

New Jersey State First Aid Council Symposium,  
Split Rock, PA, October, 16th 2009

## The Ride of Your Life: Ambulance Transport Safety – The State of the Art



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### Outline

- I. Review of data on ambulance crashes and safety standards and guidelines that exist for the ground EMS
- II. Identification of ground EMS transport safety issues, hazards and areas of risk to patients, providers and public
- III. Highlight unacceptable mythology and challenges to advancing EMS transport safety
- IV. Profile innovation, new safety technologies and strategies and knowledge transfer to enhance safety and reduce risks of ground EMS and patient transport

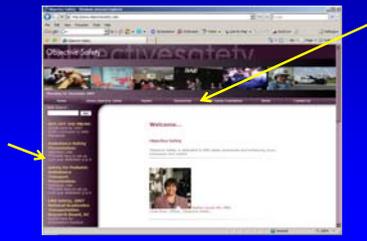
### Real world answers to real world questions -

- ▶ 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?

### Emergency Medical Service Transport

- ▶ What are the transport safety issues that pertain to this important public service and public safety industry?
- ▶ What do we know of the risks and hazards and how can we measure these ?
- ▶ How can the safety of this transport system be optimized?

<http://www.objectivesafety.net>



Firstly!

▶ **An accident ?**

- ▶ or  
a predictable and preventable event

### A tragic emergency health care intervention outcome



It does happen....

### A devastating tragedy...

- ▶ An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved
- ▶ BUT an EMS crash can kill all involved AND wipe out an EMS systems response capacity.....

### 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

## In a nutshell

- ▶ Am here to try to save you  
Lives  
Time and  
Money

## 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

## October 2008 JEMS Article "Rig Safety - 911"



## USA EMS data

In the USA\*

- ▶ ~ 50,000 vehicles
- ▶ ~ 5,000 crashes a year
- ▶ ~ One fatality each week
  - ~ 2/3 pedestrians or occupants of other car
  - Approximately 4 child fatalities per year
- ▶ ~10 serious injuries each day
- ▶ Cost estimates > \$500 million annually
- ▶ USA crash fatality rate/capita 35x higher than in Australia

\*NHTSA 2006-6

## Is it your service's tragic year?

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

## Creating a Safety Culture

within a company must 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

## 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



## An ambulance is not an ED /ICU on wheels





### What is a survivable impact ?

12 mph (20 km/hr)?

### What is a survivable impact?

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

~ 30 mph - survivable

### What is a survivable impact?

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

~ 60 mph - not survivable

### A survivable impact??

### Thursday July 5<sup>th</sup> 2007..... Paramedic Allan Parson's killed

**NEWS CENTER**  
**Paramedic Killed in Turner Ambulance Crash**

Turner, Ohio (AP) -- A paramedic was killed when his ambulance rolled over on a road here Friday night.

A TURNER (AP) (AP) -- The West-Cam paramedic was killed when the ambulance rolled over on a road here Friday night.

The Harrison County Sheriff's Department said the ambulance rolled over on a road here Friday night.

The ambulance driver, 38-year-old Robert (last name withheld) was killed in the crash. Shaffer said the ambulance driver was killed when the ambulance rolled over on a road here Friday night.

The paramedic who died has been identified as 40-year-old Allan Parson.

A section of Route 176 was closed for hours after the crash.

Several agencies responded to help the victim. Shaffer said the ambulance driver was killed when the ambulance rolled over on a road here Friday night.

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

**Posted By: [Name] at July 5, 2007 10:08 PM (Subject: Memorial)**  
to all the people worried about how fast the emt was going, would it be fast enough if it was your loved one in there.....

**Posted By: [Name] at July 5, 2007 10:15 PM (Subject: Memorial)**  
In fact, it would be too fast if they ran over my family member on their way to another's family member....

**Posted By: [Name] at July 5, 2007 10:18 PM (Subject: Memorial)**  
I know if the actions and situation surrounding this were worth this sort of loss, and I'd like to know what can be done so that this never happens again.

### 2 weeks later... Friday July 20<sup>th</sup> 2007 The worst ambulance crash in USA history

**Five Killed in Crash of Ambulance and Semi**

July 21, 2007 08:20 AM EDT

The Highway Patrol says three EMS workers were killed. They were identified as 64-year-old Sammie Smith, 33-year-old Heidi McLaughlin and 25-year-old Kelly Rager. The two paramedics were also killed. They were identified as 44-year-old Robert Wally, 60-year-old Amanda Smith of Hicksville.

Another emergency medical technician, Matt McLaughlin, and the truck driver, Gerald Chapman, Jr. of Indiana, were both taken to the hospital. It's not yet clear whether they suffered any injuries.

Authorities have not said who had the right of way at the road intersection nor how they said if the ambulance's emergency siren and lights were turned on.

**Antwerp fire chief says, 'They were doing what they loved...'**

Live! 10/10/07

Antwerp, Ohio (AP) -- The worst ambulance crash in the history of Harrison County, Ohio, was a head-on collision between a semi-truck and an ambulance Friday night.

Emergency personnel throughout the region are also shocked and mourning their own.

"That's one of our worst scenarios when it's one of our own," said Con Shubert of the Payne Fire Department.

"Everyone is a brotherhood," said Friend. "Everybody looks after everybody."

Randy Shaffer, director of Paulding County Emergency Management Agency, said the accident has had a deep impact.

"It has affected every emergency personnel in the county," he said. "We know it could happen at any time. We read about it in our newsletter. We just don't think it's going to happen to us."

Shaffer said when a call came in that an ambulance was involved in an accident Friday, "I think every squad in the county activated."

## June 17<sup>th</sup> 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

It is 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 12:45 hours on the John J. Williams Highway near the Levens Suburban joint fire company station in Angles.

The Mid-Sussex Rescue Squad ambulance was transporting to Dorset Medical Center with a patient. 2 MSRS 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 Schwan was seriously injured in a crash when a civilian struck the Midland Fire Company ambulance he was riding in, while returning from a run. Additional details on this morning's crash will follow.



## In this vehicle...



## January 10, 2008



## This is not a crashworthy environment



## Jan 28<sup>th</sup>, 2008



## April 20, 2008...??



## October 31, 2008 - Kentucky



## February 11, 2009 – North Carolina

**EMS Doctors Charged After Ambulance Crash - North Carolina**

A Rockingham County ambulance slid off the road and flipped over Wednesday afternoon. The crew was transporting a patient to a nursing home when the ambulance went off the road. The county emergency services director blames rain, says the weather may have played a role in the crash. "We said it rained, when he dropped off and started to correct it flipped on him just, so you know he was just an intersection trying to take the road and everything else into play, may have been a factor."



## April 30, 2009 - Tennessee



## Minnesota - June 20, 2009

**Woman Struck, Killed by Ambulance in St. Paul - Minnesota**

The ambulance, along with other emergency responders, was at a Walgreens parking lot in St. Paul responding to a report of a car that had gone through a fence and into an alley.

When the ambulance backed up the alley to get closer to the crash, it hit the woman, who was pronounced dead at the scene. Her identity has not yet been released.

"I want to tell us all times like these. They fall to express the depth of our sadness for those who lost a loved one today. They fall to touch the hearts of the paramedic crew whose jobs took them on a fatal run. We will fully investigate the circumstances of this tragic accident, and as this day ends in grief, our thoughts and prayers are with the family of the victim as they go through this difficult time." said St. Paul Mayor Drew Peterson in a statement.

## August 2009 – Impaired...

### EMS RESPONDER

#### Kentucky EMT Indicted on Murder Charges after Crash

By Andy Blank/WKRN  
Trenton, TN (WKRN) —

A Louisville EMT who was driving an ambulance involved in a fatal crash has been indicted on seven criminal charges, including murder and operating a motor vehicle under the influence of intoxicants.

Tommy Brewer, 36, was behind the wheel when that crash took place in April 2008. The patient made the ambulance, inside Indiana, 54, died of her injuries from the wreck.

She is charged with three April 20 when Brewer appeared in court to face a no proof of insurance charge after she was involved in an unrelated mandatory accident in her own vehicle.

## September 15, 2009

### ONE KILLED, THREE INJURED IN TN AMBULANCE CRASH

Wednesday, September 16, 2009 - A fatal wreck occurred last night in Johnson County involving a car, whose driver is suspected of being on drugs, and a rescue squad ambulance. The collision crossed the center lane of Highway 67 and hit a Johnson County Rescue Squad ambulance. The hit pushed the ambulance off the road. It came back onto the road, but the ambulance's rear tire caught the edge, and tipped it over an embankment. A female patient in the ambulance died at the scene, and three others were injured by being flung to JCHC.

The driver of the car that hit the ambulance, 51 year old Brenda J. Buchanan was probably was on drugs. The TNF said that drugs may have been a factor in the crash, so they're treating this as a criminal investigation. We wish the rescue squad members a quick recovery.



## An interhospital transport ? "Do no harm...."?

Calculi updated Tuesday, January 22, 7:14:57

EMERGENCY | Health Article | Detailed Article to a friend | Lexipol

**Pn ambulance involved in crash; patient pronounced dead at scene**

By Julie Wells Lewis  
Trenton, TN (WKRN) —  
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An Adams County ambulance enroute to York Hospital collided with a car at the intersection of routes 30 and 414 in Union Township at 5:47 PM Monday, and the patient was pronounced dead at the scene.

York County Deputy Coroner, Cassie (aka) says the patient, a woman, was being transported from Galtys Hospital because she was exhibiting "a sign of life" based on vital signs.

She said she will be a doctor in a few years in the state, and if she is in the state, she will be a doctor in a few years in the state, and if she is in the state, she will be a doctor in a few years in the state.

## EMS Safety

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

## 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



▶ **This IS a Transportation and Automotive Safety issue**

### Benefit of Safety

▶ Any cost of addressing these issues is dwarfed in contrast to the huge burden of not doing so - in financial costs let alone the personal, societal, ethical and litigation costs

### 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

### 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

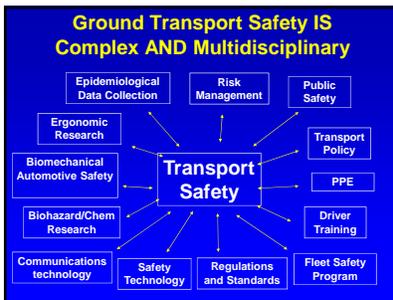
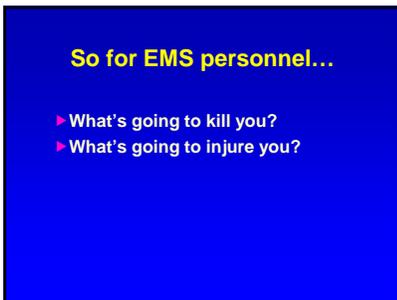
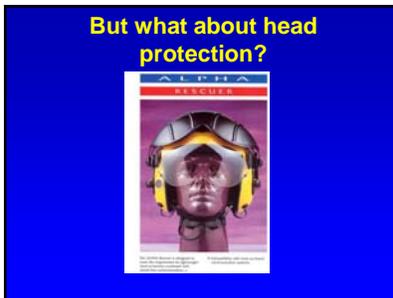
View of Ambulance interior from Rear



### Absence of standards and oversight

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

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





### Ambulance Vehicle Standards??

- ▶ KKK?
- ▶ AMD?
- ▶ FMVSS?
- ▶ NFPA?

### USA KKK ambulance purchase specifications GSA:KKK-A-1822F, Aug 2007

- ▶ 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 [www.npsa.com/WorkArea/downloadcontent.aspx?file=1337](http://www.npsa.com/WorkArea/downloadcontent.aspx?file=1337)



### 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



<http://www.npsa.com/WorkArea/downloadcontent.aspx?file=1240>

**USA Ambulances:  
FMVSS Exemption**

DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration

**49 CFR Parts 571, 572, and 589  
[Docket No. 92-26, Notice 7]  
[RIN No. 2127-AB85]**

**Federal Motor Vehicle Safety Standards,  
Head Restraints**

49.1 Vehicles manufactured on or after September 1, 1995, including September 1, 2002, except as provided in § 583, for vehicles manufactured on or after September 1, 1988 and before September 1, 2002, a percentage of the manufacturer's production, as specified in § 581.1, 581.2, 581.3, or 581.4 shall meet the requirements of this exemption. Compliance with the requirements of this exemption is required by the manufacturer's production, as specified in § 581.1, 581.2, 581.3, or 581.4, and is not required for vehicles that are exempt from the requirements of this exemption. The requirements do not apply to any vehicle that is not used only for the purposes of § 581.1, 581.2, 581.3, or 581.4. The phrase "percentage of the manufacturer's production" shall be interpreted to mean the total number of vehicles produced during the period that is reported to the National Highway Traffic Safety Administration pursuant to §§ 225.50(b) and 225.50(c).

**SUMMARY:** On August 18, 1995, NHTSA published a final rule amending Standard No. 201, "Occupant Protection: Interior Impact," to require passenger air protection, front, and side-impact passenger vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less, to provide protection when a occupant's head strikes upper interior components, including seats, side rails, headrests, and the roof, during a crash. In response to problems for § 201 vehicles, NHTSA published a notice on September 1, 2002, that allowed an exemption to § 201 for a percentage of the manufacturer's production of § 201 vehicles. NHTSA published a notice on August 18, 2007, which amended the exemption to § 201 to allow the manufacturer to specify a GVWR at the target location specified in § 581.1 rather than the GVWR specified in § 581.1. The exemption applies to any vehicle at any speed up to and including 30 kilometers per hour. The requirements do not apply to any target that cannot be tested using the procedures of § 581.1.

§ 581.1 A vehicle is exempt from the requirements of § 201 if it is:

- (1) Any target located in a convertible roof frame or a convertible roof edge mechanism.
- (2) Any target located in a convertible roof frame or a convertible roof edge mechanism.
- (3) Any target for a component of a vehicle that is not located in the seating reference point of the nearest designated seating position.

**EMS Best Practice, Sept 2006**

**What can emergency services leaders do to their own organizations to promote ambulance safety?**

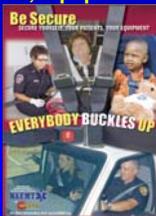
Other actions include:

- ▶ Establish and maintain vehicle inspection policies.
- ▶ Keep a full stop of and avoid driving through red lights.
- ▶ Increase attention to policies and equipment to prevent or reduce EMTs or paramedics accidents.
- ▶ Use thorough and comprehensive driver selection and training.
- ▶ Use real time driver monitoring and feedback devices.
- ▶ Use sound response. Turning at headlight signals to get to a signalized intersection is not what one should do and the negative impact on EMS is high.
- ▶ Consider using local practice sites and outside the vehicle, with a view to the individual practice, organized around and under other safety themes.
- ▶ Engage in discussion of the NHTSA's 2011 research for the safe use of vehicle practices, and
- ▶ Support collection of population-based injury data, after

**Roof Not Buckling up**

to a safety impact on existing force of practice, and one that can be viewed as a source of more than 100 EMS practices (ambulance) Emergency Medicine. The survey did not identify the exact number of ambulances that do not have the correct number of seats. It did, however, identify a number of ambulances that do not have the correct number of seats. It did, however, identify a number of ambulances that do not have the correct number of seats.

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



**What are the solutions?**

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

**Balance of concerns and risk during transport**

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

## Safety Management

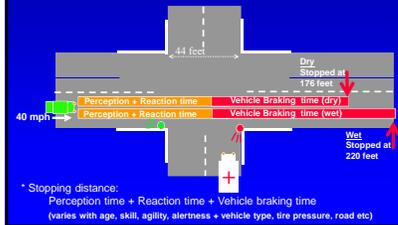
- ▶ A Safety Culture
- ▶ Protective Policies
- ▶ Protective Devices
  - ♦ To prevent a crash
  - ♦ In the event of a crash
- ▶ Continuous Education and Evaluation

## And very Predictable...

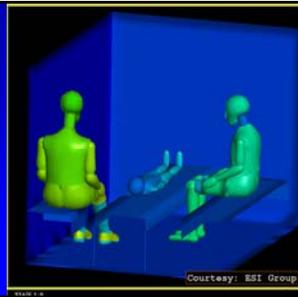
- ▶ Intersections are lethal environments

## The real world

### Intersection passenger car stopping distance\* at 40 mph dry and wet



## Testing the real world



## The Crash Event - Crash Testing

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

## Intrusion vs Deceleration

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

## Dynamic Safety Testing

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

## If we know this – and its published....



**Why do we do this?**



**What is actually happening during an ambulance crash**

1 - Target vehicle, Type I ambulance  
 2 - Faster vehicle, Type II ambulance  
 Closing speed 44 mph



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



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



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



**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**

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

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



Airbags .... Absent safety testing standards or effective occupant positioning

**ARE CONSIDERED HIGHLY HAZARDOUS BY THE AUTOMOTIVE SAFETY EXPERTS**

### Increasing awareness ...



### 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??

### Innovation

### Safety concepts out there now

- ▶ Driver feedback technologies
- ▶ Tiered dispatch
- ▶ Enhanced ambulance vehicle design
- ▶ Intelligent Transport Technologies - ITS
- ▶ New Safety Standards

### 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  
Maimonides Medical Center

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

Nadine Levis  
Objective Safety LLC  
United States of America  
Larry Wyrwich  
Michael E. Nagel  
California Automobile  
United States of America  
Paper Number 050224

### Purpose of ‘Feedback box’ Program

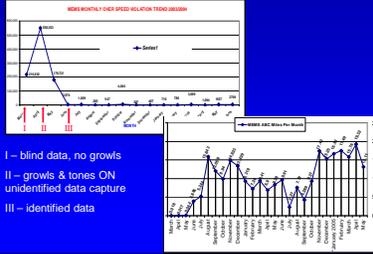
- ▶ Enhance Safety
- ▶ Improve Driver Performance
- ▶ Save Maintenance Dollars
- ▶ Aid Accident / Incident Investigation

## How the Device Works

- ▶ Computerized monitoring device installed on each vehicle to measure parameters
- ▶ Each driver has individual key "fob"
- ▶ Data collected every second
  - including: vehicle speed and performance, driver behaviors and emergency mode
- ▶ Auditory feedback of warning 'growls', and penalty tones
- ▶ Data downloaded automatically every day



## Demonstrated Effectiveness



## A key to safe ambulance transport



## Extensive Indirect cost savings

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

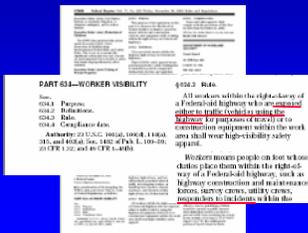
## Other monitoring devices

- ▶ Primarily to record events during and immediately preceding a crash
- ▶ Give no driver crash prevention feedback
- ▶ Administratively burdensome
- ▶ Intrusive
- ▶ Not demonstrated to be as effective in improving vehicle maintenance costs or as effective in modifying driver behavior long term

## You want a system that works!!

- ▶ Does the system really work
- ▶ Is it going to be a major burden on your staff to implement
- ▶ What are the real costs
- ▶ Are you going to have video of your company vehicle on you tube??

## Worker visibility Act: November 24th 2008



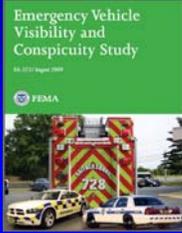
## Day visibility



## Night visibility



**August 2009 - review**



**Policy and practice ignorant of existing technical safety data**

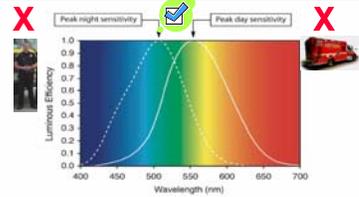


Figure 1. The scotopic (dashed line) and photopic (solid line) luminous efficiency functions, describing the spectral sensitivities of night and day vision, respectively.

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



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



**Color-blindness affects 10% of the population**



▶ 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



**Summit County EMS - Colorado**

Old vehicle



New yellow vehicle markings

Staff use lime-green vests & jackets



## Muskoka EMS - Canada

Old design



New design



## Muskoka EMS - Canada

Old design



New design



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



## International approaches

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

## EMS Safety Foundation Delegation bringing Rettmobil to you



Wayne Zygowicz, Advisory Board, Littleton Fire/EMS, Colorado & JEMS  
<http://connect.jems.com/profiles/blog/list?user=2odthpncsm46j>



## Vehicle Occupant Safety design

European design  
 Safety technology  
 is a key focus



### Safe and Ergonomic design



### Ergonomic layout and equipment



### Flexibility to manage two patients



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



### JOURNAL

#### IRHA selected to test new ambulance

New design smaller, more cost efficient, say health officials

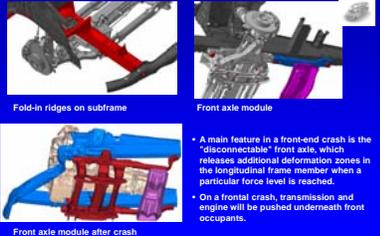
Manitoba Health is looking to act on its original plan by implementing a pilot project, giving the RHA's a year to test the Sprinter design to see if it could be a replacement to the current Fleet Mac ambulance design.

According to Christenson, the Sprinter design looks similar to delivery vans, and boasts a whole new set of safety and technology features such as GPS.

It's a lot smaller, so that makes it a lot easier for paramedics to be strapped in but still be able to reach all the equipment needed to tend to a patient," said Christenson.

Christenson also explained that the new ambulances require less maintenance, and have an overall smoother slower ride. They also are lower to the ground and come equipped with new "no-lift" stretchers, that eliminate 80 per cent of strenuous lifting paramedics do to get patients in and out of the vehicle.

### Safety first - Passive Safety



Fold-in ridges on subframe

Front axle module

Front axle module after crash

- A main feature in a front-end crash is the "disconnectable" front axle, which releases additional deformation zones in the longitudinal frame members when a particular force level is reached.
- On a frontal crash, transmission and engine will be pushed underneath front occupants.

### Is safety crash tested by automotive experts



### Unlike this vehicle



### So....

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

### Were we safer in the Cadillac???



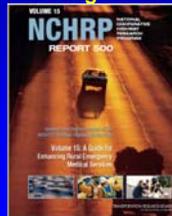
### Fleet Mix ?



### “Ripoff and Duplicate”

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

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



### Tips for Emergency Vehicle Operations



### USFA Emergency Vehicle Safety Initiative



### Traffic Incident Management Systems (TIMS)

- ▶ Released April 2008
- ▶ FEMA, USFA, IFSTA
- ▶ Covers setting up safe roadway incident work areas and using unified command at these incidents



### National Academies TRB Ambulance Transport Safety Summit October 29, 2009



<http://www.objectivesafety.net/TRBSummit2009.htm>

### Risk/Hazards

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

### What you can do now

- ▶ Have a written and implemented 'safety program'
- ▶ Secure all equipment
- ▶ Secure occupants with standard belts
- ▶ Don't drive through red lights/stop signs
- ▶ Use properly implemented "Feedback Boxes"

### What do we know works...

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

### 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

### small changes can make a BIG DIFFERENCE

- ▶ **PREPARE – TEACH – REACH – RESPOND**
- ♦ Look at your own safety record
- ♦ Teach safety and hazard awareness
- ♦ Reach out with safety information to all your EMS providers
- ♦ Respond with the best safety practices

**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

### And....

- ▶ It is no longer acceptable for EMS to be functioning outside of automotive safety and PPE safety standards for prevention of and protection of EMS providers and the public from injury and death

Thank you!  
Any Questions??

Electronic handout available online

<http://www.objectivesafety.net>

