# NIOSH, 2003
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

And...

New Information/Technical Developments Jan 2006- Jan 2011
- SAFETEA-LU, 2006 – EMS identified as one of the 4 E’s
- 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
- NEMSAC established – April 2007
- National Academies TRB – Inaugural EMS Safety address, Jan 2007
- State Strategic Highway Safety Plans, October 2007
- Sporadic State EMS Council Transport Safety Policies
- EMS Safety Foundation established – Dec 2007
- National Academies TRB – Inaugural EMS Safety Subcommittee meeting Jan 2008
- Transportation Safety Advancement Group (TSAG) – Feb 2008
- Society for Automotive Engineers (SAE) – publications Oct 2007, 2008, 2009
- Worker visibility Act - Nov 2008
- NFPA Ambulance Standards Committee – June 2009
- EMS Safety Foundation Innovation WorkShop  - October 2010

...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

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

Systems safety of:
- 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 are your policies???
- If your patient is pink, warm and talking?
- Are you required to notify the driver if you are out of your seat belt?
- Are ‘routine procedures’ putting you at risk?

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

When is it safe to do what…?

What is a survivable impact?
12 mph (20 km/hr)?
What is a survivable impact?
\[ E = \frac{1}{2} mv^2 \quad v^2 = 2as \]

- 30 mph - survivable

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

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

- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

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

April 14th, 2008

A paramedic and a patient killed in accident - New York, New York

In this vehicle...

May 11th, 2008

June 17th, 2008

a paramedic and a patient killed

In this vehicle...

July 7th, 2008

In this vehicle...

October 31, 2008 - Kentucky

In this vehicle...

April 30, 2009 - Tennessee

In this vehicle...

August 2009 – Impaired...

In this vehicle...

April 30, 2009 - Tennessee

In this vehicle...

August 2009 – Impaired...

In this vehicle...

April 30, 2009 - Tennessee

In this vehicle...

August 2009 – Impaired...

In this vehicle...

April 30, 2009 - Tennessee

In this vehicle...

August 2009 – Impaired...

In this vehicle...

April 30, 2009 - Tennessee

In this vehicle...

August 2009 – Impaired...

In this vehicle...
October 22, 2009, TN
Patient and Provider killed, Attendant Critical

Monday November 30, 2009
Smithfield

December 2009

January 14, 2010

February 1, 2010

April 28, 2010

Sept 16, 2010
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.

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

CPR?

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.”

Policy makes a difference…
Patients must be in the over the shoulder harness, medics restrained in seat belts, equipment secured.

Safety is Good Business

Are you self insured???

Very Scary Insurance data – the $10 million dollar EMT

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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….

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....

Testing the real world

A few key words about restraint systems...

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

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

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)

Testing the real world

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

Impact residue

A few key words about restraint systems...

Deceleration Sled test (upon impact) 24 G, 30mph
PPE from the stationary environment can be highly hazardous in the automotive setting

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

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
Tort Claims from Adverse Events in Emergency Medical Services
- We should use the best safety practices demonstrated in engineering
- ...in automotive safety engineering
- and in ergonomics

**An Aviation Safety Plan**
- Safety Program Planning
- Evaluating
- Analysis of Safety Performance
- Analysis of Safety Information and Data
- Analysis of Risk Profiles and Plans

**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**
- Engineering
- Epidemiology

**EMS Ergonomist Chris Fitzgerald addressing the EMS Safety Foundation Workshop**

**The science of Stretcher lifting & loading**
A stretcher system that doesn’t harm your back… and your services wallet

The new Mondial Ferno

And what is the loading height of your ambulance??

Size matters…. Less than 27 inches will save your back!!!!

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

So what’s important..

• A stretcher system that doesn’t harm your back… and your services wallet
• The new Mondial Ferno
• A 27 inch loading height
‘Workplace’ Hazards

Bigger is not necessarily better……

Nascar Safety Expert

- On ambulance patient compartment
  “It is a death vault”

Tom Gideon,
Head of Safety, GM Nascar

---

and who’s life was he racing to save?

Carl Craigle EMT-P, Chief Platte Valley Ambulance, CO

IMPORTANT ADVISORY

- Due to respect for the wishes of the families of medics killed in the line of duty there is to be NO PHOTOGRAPHY of any aspect of the images in this presentation - that is NO video, NO photography, NO digital images of any type

---

It does happen……

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

Airbags in the back....??

Hazardous for this environment

Absent safety testing standards, any meaningful crash or injury mechanism data or effective occupant positioning – as per the automotive engineers, rear compartment airbags are likely to be highly hazardous

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”

Google Image

Global EMS Vehicle Safety Standards
v Specifications and Guidelines
• EMS Safety and Performance Standards
  – Australia & New Zealand 4535
  – Common European Community (CEN) EN1789
• Non EMS Specific USA Standards
  – [Aviation - FAA/CAAA]
  – [Fleet vehicles - ASSE/ANSI 215]
• USA Other
  – Purchase Specification: KKK
  – “Standards” - NTEA – AMD, ASTM F 20, NFPA (dual)
  – Guidelines: EMSC Dos and Don’ts, and (ASTNA, CAAS and CAMTS)

Ambulance Vehicle Standards??
• KKK?
• AMD?
• FMVSS?
• CMVSS?
• NFPA?
• SAE…?
• ASTM…?
• International
  – ASA
  – CEN

American 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

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

NTSB 1979… and 30 years later…
and still the same problem

USA Ambulances: FMVSS Exempt

http://www.objectivesafety.net/JEMS/RigSafety911.pdf

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• FMVSS?
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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!!
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!

“The multicolored (patterned) ambulance while distinctive, may suffer decreased conspicuity because of the effects of camouflage” – De Lorenzo & Eilers Annals EM 1991

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

Muskoka EMS - Canada
Old design

New design

Muskoka EMS - Canada
But whatever color … If you run a red light someone will be killed

Innovation

- 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??

- Aftermarket in vehicle electronic e-safety devices with monitoring and feedback

Invehicle technologies to enhance transport safety

Human Interface approaches

- Hardware fitted to the vehicle
- Non hardware App Driven cellular technology

The “Feedback box”

Driver behavior monitoring and feedback device

Extensive Indirect cost savings

- Fewer out of service vehicles
- Improved transport times
- Decreased administrative lost in managing unsafe behaviors
- Decreased legal burden
- Automatic system wide data
- Insurance benefits
Demonstrated Effectiveness

And when a rare crash happens....

Unit 302 Accident

Monitoring and feedback devices
- Implementation well received by the providers.
- 20% cost saving in vehicle maintenance within 6 months.
- No increase in response times
- Fewer crashes and less severe crashes
- Sustained improvement in safety proxies, with no inservice or retraining after the initial introduction period.

THE ACETECH™ AVI advantage
- ACETECH™ AVI – Vehicle Informatics
  - “Learn”
  - All Trips recorded (start trip/stop trip)
  - Established benchmarks
  - “Alert Active”
  - “Guide”
  - Speed feedback activated
  - Driver Clinics
  - Automated Application update
  - “Sustain”
  - Messaging
  - Incident Management
  - "IDS"

ACETECH™ Auto Vehicle Informatics (AVI) key features

Telematicus

“A smart phone App that is a safety tool"
Driver controls GGD on mobile platform to provide data

Driver feedback to GGD scorecards, messages, training.

Closed loop system GPS to locate & GPRS to communicate

GGD business system records, analyses & actions data in real time

Reports & Scorecards

Example trip trace from the ggdrive business application TM.

This trace is automatically created using GPS data sent from gg drive and can be used to analyse speed, distance, acceleration (deceleration), and time during the trip.

Example scorecard of comparative driver performance from the ggdrive business application TM.

The scorecard is created using telematics data from dedicated on-board telematics device and is presented in traffic light format against benchmark and set targets.

GGD Smartphone views

Driver's Individual performance against company set performance targets in the system

• Needle points to individual driver performance against targets
• Green area represents the difference between standard and stretch targets
• Goals can be varied by region, market, team as required
• Performance is updated and presented in real time.

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 – dispatch, congestion routing, deployment of resources, benchmarking

Vehicle safety

• Occupant protection design and testing
• Vehicle performance safety
• Vehicle and personnel human factors issues

Dissemination and Policy

• Knowledge transfer
• Standards, specifications and policy

TRB TRANSPORTATION RESEARCH BOARD

OF THE NATIONAL ACADEMIES

October 29, 2009 TRB Summit

Its 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

2011 TRB Summit

• Safety Strategies and Solutions Summit
• To be held on site DC and online in the Fall
• Auspices of the National Academies of Science, Medicine and Engineering
The EMS Safety Foundation
www.EMSSafetyFoundation.org

EMS Safety Foundation

- 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

EMS Safety Foundation Ambulance
Vehicle & Ergonomics Workshop,
October 2009

Automotive engineers addressing
EMS Safety Foundation Workshop

EMS Safety Foundation Ambulance Innovation Workshop
and Design Clinic

Session A
Vehicle Safety and Occupant Protection
Gene Lukianov
Session B
Hands-on human factors operational safety and
task analysis
Chris Fitzgerald
October 2nd, 2010
International approaches

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

EMS Safety Foundation Delegation seeking out International Innovation

EMS Responder Rettmobil 2010 Delegation

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
Vehicle Occupant Safety design

Safe and Ergonomic design

Patient Transferring Slides

Ergonomic layout and equipment
Flexibility to manage two patients

Rettmobil 2011 – May 11-13th

Planning for 2011 EMS Safety Foundation Rettmobil Delegation??
May 11-13th, 2011

Registration link is now live!

Texas - Careflite’s new vehicle

Careflite’s new vehicle

Manitoba’s new fleet

Manitoba’s new fleet
Tips for Emergency Vehicle Operations

USFA Emergency Vehicle Safety Initiative

Traffic Incident Management Systems (TIMS)
- Released April 2008
- FEMA, USFA, IFSTA
- Covers setting up safe roadway incident work areas and using unified command at these incidents

Transportation Research Board is an excellent resource... we should be using it!!

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

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?
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

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
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 far 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