





September 10, 2013

Strategies and Solutions for Ambulance Transport Safety Systems

Nadine Levick, MD MPH
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 CEO, Objective Safety, New York, USA
 Chair, TRB, EMS Subcommittee, National Academies


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Research | Education | Knowledge Transfer

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What are we going to cover today?

- Key principles of ambulance transport safety
- Ambulance safety research and data
- National and Regional Standards and Guidelines
- How to make your ambulance transport environment safer right now
- Future goals for Ambulance transport safety


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Goals and Learning Objectives

- Educate on the risks to patients, transport and emergency medical service providers and the public from ambulance transport adverse events
- Identify and explore factors related to ambulance crashes and identify potential mechanisms of injury to EMS transport providers, patients and the public and expose safety myths
- Instruct providers on strategies for enhancing transport safety and reducing risk of injury to patients and providers and the public during transport


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Emergency Medical Service Safety

- What are the transport and other 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 and share with our international colleagues


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Who am I?

- ▶ Nadine Levick MD, MPH
- ▶ Emergency Medicine Physician and Public Health Academic, (USA-Hopkins, Columbia SUNY & Australia – Royal Melbourne, Royal Childrens 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


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Jump start
 A Bushbuck Service II kangaroo leapt during its sand in New South Wales, Australia, to help automobile designers study a unique Australian road safety issue – traffic accidents with kangaroos.


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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


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Emergency Medical Services (EMS)

An important and unique transport system

- Public safety, public health and emergency service
- Is there to save lives


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The Public Health Paradigm

1. Define the problem
2. Measure its magnitude
3. Understand the key determinants:
 - a. Biologic etiology: host /agent/vector
 - b. Environmental & biomechanic influences
 - c. Social/behavioral practices of at risk pop.
4. Develop intervention/prevention strategies
5. Set policy/priorities
6. Implement and evaluate


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A lot is now possible and for less!

- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling



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Goals

- Better
- Safer
- Cheaper



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EMS Transport Safety

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



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




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Absence of standards and oversight

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



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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




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EMS Safety Crisis

"The **Chinese** word for '**crisis**' (危機) is made up of the words '**danger**' (危) and '**opportunity**' (機)"



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In a nutshell...

- Understanding of the dangers in Ambulance Transport
- Overview of the opportunities to enhance safety



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EMS Safety timeline

- Didn't know it was an issue – 60's-70's
- Knew it was an issue – but didn't really know what to do – 80's-90's
- Safety technical data rolls out – past 10 years
- Change and adoption challenges – *we are here now*



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Safety Dimensions

- Safe systems – CRM / transport system safety
- Risk perception
- Fleet and operations management
- Vehicle safety
- Scene safety
- Patient Handling
- Health and wellness

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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

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Your electronic 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

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Your electronic handout/resource link



Or if you are < 30 years

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How do you use a QR code for the first time?

Get any Tag reader App on your smartphone (free from your App store)

open Tag App and scan the QR code



www.objectivesafety.net/PDFHO.htm
 form will open directly on your phone

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



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Expo 2012 – a booth



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Expo 2013 – INDEMO 1.0



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Ambulance Safety Innovation
Design Module 1.0

See us @booth 567
or
www.INDEMO.info



POWERED BY EMS SAFETY FOUNDATION



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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



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**The EMS Safety Foundation:
A practical and functional model**

Interdisciplinary and Operational and International

- Innovation
- Collaboration
- Knowledge transfer



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R & D “Ripoff and Duplicate”

- Avoid reinventing the wheel at all costs
- Where are the best practices that we need to transfer knowledge from

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EMS Safety Foundation Ambulance Vehicle & Ergonomics Workshop



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Automotive engineers addressing EMS Safety Foundation Workshop



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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

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Neonatal transport crash July 10, 2013

- Single vehicle collision, ran off the road
- Clear weather daytime
- No patient on board
- Non emergency
- All occupants wearing seat belts
- No intrusion
- Most other injuries minor
- Doctor killed with closed head injury

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Doctor Killed in Ambulance Crash Being Remembered

Updated: Jul 12, 2013 6:59 PM EDT
By Emily Wilson - wjw@fox2.com



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July 21, 2013
http://host.madison.com/news/local/health_med_fit/meriter-ambulance-design-might-not-be-safest-some-ems-experts/article_3c50d6fc-ee1f-51af-b03a-78ca1c4e881.html

STATE JOURNAL

Meriter ambulance design might not be safest, some EMS experts say

The taller hospital ambulance that crashed this month, likely to have no crash test, has a roof height that will not work with some ambulances used in some areas, EMS experts say.

Other EMS officials say vans aren't big enough to carry specialized equipment and personnel, a key reason the box-style ambulances are much more widely used.

But a Pittsburgh hospital and a Dallas area ambulance service are among those that use a van to transport newborn patients, as Meriter's box-style vehicle did. Meriter will consider switching to a van, an administrator said.

Van ambulances are safer for patients, medical workers and other passengers because they're designed to absorb energy, equipped with stability controls and undergo extensive safety testing, Dr. Nadine Levick said.

Levick, of New York, is founder of the EMS Safety Foundation and chairwoman of the Transportation Research Board's EMS & EMSA subcommittee, part of the National Academies that advise Congress.

Box models like the Meriter ambulance don't have such safety features, Levick said.

"You have a physician dying in a vehicle that was largely designed by health care providers, not transportation safety engineers," Levick said. "It's a big box stacked on a truck chassis."

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But what about head protection?

ALPHA RESCUE



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New EMS helmet prototypes



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Head protection @ EMS Expo 2012



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A System of Safety

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- ### 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
 - Public safety

- ### Occupant Systems Safety
- Occupant Safety in EMS is driven by both operational and biomechanical systems.
 - Systems Safety integrating these two issues is key
 - There is interaction of occupants with the system, with each other and with available seating options and vehicle interior, equipment and operational tasks.

- ### Safety Performance
- Measurement
 - Outcomes
 - Technical expertise

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

- ### Safety of the...
- Provider
 - Public
 - Patient

- ### Safety is a tool to save
- Lives
 - Time
 - Money
- must be evidenced based

- ### 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

- ### When is it safe to do what... ?
- 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?



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What is a survivable impact ?



12 mph (20 km/hr)?



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What is a survivable impact?

$E = \frac{1}{2} mv^2$ $v^2 = 2as$



~ 30 mph - survivable



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What is a survivable impact?

$E = \frac{1}{2} mv^2$ $v^2 = 2as$



~ 60 mph – not survivable



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A survivable impact??




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A serious problem...



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July 18, 2013

Utah Medic to Stand Trial for Traffic Death

THE ASSOCIATED PRESS

BY AP/WIDEWORLD

CREATED BY: JULY 18, 2013

OXFORD, Utah, July 18 — The seemingly overwhelming state statistics that average when an ambulance driver is accused of causing a fatal traffic accident will be aimed now for a trial District Court judge.

Scott Reed Stephens Applegate is charged with negligent homicide in the death more than a year ago of a motorcycle struck by his South Davis Fire District ambulance.

Arthur H. Logan, III, was killed in the collision July 6, 2011, in the intersection of U.S. 89 and Sunset Drive. Located in South Ogden, it's just east of Ogden Regional Medical Center.



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September 7, 2013

Two injured in Wayne County ambulance crash

Monday, September 9, 2013

Southwest Missourian

Two men suffered moderate injuries Saturday when an ambulance in which they were riding ran off the road and hit an embankment, the Missouri State Highway Patrol reported.

Michael D. Irms, 34, and Harry Shearer, 73, both of Patterson, Mo., were passengers in a 2009 Ford Ego ambulance driven by David Ross, 27, of Pinckney, Mo., according to a crash report from the patrol.

The ambulance was traveling south about 6:05 p.m. Saturday on U.S. 67 two-tenths of a mile south of County Road 144 in Wayne County when it ran off the left side of the road, hit an embankment and came to rest in the median, the report stated.

Irms and Shearer both suffered minor injuries in the crash, according to the report.

Irms was taken by air evac to Saint Francis Medical Center in Cape Girardeau, and Shearer was taken by ambulance to Poplar Bluff Regional Medical Center in Poplar Bluff, Mo., the report said.



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April 2, 2013

Patient ejected in Ga. ambulance crash

The patient in the back of the ambulance was thrown from the vehicle by the impact

by EMS1 Staff

LANTANA, Fla. — A patient and two medics were injured in an ambulance crash in Carter County Tuesday.

The Carter County reported the accident Wednesday. The 2011 ambulance was heading to the northeast side of the interstate when it left the roadway and crashed into trees.

The patient in the back of the ambulance was thrown from the vehicle in the impact, local reports said the patient died 11.1, but a 12-year-old child and two emergency medical technicians were taken to the hospital and released.

Carter County Fire and Emergency Services responded to the scene in the hospital and that patient was not sent to the hospital.

An investigation is now under way into the crash. #photos: @cartercountyfla




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Your work environment!!



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Incident: 2 Ambulance & 1 Emergency Transport
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And yes, this meets KKK or NFPA



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June 6, 2013

Georgia EMTs and Patient Killed in Crash Involving Semi

Coffee County EMTs and a 66-year old patient killed in collision

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Thursday, June 6, 2013

OKTALA, GA (AP) — An ambulance with its lights and siren on collided Thursday with a semi-trailer on a Georgia highway, killing the two paramedics and the patient on board, authorities said.

FEATURED IN NEWS
State House Votes to Overhaul 'Veto of School' VET 20

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NEWS TECHNOLOGY

WE'RE SPENDING OVER \$8 BILLION THIS YEAR ON ENERGY PROJECTS THAT MOVE AMERICA FORWARD.

Mercedes-Benz adds QR codes to save car crash victims

Mercedes is updating its latest S-Class (S650) with vehicles on to its Mercedes-Benz S-Class.

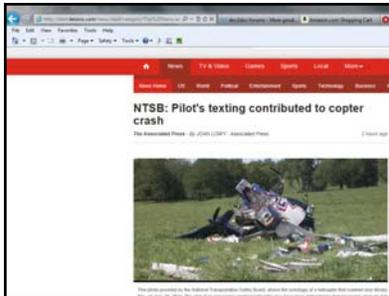
The front and side square bumpers are designed to absorb impact and prevent the car from shifting forward to save on crash victims.

The QR codes about contribution to a car crash, allowing them to call the next best type of vehicle to use in emergency.

The first call is not saved the right to attend the emergency to help others and a 100% of them.

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Incident: 2 Ambulance & 1 Emergency Transport
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August 27, 2012 - NYC

2 dead when ambulance and SUV collide on Staten Island's Hylan Boulevard

Published: Monday, August 27, 2012, 9:08 PM Updated: Tuesday, August 28, 2012, 9:22 AM

By John H. Assoc/Staten Island Advance

STATEN ISLAND, N.Y. — A wild collision between an ambulance and an SUV has left two people dead, one of them a retired EMT paramedic working as a paramedic for Staten Island University Hospital.

The crash happened on Hylan Boulevard shortly after 7 a.m. Monday, near the intersection of Seaview Avenue in



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Paramedic David Restuccio killed



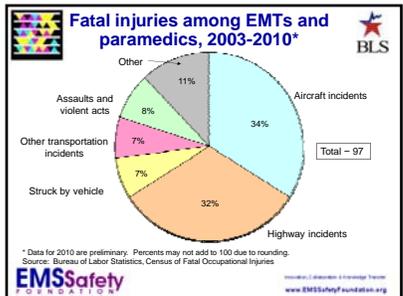
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08/05/2012



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Science behind Policy

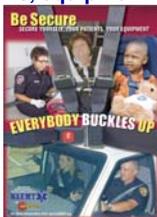
- "For successful technology, reality must take precedence over public relations, for Nature cannot be fooled."

Richard P. Feynman 1988

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



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Policies to protect you too!

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Policy makes a difference...



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DOH NYS, 2012

Advisory on patient care in a moving ambulance
www.EMSSafetyFoundation.org/2012-04_NYSAdvisory_on_Patient_Care_in_a_Moving_Ambulance.pdf



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Pennsylvania Department of Health Operations 123– BLS– Adult/Peds Effective 07/01/11 Protocol 123

- EMS VEHICLE OPERATIONS/SAFETY
- EMMCO WEST REGIONAL PROTOCOL
- Criteria:
 - A. All EMS operations, including incident responses and patient transports.

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EMS VEHICLE OPERATIONS/SAFETY EMMCO WEST REGIONAL PROTOCOL

- These guidelines provide general information and "best practice" guidelines related to the use of lights and sirens by EMS providers and EMS vehicle operators during incident response and patient transport. EMS agencies may use these guidelines to fulfill the agency's requirement for a policy regarding the use of lights and other warning devices as required by EMS Act regulation 28 § 1005.10 (l) or regions may use these guidelines in establishing regional treatment and transport protocols.

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Seat Belt and Restraint Use:

Seat belts or restraints will be securely fastened to the following individuals when the vehicle is in motion:

- 1) All EMS vehicle operators
- 2) All patients
- 3) All non-EMS passengers (cab and patient compartment)
- 4) All EMS practitioners (when patient care allows)
- 5) All infants and toddlers (these children should be transported in an age appropriate child seat if their condition allows). Children should not be placed in cab passenger seat with airbag.

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e. Avoid Distracted EMSVOs

- 1) Distracted driving is responsible for many MVCs, and EMS agencies should assure that policies reduce the risk of a distracted driving accident.
- a) EMSVOs should not view pagers, cell phone screens, text messages, or mobile data terminals or enter data into GPS devices while an EMS vehicle is in motion.

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Safety Event reporting

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Balance of concerns and risk during transport

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

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Communicating risk

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October 28, 2012

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Which image of October 26th communicates better risk perception

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the EMS transport process

- communications/dispatch
- the patient
- restraining device/seat
- transporting device/gurney
- paramedics/transport nurses, doctors & family
- patient monitoring equipment
- clinical care & interventions
- protective equipment
- the vehicle
- the driver/driving skill
- other road users
- the road

TIME & PLACE

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The Emergency Department (ED)

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An ambulance is not an ED /ICU on wheels

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Firstly!

▪ **An accident?**

▪ or
a predictable and preventable event



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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

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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.....

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A tragic emergency health care intervention outcome



Rollover Crash Kills Medical Technician
Ambulance Rans Off Side and Rolls Over, Sparing Two Employees and a Patient

It does happen....

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



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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

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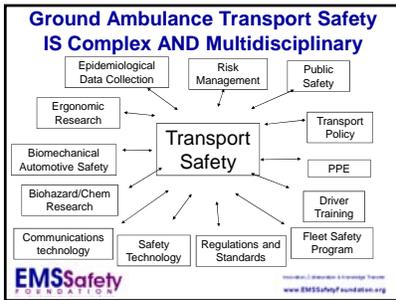
Ambulance Transport Safety

▪ 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

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

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USA EMS

- EMS Systems - >19,000
- Personnel - ~1 million
(~30% F/T professional & 70% volunteer)
- Vehicles - ~80,000
(Type I, Type II, Type III, Freightliners, ?motorcycles)
- Transports - ~30 million
(to Emergency Depts ~ 50%, < 1/3 emergent)
- Cost - ~\$8 Billion annually
- Safety Oversight - ? Disparate

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USA EMS transport safety data estimates

- ~ 80,000 vehicles
- ~ 9,000 crashes a year
- ~ One fatality each week
- ~ 2/3 pedestrians or occupants of other car
- ~10 serious injuries each day
- Cost estimates > \$500 million annually

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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##

*Klein CA, Pirralo RD, Kuhn EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9
**Baker, Zelenyich, Lewicki, Li, Miller. Accid Anal Prev 2003
***Maguire, Hunting, Smith, Lewicki, Annals Emerg Med Dec 2002
#MOSCA 2003
##Wang, AS, Aggarw CF. Prehosp Emerg Care 2005 Dec; 9:412-415

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EMS Transport General Concerns

- Consequences can be predictable & likely preventable
- Costs of these adverse events are high in loss of life, financial burden and negative impact on delivery of EMS care
- Other high speed vehicles (eg. racing cars) have a different safety paradigm
- Design of interventions to mitigate injury is predicated on a valid testing model
- Complex both engineering and public health issues

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USA Occupational transportation fatalities..

WE HAVE A BIG PROBLEM HERE

* Maguire, Hunting, Smith & Lewicki, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec 2002

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and what is killing EMS ?

USA 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

* Maguire, Hunting, Smith & Lewicki, Occupational Fatalities in Emergency Medical Services: A Hidden Crisis, Annals of Emergency Medicine, Dec 2002

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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

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August 2009 – Impaired...

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September 25, 2012

EMT killed when ambulance, tractor trailer crash in front of hospital

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Training... effectiveness...??

September 26, 2012

EMT charged with colleague's death in ambulance crash

Jonathan Cory Brown was the driver of the ambulance that pulled in front of a tractor trailer, causing an accident that killed EMT Bethula Bover in EMS's last.

REPORT: N.E. - A 33-year-old EMT has been charged with manslaughter death after allegedly causing a crash that killed his co-worker on Tuesday.

Jonathan Cory Brown was driving the ambulance when it pulled in front of a tractor trailer, causing an accident that killed EMT Bethula Bover in EMS's last.

The Southfield authorities have not yet released any details about the crash, but the ambulance was reportedly involved in a collision with a semi-truck on the passenger side, according to the Southfield Press.

The ambulance authorities have not yet released any details about the crash, but the ambulance was reportedly involved in a collision with a semi-truck on the passenger side, according to the Southfield Press.

Brown is expected to appear in court for his alleged manslaughter charge.

Southfield is a suburb of Detroit.

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USA 1980's Then....



And NOW!...



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USA 1980's Then....




And now...

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Equipment hard to reach



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Innovation Now...




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But avoid repeating old mistakes!



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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?

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We should use the best safety practices demonstrated in engineering

Development of an Effective Ambulance Patient Restraint

Development and Application of a Dynamic Testing Procedure for Ambulance Paediatric Patient Restraint Systems

2001-05-1173

Biomechanics of the patient compartment of ambulance vehicles under crash conditions: testing countermeasures to mitigate injury

Neelma Levick, Gordon Li
John Yarnagum

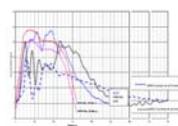


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ESV July 2009

USA AMBULANCE CRASHWORTHINESS FRONTAL IMPACT TESTING

Neelma Levick
EMMS Safety Foundation (1)
USA
Rajkumar Chakraborty
Injury Risk Management
University of New South Wales
Paper Number: 09-047



ABSTRACT
Recent epidemiological data indicates an high risk population...



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and in ergonomics

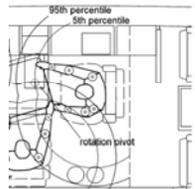
Ergonomics in the rescue service - Ergonomic evaluation of ambulance crew

Reviewing ambulance design for clinical efficiency and paramedic safety




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




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As well as epidemiological injury data August, 2011

<http://www.ncbi.nlm.nih.gov/pubmed/21834620>

Fatal and Nonfatal Injuries Among Emergency Medical Technicians and Paramedics



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TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

2012 EMS Safety Systems, Strategies and Solutions Summit

- One Day event, 30 presentations
- Held in Washington DC, Keck Center
- Simulcast Live to EMS Today
- Live Webinar Access - globally
- Over 100 participants live across 3 continents
- Greater than 10,000 downloads of handouts within the first week!!



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The 2012 TRB EMS Safety Summit

print this page & your smart phone will play the 8 sessions from the eTags! (even in B&W)

- Opening Address: A.J. Heightman
- Safety Developments Update - N. Levick

Research needs assessment forms explained - E. Frazer

- 1: Data and Recent Initiatives
- 2: Transport, Human Factors - Bridging Diverse Disciplines
- 3: Testing and Standards
- 4: New systems safety technology solutions & telematics
- 5: Fleet management strategies
- 6: Innovative Vehicle Design
- 7: Operationalizing Safety
- 8: Panel: How to optimize the safety of your existing fleet

Wrap up - from Prof. Art Cooper



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TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

2012 EMS Safety Systems, Strategies and Solutions Summit

<http://www.emmsafetyfoundation.org/2012TRBSummitAgendawithLinks.pdf>



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Its out there NOW

- TRB 2012 Summit – addressed the key and interdisciplinary applied solutions issues, in one day – please seek that information out. www.objectivesafety.net/TRBSummit2012.htm
- There have been two prior 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



Telematics

telematics UPDATE

Telematics and cloud computing: Help you, get onto my cloud!

28 April 2010

Mobile phone users in the past and web-based users that are being replaced by full-featured mobile devices.

A lot of cloud computing, convergence and application ideas in transportation information that will change the way people experience travel. Features on being more general systems that require a lot of time available, only brought to mobile devices are being integrated with applications to offer emergency, real-time and road conditions. Information coming in 2010, according to technology market research firm ABI-Research, the use of mobile devices is expected to be a significant market for "transportation" in 2010.

Telematics is a growing area and most other services and technologies built on smartphones are being embedded into the system. Such as navigation, general travel information, real-time traffic information, etc. Telematics are making the transportation of connected cars and trucks with a range of services. Telematics and mobile devices, offering a whole new range of services.

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Communication Technology trends

Rise and Fall of Gadgets

NOTE: 2010 data are estimates and 2011 data are projections. GRAPHIC: Alicia Partigiano / The Washington Post - January 10, 2011

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Smartphone navigation devices



A lot is now possible and for less!

- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling



Rules/Policies Addressing Known Hazards



- Federal Motor Carrier Safety Administration (FMCSA)
 - Cell phone use – November 2011
 - Hours of Service – December 2011



Federal Motor Carrier Safety Administration - FMCSA

- <http://www.fmcsa.dot.gov/>

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Nov 2011, Hand Held Cell Phone Ban

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

U.S. Transportation Secretary Lighthizer Announces Step towards Safer Highways

U.S. Transportation Secretary Lighthizer Announces Step towards Safer Highways

U.S. Transportation Secretary Lighthizer Announces Step towards Safer Highways

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Dec 2011, New FMCSA Hours of Service

U.S. Department of Transportation
Federal Motor Carrier Safety Administration

Hours of Service Regulations

U.S. Department of Transportation

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DOT HOS Rules

- Limits established for on-duty hours
- Establishes minimum levels of off-duty time- 8 hours if on duty less than 12 hours FRA or if over 12 hours then 10 hour off-duty time
- Commercial airline pilot can fly up to 100 hrs/month
- Adopts 60/70 hour weekly maximum for truck drivers, 10 hour off-duty time




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Fleet Management technologies

- ACETech/Ferno
- FleetEyes – Intermedix
- Zoll rescuenet and roadsafety fleet management systems
- Marvlis
- Telematicus
- Optima
- Northrop Grumman




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Spectrum of dimensions

- CAD
- Resource allocation
- Fleet performance –
 - Monitoring: System that gives management data of vehicle efficiency and use
 - Feedback: Directly to drivers at the wheel
- Public Alerts




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Response, Emergency Staging, Communications, Uniform Management, and Evacuation (R.E.S.C.U.M.E.)

Linda D. Dodge
ITS Joint Program Office, US DOT

EMS Subcommittee of the TRB ANB10(5)
EMS Transport Safety Summit

February 29th, 2012




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Overview

- USDOT ITS Program Background
- Traffic Incident Management & ITS
- Mobility Program
- NG9-1-1 Status
- R.E.S.C.U.M.E. Status and Plans




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ITS Research Program

Applications	Safety	Mobility	Environment
	V2V, V2I, Safety Pilot	Real Time Data Capture & Management, Dynamic Routing Applications	ADMS, Road Weather Applications

Technology

- Harmonization of International Standards & Architecture
- Human Factors
- Systems Engineering
- Certification
- Test Environments

Policy

- Deployment Scenarios
- Financing & Investment Models
- Operations & Governance
- Institutional Issues



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Next Generation 911 Initiative

Long Term Goal:

To enable the general public to make a 911 "call" (any real-time communication – voice, text, or video) from any wired, wireless, or Internet Protocol (IP)-based device, to the PSAP, and enable data sharing with the emergency communication network.

Major Milestones:

- National architecture and high-level design for NG911 System
- Proof of Concept Demonstration
- Transition plan for NG9-1-1 implementation




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For More Information



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<http://www.its.dot.gov/>



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Model Inventory of Emergency Care Elements "MIECE"

Example of how a MIECE color-coded road map might appear:

- Green – high level of emergency care resources
- Yellow – medium level of emergency care resources
- Red – low level of emergency care resources




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Talking increases crash risk 5x Texting is COMPLETELY UNACCEPTABLE 23X increase in crash risk

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The impaired/distracted driver

- Impairment
 - Illness
 - Exhaustion
 - Substance
 - Emotion
 - Distraction
 - CELL PHONE !!!!! - (A MAJOR HAZARD)
 - Other technology

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The science of Stretcher lifting & loading

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Stretcher Load - # 1 (CNLOAD01)

Measurement Data	
Maximum	62.8890
Average	19.1937
Minimum	0.0660
Area	417.9096

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And what is the loading height of your ambulance??

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

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USA Ambulance Standards & Testing

- KKK A 1822F: Purchasing Guideline
 - “Minimum Specification and performance parameters”
- AMD-001-025: Manufacturing Guideline
- ASTM F2020-02a: Standard Practice
- NFPA 1917 Standard for Automotive Ambulances: 2013 Edition

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Ambulance Standards and Testing

- Interrelated – mostly paraphrasing each other's requirements
- Self certified

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International Ambulance Design Safety and Occupant Protection Standards

In existence since 1999

- Australia – ASA
- Europe - CEN

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

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A few key words about restraint systems...

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Dynamic Sled Testing of Ambulance Pediatric Restraints (a resident research project)

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

Levick NR, et al. Development and Application of a Dynamic Testing Procedure for Ambulance Pediatric Restraint Systems, SAE Australasia 1998,SS2-45-51

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

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Systems safety failure AND dangerous

The innovative **EVS High Mobility™ HMR Harness System** for Emergency Vehicles

Overwhelming existing evidence these practices are HIGHLY dangerous

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

WHAT'S THE PLUS IN THE MOBILITY??

The Best Can Go With the Attendant!

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NOT new technical data...

Richardson S.A., et al, Int. J. of Crash., 4:3, 239 – 259, 1999

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

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Beware some provider restraint systems are dangerous

Richardson S.A., et al, Int. J. of Crash., 4:3, 239 – 259, 1999

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

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'Workplace' Hazards

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Bigger is not necessarily better.....

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

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October 2008 JEMS Article "Rig Safety - 911"

Rig Safety 9-1-1

What you need to know about ambulance safety & standards

<http://www.objectivesafety.net/JEMSRigSafety911.pdf>

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Ambulance Vehicle Standards??

- KKK?
- AMD?
- FMVSS?
- CMVSS?
- NFPA?
- SAE...?
- ASTM...?
- International
 - ASA
 - CEN

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Transporting kids?

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Basically...

- DON'T put child in the front seat
- DON'T put the child on the rear facing captains chair
- Just about anywhere else is OK!
- Use a child seat when medically appropriate and size fits, well secured

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NASEMSO MRAVD initiative

<http://www.nasemso.org/Projects/AgencyAndVehicleLicensure/AmbulanceVehicleDesignProject.asp>

National Association of State EMS Officials

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August 1, 2012 NASEMSO - Model Rules for Ambulance Vehicle Design (MRAVD)

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Golden Hour – not so hot

- March 2010
Annals EM

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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.]

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

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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
- # Staff/
EMS Transportation Units/
- 10,000 citizens
- 100 km rural road length
- 1000 km² area
- EMS response times/

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GAO-13-6

<http://www.gao.gov/assets/650/649018.pdf>

AMBULANCE PROVIDERS

Costs and Medicare Margins Varied Widely; Transports of Beneficiaries Have Increased

GAO-13-6

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GAO findings

- Transports for all Medicare fee-for-service beneficiaries grew 33% 2004 to 2010
- Transports nationwide grew most in super-rural areas (41%) relative to urban & rural areas
- 59% increase in basic life support (BLS) nonemergency transports
- BLS nonemergency transports in super-rural areas grew the most—by 82%

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Cost components

Figure 3. Average Percentage of Ambulance Providers' Total Cost Accounted for by Certain Cost Components

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Safety is Good Business

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What are the solutions?

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

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EMS SAFETY COURSE

National Association of
Emergency Medical Technicians




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NAEMT Safety Course

- Crew Resource Management
- Emergency Vehicle Safety
- Scene Operations
- Patient Handling
- Provider, Patient & Bystander Safety
- Personal Health




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Are you self insured???

Very Scary insurance data – the \$10 million dollar EMT

Year	Payroll \$million	Modified Premium \$1,000	Incurred Indemnity \$1,000	Incurred Medical \$1,000	Total Claims #
2003	14.1	540	885	9,925	93
2002	12.6	547	266	255	78
2001	11.3	454	88	128	55
2000	10.6	420	63	194	89
1999	10.1	405	115	117	56
1998	9.6	411	13	30	51

Workers Compensation Rate increased by 27 %



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A problem

2011 Insurance data –

- 35 fold more likely to have a claim based on transport than related to medical care

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



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Expensive....



Ambulance suit gets \$3.1 million

Merckandale been killed in wreck with speeding vehicle

Merckandale Tuesday, May 07, 2007

By GUY W. HICKLEN
Times Staff Writer Guy.Hicklen@times.com

A federal jury awarded \$3.1 million in damages Friday to the family of a Madison County woman who was killed in a collision with a speeding ambulance from Tennessee in 2005.

A felony charge of manslaughter is still pending in Madison County Circuit Court against the ambulance driver, Charles Christopher Eakes of Tennessee.

Dianca Christine Bowden, 18, of Mariettaville died in a two-vehicle crash Oct. 13 involving the ambulance owned by Lincoln County Medical Center Emergency Services. The wreck occurred around 9:45 p.m. at U.S. 231431 and West Limestone Road, about seven miles north of Huntsville.



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Very Expensive

Law B. Justice B. ambulances Firegazer on 30 Sep 2008 09:10 am

\$24 Million Judgement Against AMR

AN ALAMEDA COUNTY, CALIFORNIA, JURY ORDERED AMERICAN MEDICAL RESPONSE (AMR) to pay nearly \$24 million damages to a man who was permanently paralyzed after a traffic accident involving one of their ambulances.

On April 14, 2007, Louis Del Barba, 85, was driving his auto and making a turn when he was broadsided by the ambulance. The ambulance's speed was measured at 43 mph in a 25 mph zone. Experts agreed that such a speed, in rush hour conditions, was reckless and unsafe.

A press statement released yesterday by the plaintiff's lawyers stated:

Mr. Del Barba had the right of way and was wearing a shoulder and lap seat belt when the crash occurred. As a result of the accident, he received numerous traumatic injuries and is paralyzed completely, save for some movement of his head and left arm. He is constantly dependent on a ventilator. Doctors believe that he can return to his 110-year-old family home if there are funds to fit a room for medical care. The jury felt strongly that Mr.



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



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And very Predictable...

- Intersections are lethal environments

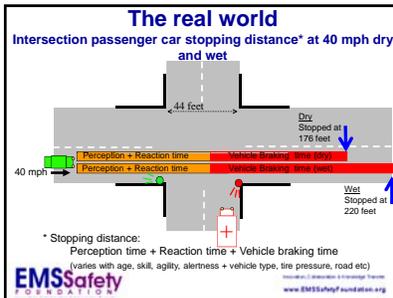


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So.. The real world for an EMS vehicle approaching a red light

- 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.....



Transport Medicine

Key elements to safety

- 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

A "Fleet" to many in Emergency Medical care means....



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

David Wang, PhD, Fellow, CI, Transportation 11, 2012
 www.EMSSafetyFoundation.org

The Relationship between Ambulance Crashes and Emergency Medical Technician Age
 Ambulance 5, October 2012

The Authors: James A. Parnianpour, PhD, University of Illinois, Urbana, IL, USA; Dan Lee, PhD, University of Illinois, Urbana, IL, USA

ABSTRACT

Objective: Ambulance crashes can have devastating effects on the community. Given the high cost of ambulance crashes, it is important to investigate the relationship between ambulance crashes and the age of emergency medical technicians (EMTs). The purpose of this study was to determine if there is a relationship between ambulance crashes and the age of EMTs.

Methods: In 2010, a cohort of 10,000 registered EMTs nationwide was used to determine if there is a relationship between ambulance crashes and the age of EMTs. The study was conducted in 2010, and the data was analyzed in 2011. The study was conducted in 2010, and the data was analyzed in 2011. The study was conducted in 2010, and the data was analyzed in 2011.

Conclusions: When controlling for call volume and ambulance time, the odds of having been in an ambulance accident within the past year were significantly higher for younger EMTs. Future studies should investigate the effects of various interventions such as increased field supervision or driver safety training programs on the driving performance of younger EMTs.

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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 sidefacing occupants are potentially lethal – and in **NO WAY SUPPORTED BY ANY DATA OR INDEPENDENT AUTOMOTIVE SAFETY EXPERTISE**

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Safe Practices for Motor Vehicle Operations
ASSE/ANSI Z15.1 2012
https://www.asse.org/cartpage.php?link=Z15_1_2012&utm_source=ASSE+Members&utm_campaign=b4472c203c-Z15_5_12_125_11_2012&utm_medium=email



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Z15.1 Technical Brief
<http://asse.us2.list-manage.com/track/click?u=c607119210bc178f7ceb6d716&id=a311862ffc&e=8007d740a6>



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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



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Newly Revised ANSI/ASSE Z15.1-2012 Standard is now available.

- ANSI/ASSE Z15.1-2012 Revised Standard is now available. "Safe Practices for Motor Vehicle Operations"
- These practices are designed for use by those having the responsibility for the administration and operation of motor vehicles as a part of organizational operations.

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New Safety Data

- TRB 2012
- 2011 National EMS Assessment
- 2011 NFPA
- TZD EMS
- NCHRP 17-51
- FARS/MMUCC
- NEMESIS
- BLS

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Increasing focus

- TRB - ANB10(5)
- RITA/ITS/DOT
- Traffic Records Forum
- DHS/NIST/NIOSH
- TIMS
- ASSE
- SAE
- EMS Safety Foundation



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A lot is now possible and for less!

- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling



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Fleet Management technologies

- ACETech/Ferno
- FleetEyes – Intermedix
- Zoll rescuenet and roadsafety fleet management systems
- Marvlis
- Telematicus
- Optima
- Northrop Grumman



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Spectrum of dimensions

- CAD
- Resource allocation
- Fleet performance –
 - Monitoring: System that gives management data of vehicle efficiency and use
 - Feedback: Directly to drivers at the wheel
- Public Alerts



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Telematics




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Transport performance

- Driver training?
- Real time safety performance outcomes?



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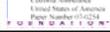
What about changing driver behavior in the real world??

AN OPTIMAL SOLUTION FOR ENHANCING AMBULANCE SAFETY: IMPLEMENTING A DRIVER PERFORMANCE FEEDBACK AND MONITORING DEVICE IN GROUND EMERGENCY MEDICAL SERVICE VEHICLES

Nadine R. Levis, MD, MPH
Mannodes Medical Center

REAL WORLD APPLICATION OF AN AFTERMARKET DRIVER HUMAN FACTORS REAL TIME SAFETY MONITORING AND FEEDBACK DEVICE: AN EMERGENCY SERVICE PERSPECTIVE

Nadine Levis
Optima Safety LLC
United States of America
Larry Wierock
Michael F. Nagel
Columbia Ambulance
United States of America
Paper Number 07-2224
P. E. R. A. T. I. S. Q. I. A.



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Invehicle technologies to enhance transport safety

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



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Human Interface approaches

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



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This IS a Transportation and Automotive Safety issue



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Creating a Safety Culture

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

- Awareness
- Training
- Incentive



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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

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Oslo Norway mass shooting EMS response July 2011



Oak Creek, Wisconsin mass shooting EMS response July 2012

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August 5th, 2012 - Mars

Mission to Mars
Mars Science Laboratory mission is scheduled to land the Curiosity rover in a Martian crater

Mobile Lab Curiosity is the size of a small car and carries 12 science instruments



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What MUST we do?

- We MUST stop pretending that this is not an automotive safety occupant protection impact engineering issue
- We MUST stop writing 'consensus' policies on disciplines we are not trained in
- We MUST reach out to the technical experts in this field
- We MUST engage the existing technical and safety transport arenas with EMS transport

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Which of these two vehicles would you want?

Sprinter v Ford Transit crash test

<http://www.youtube.com/watch?v=C3kN6WF5vAA&feature=related>

Sprinter V Transit Crash Test



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Innovation

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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

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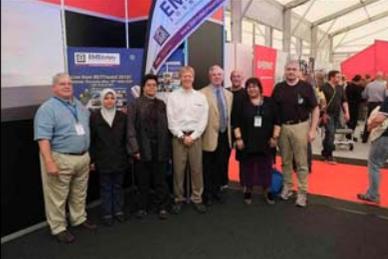
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EMS Safety Foundation Rettmobil 2013 Delegation's Special Participants

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Live from Rettmobil 2013
Public Access – www.EMSSafetyFoundation.org



https://www.youtube.com/watch?v=kJw9_PyIIr0

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So What is RETTmobil??

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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
- Over 460 exhibitors, 19 Countries!

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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 by promoting and advancing EMS safety innovation, collaboration, research, knowledge transfer, education and safety information dissemination

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In a nutshell

- EMS Safety Foundation is a not-for-profit multidisciplinary virtual think – tank and test bed for safety innovation and knowledge transfer
- It is a virtual network integrating the end users and the technical experts
- A tool to enhance the safety of delivery of EMS services

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- Innovation
- Collaboration
- Knowledge transfer

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Chris Fitzgerald

- Advisory Board and Technical Expert Panel
 - EMS Safety Foundation, Director of Human Factors and Ergonomics
 - CEO, Risk and Injury Management Services



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EMS Safety Foundation Delegate AJ Heightman – Rettmobil 2013



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EMS Safety Foundation Delegate Scott Cravens – Rettmobil 2013



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Safe and Ergonomic design



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Patient Transferring Slides



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Ergonomic layout and equipment



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Flexibility to manage two patients



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Ambulance Sprung

- In almost ¼ (23.5%) of all motorcycle missions ambulance use was avoided!

Nakstad AR, Bjelland B, Sandberg M. Medical emergency motorcycle – is it useful in a Scandinavian Emergency Medical Service? Scand J Trauma Resusc Emerg Med. 2009;17(1):9

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ESC – Does your ambulance have it??

- 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

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Areas of need

- Crashworthy vehicles
- Improvement in use of occupant restraint systems
- Improvement in use of equipment restraint systems
- Policies to minimize transport risks

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EMS Safety Foundation's
Live @ Rettmobil 2013
on YouTube!!
 Click here
https://www.youtube.com/watch?v=kJw9_PyIIR0

The ambulance response vehicle of the future?



What do we know???

- 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

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

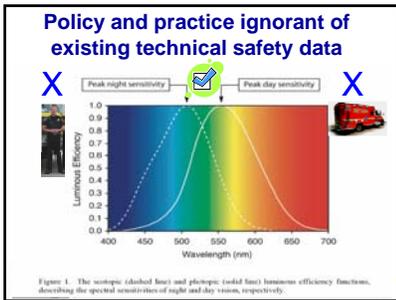
Transport related aspects -

- 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

Emergency Vehicles – Viewer Awareness

- Location
- Size
- Shape
- Speed
- Intended path





But whatever color If you run a red light someone will be killed

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June 17th 2008 a paramedic and a patient killed

EMS CRASH KILLS PATIENT AND A SUSSEX COUNTY (DE) PARAMEDIC IN THE LINE OF DUTY Tuesday, June 17, 2008

We regret to advise you that a female Sussex County (DE) Paramedic was killed in the Line of Duty as was a patient killed in a horrific crash involving an ambulance in Sussex County (DE) this morning.

The single vehicle crash happened around 02:10 Hours on the John J. Williams Highway near the Levers-Rohoboth joint fire company substation in Angles.

The Mid-Sussex Rescue Squad ambulance was transporting to Beebe Medical Center with a patient. 2 EMSRS Squad members and the Sussex County Paramedic were on board when it struck a tree, which opened the side of the ambulance as seen on our home page. Tragically, the patient was killed as was the Sussex County EMS Paramedic, who was killed in the Line of Duty.

Sussex County EMS also suffered a close call last year when a Paramedic John Schmitt was seriously injured in a crash when a civilian struck the Millard Fire Company ambulance he was riding in, while returning from a run. Additional details on the morning's crash will follow.

In this vehicle...

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April 30, 2009 - Tennessee

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Caution!!!

- Just because it has been 'Tested' does not necessarily mean it has been crash tested – nor that it is crashworthy and/or going to protect you
- Even if it has been 'Crash tested' – it depends upon to which standard, whether or not it is actually safe under real world crash conditions
- Appropriate technical expertise is key!!

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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

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this vehicle is safety crash tested by automotive experts

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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?

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What do we know works...

- Tiered dispatch
- Vehicle Operations Safety Policies
- Ideally, forward and rear facing seating
- If not, use squad bench lap seat belts
- Patient over the shoulder belts
- Securing equipment
- Fleet management electronic technical devices
- Safety awareness
- Cultural change

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Risk/Hazards

- Predictable risks
- Predictable fatal injuries
- Serious occupational hazard
- Public safety hazards

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Goals

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

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Safety Management

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

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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

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Future directions

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

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Key future focus

- Data and Recent Initiatives
- Transport Technical science
- Human Factors
- Bridging Diverse Disciplines
- Testing and Standards
- New systems safety technology solutions
- Fleet management strategies
- Innovative Vehicle Design
- Operationalizing Safety

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Expo 2013 – INDEMO 1.0



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Ambulance Safety Innovation Design Module 1.0

See us @booth 567
or online
www.INDEMO.info

INDEMO 1.0
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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

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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

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Your electronic handout/resource link



Or if you are < 30 years

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www.objectivesafety.net/PDFHO.htm

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Thank you!
Any Questions??

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



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