Welcome to today’s Injury Risk Management Research Centre (IRMRC) UNSW, Sydney, December 2nd, 2008
Safety Science Seminar Series Webinar -

“The Ride of Your Life: Managing the risks and hazards of ambulance transport”
Guest Speaker – Nadine Levick MD, MPH
Start time is 4.30pm Australian EDT today (Webinar will be ‘open’ from 3.30pm Australian EDT today for sound and system checks)

EMS Safety Foundation
and Objective Safety
New York, USA

The Ride of Your Life: Managing the risks and hazards of ambulance transport

Nadine Levick
Research Director, EMS Safety Foundation
CEO, Objective Safety
New York, USA

A Webinar is:
• Real time interactive web technology
• No other hardware is necessary aside from a computer connected to the internet and a microphone - if you choose to speak
• These interactive seminars can also be stored for later asynchronous use

Webinar Basics
Raise Hand
Text messaging
(Type in your name and location now)
The ‘mic’ button

...use white board tools to mark your location.....

Today’s Webinar is recorded! The presentation and all comments typed in the text box!! are RECORDED

Slide handouts and Recording will be available via www.irmrc.unsw.edu.au and www.objectivesafety.net web sites within 48 hours

This afternoon’s Webinar
• Will cover:
  • An overview of ambulance transport safety data
  • Automotive and transportation safety dimensions
  • Ambulance transport safety challenges and opportunities
  • Some practical perspectives from the field
  • Research directions

Today’s Webinar Hosts
• Injury Risk Management Research Centre (IRMRC), University of NSW, Sydney, Australia
• Center of Injury Research, (CIRCL) Pittsburgh, PA, USA
• Objective Safety and the EMS Safety Foundation, New York, USA
Where am I really from?

...Yes, it IS that big!

San Francisco
Boston
Los Angeles
Baltimore

0 1000 km

Here!

Your Interactive Handout and Recording awaits you online at...

www.irmrc.unsw.edu.au
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

Highlight some of the areas of ambulance transport system safety and risk management:

- Safety for the patient, the provider and the public
- System safety data
- Interdisciplinary aspects
- Innovations to optimize system safety performance

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?
In a nutshell

- Am here to try to save you lives, time and money

Firstly!

- An accident?

- or a predictable and preventable event

A tragic emergency health care intervention outcome

It does happen....

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

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....

2 weeks later... Friday July 20th 2007
The worst ambulance crash in USA history

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
### Victoria’s first on duty tragedy

June 17th 2008

A paramedic and a patient killed

In this vehicle...

October 31, 2008, Kentucky

Fatalities and funerals

2 counts of vehicular homicide...

November 5, 2007, PA

In this vehicle...

### October 31, 2008, Kentucky

An interhospital transport

?”Do no harm...”?

Fatality and funerals

Haddon/Baker/Runyan Phase-Factor Matrix

as applied to EMS Safety

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<tr>
<th>Phase</th>
<th>Effectiveness</th>
<th>Cost Benefit</th>
<th>Ethics</th>
<th>Social Acceptability</th>
<th>Societal Need</th>
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Key Issues

- **Mythology**
  - That Emergency Medical Service personnel are safe

- **Injury Hazards**
  - Radiation
  - Chemical/Radiation
  - Physical/Mechanical trauma – THE BIG PROBLEM

- **Motor Vehicle Crashes** are the highest cause of death at work – EMS has > 2X the mean national rate in USA

- **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 workplace – ‘exempt’ from automotive research and regulation

Some challenges

- No accepted national safety standards for -
  - EMS fleet management or safety practice
  - Ambulance vehicle rear compartment design and performance
  - Provider occupational injury protective equipment

- Yet convincing data for injury risk and hazard

- Need for patient, provider and public safety focus

Ambulance Transport Hazards in the current world climate...

1960 to 2007

A passenger vehicle - sure

A passenger vehicle - yes!

A 1960s era ambulance with a bench seat and a captain's chair.

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
  - Captains chair
  - Standing or kneeling

The ‘workplace’ is also a crash scene

October 2008 JEMS Article

“Rig Safety – 9-1-1”

2008 - Air EMS on the NTSB’s “Most Wanted List”, where is ground EMS??
Key Elements to Ambulance Transport Safety
- Data capture
- Vehicle fleet operations and the transport environment
- Vehicle biomechanics and crashworthiness
- Ergonomics, human factors and biohazards
- Standards and Policy
- Ongoing safety management – evaluation and analysis

TRB EMS/Medical Transport Safety Summit – November 7, 2008

TRB Ambulance Transport Safety Summit Outline
- Systems Safety Engineering
- Transport safety, Biomechanics, Ergonomics, Clinical care and Outcomes
- Patient, Provider and Public safety focus
- Low hanging fruit
- Transfer knowledge into practice
- Path forwards

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

Creating a Safety Culture
within a company must start with upper management’s commitment to safety
- Awareness
- Training
- Incentive

Safety - Why now?
- Operating optimally in a transportation environment that is largely devoid of specific safety standards for the hazards and risks present
- Bridge the gap between what technical information exists and what is accessible and applied to EMS

EMS Safety
- ‘patient safety’ AND also
- ‘provider’ and ‘public safety’

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 (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

Ground Transport Safety IS Complex AND Multidisciplinary

- Epidemiological Data Collection
- Risk Management
- Public Safety
- Transport Policy
- PPE
- Driver Training
- Safety Technology
- Regulations and Standards
- Fleet Safety Program

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

There are more safety standards for moving cattle than for moving patients in the USA

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

Data Capture
- Vehicles
  - Total number and type
  - Total number of runs
  - Total number of miles traveled
- Providers
  - Total number and type
  - Hours worked
- Transportation adverse events, including mechanism - both injuries and fatalities
  - The vehicle
  - Patient
  - Provider
  - Public

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

USA EMS data
In the USA*
- ~ 50,000 vehicles
- ~ 5,000 crashes a year
- ~ One fatality each week
  - ~ 25 pedestrians or occupants of other car
  - Approximately 2 child fatalities per year
- ~10 serious injuries each day
- Cost estimates > $500 million annually
- USA crash fatality rate/capita >10x higher than in Australia

USA crash data….? – not EMS crash data

Is it your service’s tragic year?
In the USA
- ~ 50 fatalities a year
- 15,000 EMS services
- Each year one in 300 services experiences a fatality

How are we counting these events?
What are the relevant databases?
- CAA
- FARS
- NASS/CDS
- GES
- State Traffic Records
- FMCSA
- BLS
- Other

and what is an EMS crash?
- Definition of an EMS crash
- Definition of Emergency Response Mode
Ambulance Safety Research: A New Field

Fatal Crashes 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
- > 70% of fatal EMS crashes during Emergency Use

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

USA BLS data sources on EMS injuries
- Census of Fatal Occupational Injuries (CFOI)
  - Covers all work-related injury fatalities in the U.S.
  - Collected from multiple data sources
- Survey of Occupational Injuries and Illnesses (SOII)
  - Currently covers private wage and salary workers, but data for 2008 will include public sector also.
  - Establishment survey based on OSHA recordkeeping logs
  - Case data available for cases with days away from work

USA BLS Data available
- Occupation (EMTs and paramedics; Ambulance drivers and attendants, except EMTs)
- Industry (Ambulance services, including air and ground)
- Nature of injury
- Part of body affected
- Source of injury
- Event or exposure
- Gender, age, race of worker
- Time in job
- Hours worked when injured
- Worker activity and location type (fatal only)
- Median number of days away from work

Fatalities among EMTs and paramedics, 2003-2007

- Other
- Assaults
- Other transportation
- Struck by vehicle
- Aircraft incidents

Source: Bureau of Labor Statistics, Census of Fatal Occupational Injuries

Vehicle Operations

- Dispatch, priority, emergency response v immediate
- Scene safety, vehicle positioning
- Fleet mix
- Rapid response vehicles
- Vans, Trucks, Motorcycles, other
- Performance, training, supervision, evaluation, maintenance
- Impairment, hours of service, system safety oversight

Australasian National Ambulance Statistics

Ambulance Services in Australia, New Zealand & Papua New Guinea
Annual Report on Government Services

CAA Annual Report Statistics
Council of Australasian Ambulance Authorities
- Ambulance Emergency response times (minutes)
- Report ambulance incidents, responses, patients & transport
- Emergency, urgent and non urgent incidents
- Patient numbers
- Cardiac arrest survived event rate
- Human resources
- Salaried personnel
- Volunteers
- Stations and Staffing
- Assets (number)
- Costs ($)
- Organisational expenditure per 1000 people
- Satisfaction Survey
Resource availability and allocation technologies

- Computer Aided Dispatch systems are different in each State & Territory
- Automatic Vehicle Location (AVL) – usually cities only
- Some have Duress alarms in vehicles and on handheld radios
- Crews are alerted by pager, radio or Mobile Data Terminal (MDT)
- Integration of VACCUS notebook electronic case recording nationwide
- Satellite phone communication in some regional and remote areas

Smart Consumers

Personnel
- Selection
- Education
- Training
- Safety Culture
- Reinforcement
- Evaluation

Performance
- Performance aids
  • Driving monitors
  • Technologies
- Management intensive
  • Feedback
  • Quality improvement cycle
  • Systems Orientation

Elements of Fleet Safety Management
- Management Leadership
- Driver Selection Standards
- Driver Performance Monitoring

Measures of Effective Fleet Safety System
- Fleet Safety & Operational Practices that can be defended
- Management Accountability and Controls
- Loss prevention efforts that identify key loss drivers and establish action plans to control/reduce risk factors leading to losses

June 2007

The inevitable bottom line…
Safety saves time, lives AND money
Canada, Nova Scotia

- Since 2000 working towards a goal of zero loss ratio with insurance provider
- 10 million kilometers per year
- 150 emergency response ambulance units
- Collision claim history measured in dollars per 100,000 kilometers traveled:
  - 2000/2001 $1725.00
  - 2001/2002 $1049.00
  - 2002/2003 $751.00
  - 2003/2004 $416.00
  - 2004/2005 $229.00

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

Expensive....

The Huntsville Times

Ambulance suit gets $3.1 million

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

Key Fleet Factors
- Driver
- Vehicle
- Conditions

Driver and impairment
Human factors that influence willingness and ability to drive safely:
- Fatigue
- Distraction
- Experience
- Age
- Knowledge
- Attitude
- Hours of Service
- Physical well being
- Emotional state
- Alcohol
- Controlled Substances
- Prescription medication
Clinical Care? Occupational Health and Safety.....?
- This IS a Transportation and Automotive Safety issue
- This is a Systems safety issue

EMS CANNOT Afford to keep paying out like this.....

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

Ambulance Motorcycles

- Response Times
  - 77% < 10 minutes (Avg.- 3.5 mins)
  - 23% < 5 minutes
  - 78% cases in the CBD
- Difference between Paramedic responder in a car and a motorcycle to cardiac arrest- 2 minutes avg.
- One pt every 3 days- 5 minutes before assistance can get to them

NSW Ambulance a leading approach to innovation and outcomes evaluation

Safety advantage
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Cost advantage
- Running costs half that of Subaru Forester
- Quarter that of a Mercedes Benz
- Total running costs: leasing 3 motorcycles, uniforms, equipment, training, wages- $450 000.
- QALY- WHO $40 000/life saved

Motor Cycle Medics
- The benefits are not just going faster!
- Safety advantage- a not often thought advantage
- Response times- seems like an obvious one but...
- Cost advantage- Not just in the purchase price
- Safety advantage
Unique roles

- Motorcycles could be included in disaster planning as a vehicle which could play a role different to everyday requirements.

The real-time auditory feedback safety performance monitor

Which is best, how many hours...??

‘Feedback box’ Program

Objectives

- Change the culture
- Provide objective data
- Enhance and reward safety
- Improve driver performance
- Save maintenance / insurance dollars
- Aid accident / Incident investigation

How The Feedback Box Works

Recorders installed on each unit to measure:
- Speed against user set limits – both running hot & cold
- Cornering velocity / hard braking / acceleration
- Use of seat belts, lights & sirens

Over speed - accelerating

- Listen for growl – 15 sec warning begins
- Growl frequency increases near end of warning
- Tone on – penalty points awarded
- Slow down – tone stops
- Accelerate again - growl on – slow down – growl stops - no points

MEMS - Seatbelt Violations per Month

MEMS - Overspeed Violations per Month
Monitor and feedback device in summary
- The system works
- Has objectively improved performance
- No increase in response times
- At fault accidents reduced
- Now accepted into the culture

However:
- The system requires constant monitoring
- Must be reinforced by management
- Rewards for good safety performance
- Consequences for poor performance

What about changing driver behavior in the real world??

And when a rare crash happens....

Unit 302 Accident

A key to safe ambulance transport

Transportation Environment
- Integration with Highway Safety strategies
- Partnerships/collaboration and Information sharing
- Intelligent Transportation System (ITS) Technologies
- Driver/vehicle performance monitoring & feedback devices
- Collision avoidance vehicle technologies
- Signal systems
- Roadside safety design and planning technologies
- Vehicle positioning and scene safety issues
- Hospital ambulance bay access and egress

Intelligent Transport Safety Systems

Vehicle Biomechanics & Crashworthiness
- Vehicle
  - Crashworthiness, vehicle hazards, occupant protection science and technology
  - Compact crashworthy vehicles (i.e., vans)
  - Non-hostile interiors
  - Lock down positions for equipment
  - Seat belts for all occupants – low over pelvis
  - Over-the-shoulder harnesses for all patients on the stretcher
Intrusion vs Deceleration

- Intrusion = vehicle to vehicle or vehicle to fixed narrow object
- Deceleration = sudden stop – ie. sled test
And this all takes place in 60 milliseconds – the blink of an eye.

NIOSH Ambulance Occupant Safety Crash Testing

Impact Direction 25 MPH!

Head Strike zone and harness hazards

New Australian vehicles

Flexibility to manage two patients

28 mph (45 km/hr)

Ergonomics, Human Factors and Biohazards

- Equipment and Vehicle Layout and Design
  - Equipment interface ergonomics
  - Vehicle interface ergonomics and human factors
- Vehicle visibility and appropriate warning signals
- PPE
  - Head protection
  - Protective Clothing
  - Visibility
  - Biohazard protection

Important...

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

December 2007
Prof Issachar Gilad

Range of reach

Chris Fitzgerald

Australia, Melbourne

EMS Ergonomics 2005, 2006
Awkward tasks? Develop solutions!

Worker visibility Act:
Help is on the way!! November 24th 2008

Policy and practice ignorant of existing technical safety data

Night visibility

This addresses some very real risks, very creatively — and currently ONLY available in London Ontario!
John Killeen, Paramedic

- Intensive Care Paramedic, ACT Ambulance Service, Australian Capital Territory (ACT), Australia
- Lead operational expert in ambulance safety, visibility and conspicuity

www.ambulancevisibility.com

“Anything that lengthens reaction time increases the chance of an unwanted event”

Stephen Solomon

“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

- As seen with normal vision
- As seen with color blind vision

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response

- Location
- Size
- Shape
- Speed
- Intended path

Increasing safety with a 30% cost saving

Queensland Ambulance Australia

Summit County EMS - Colorado

Old vehicle

New yellow vehicle markings
Staff use lime-green vests & jackets
Under Way...
Emergency Vehicle Visibility and Conspicuity Study
- Funded by the USFA
- Conducted by IFSTA
- Looking at the effectiveness of reflective markings used on emergency vehicles
- Doing best practice research and working with manufacturers

Standards and Policy
- Operations and fleet management
- Vehicle design safety and crashworthiness
  - Australia: ASA (AS/NZS 4535:1999)
  - USA: KKK-F 2007, AMD 2007 (not by national standardizing bodies)
- Worker and vehicle visibility
  - Some apparel, minimal vehicle visibility standards limited evidence base

Ambulance Standards??
- Australasia
- Europe
- USA
  - KKK?
  - AMD?
  - FMVSS?
  - NFPA?

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

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 - 10 G in Forward, Rearward, Transverse, & Vertical directions
- Certified by Notified Body and Ambulance Mfg.

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

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
  - Voluntary

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

USA Ambulance Manufacturing Division (AMD) Ambulance Standards – August 2007
- Compared with -
  - Accepted automotive safety occupant testing
  - Certified by Notified Body and Ambulance Mfg.
AMD – static ‘safety testing’

- Inconsistent with automotive safety principles – and specifies that a ‘successful test’ is -
  - No structural damage to any load bearing or supporting members, i.e., torn or broken material, broken welds, popped or sheared body rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

No ‘a’… then NO ‘F’ !!!!!

- F = ma
  where F – force  
  m – mass  
  a – acceleration

Unacceptable, and non-automotive AMD/KKK-F ‘safety testing’ practices and standards ???

USA Ambulances: FMVSS Exemption

NFPA Ambulance Standard Development

- NFPA Ambulance Standard Development Public Comment
- The Public Comment period for the development of the new NFPA Ambulance Standard – is open until October 15, 2008

Ongoing Safety Management – evaluation and analysis

- Monitoring
- Measuring
- Mining the data

A number of potential interventions to enhance safety have been identified:

- Safety Policy
- Safety performance standards
- Vehicle crashworthiness
- Vehicle interior ergonomics
- Personal Protective Equipment design
- Driver selection, training and simulation
- Safety and risk awareness modification
- Risk behavior modification
- Intelligent Transportation Systems (ITS)

Balance of concerns and risk during transport

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

- Safe practices save lives, time and money

**This is about you and your safety**

- What safety practices do you use??
  - Seat belts ?
  - EVOC training ?
  - Equipment lock down ?
  - Helmets ?
  - Driver Feedback technology ?
  - Tiered dispatch ?

**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 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??

**Safety Management**

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

**What do we know works...**

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

**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

**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
- 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 safety and occupant protection
Conclusion

- There is some valuable technical information published on ambulance vehicle safety performance.
- There are international models that address ambulance occupant safety issues.
- Accessing and utilizing the existing technical information is key.
- Applying the accepted principles of automotive safety performance is key.

Acknowledgements

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- Rick Pecor – US Transportation Research Board
- Eileen Fraser – Commission on the Accreditation of Medical Transport Services (CAMTS)
- Ambulance Association of America
- The USA EMS Community
- John Allen – ACT Ambulance
- Chris Fregant – NSW Ambulance
- Paul Bray – NSW Ambulance and Road Safety
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Thank you!

Any Questions??

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