EMS operations are identified to be high risk. This presentation outlines the concept of a systems engineering safety approach to addressing the key determinants of the safe operation of an EMS system.

Loss Prevention is the goal here

In a nutshell...

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

Who am I?

- Nadine Levick MD, MPH
- Emergency Medicine Physician and Public Health Academic, (USA-Hopkins, Columbia SUNY, Montefiore & 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

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
Much of what you shall hear today is thanks to the work of the:

**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

**The EMS Safety Foundation:**

A practical and functional model

- Interdisciplinary and Operational and International
  - Innovation
  - Collaboration
  - Knowledge transfer
R & D
“Ripoff and Duplicate”

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

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

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

Integration of transportation safety and human factors and ergonomics
- The design of ambulance vehicle interiors involves interrelationship of transportation safety and the human factors and ergonomic aspects.

Integration of transportation safety and human factors and ergonomics
- Even though these elements are central to the operational safety of this system, there has been minimal focus on operational modeling integrating these aspects.

EMS Safety Foundation Ambulance Vehicle & Ergonomics Workshop
Automotive engineers addressing EMS Safety Foundation Workshop

EMS Safety Foundation Ambulance Innovation Workshop and Design Clinic

Session A
Vehicle Safety and Occupant Protection
Gene Lukianov

Session B
Hands-on human factors operational safety and task analysis
Chris Fitzgerald

World Expo/EMS Safety Foundation 2012 and 2013 Safety Innovation Awards

- 12 product winners
- 4-5 special mentions
- Criteria
  - Safety Innovation
  - Practical/Usability
  - Cost Efficiency

EMS Safety Foundation
www.EMSsafetyfoundation.org
Minimizing your losses

- Participants in the EMS Safety Foundation’s Innovation Consortium have demonstrated consistent improvements in their losses.

Why?

Access to:

- Independent technical information and expertise
- Be on the cutting edge of cost efficient safety innovation
- Identifying practices that are inefficient, risky, and ineffective
- Facilitating change and smooth transitions to safer, better practices
- An innovation market

We shall cover today

- The scope of the safety problem, the challenges in defining it, the specific key disciplines and the existing data available to address and enhance system safety and a new ambulance safety design interactive tool, the innovation Demonstration Module INDEMO 1.0, will be presented.
A System of 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.

Safe Systems Approach

Source: Road Safety Branch, Infrastructure and Surface Transport Policy, Department of Infrastructure, Transport, Regional Development and Local Government, Australia.

Getting you, your patient and equipment to, in and out of the vehicle

Providing patient care inside the vehicle

Occupant protection in crash and near miss situations

Public safety

In the USA there are more safety standards for moving cattle than for moving patients
**Absence of standards and oversight**
- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No safety performance standards
- Absent national safety oversight

**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

**Safety is a tool to save**
- Lives
- Time
- Money

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

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

**Safety Performance Outcomes**
- Technical expertise

**Occupant Systems Safety**
- Safety Performance
- Measurement
- Outcomes
- Technical expertise

**Safety is a tool to save**
- Lives
- Time
- Money

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

**Safer Better Cheaper is NOW**
- What are the practices that are costing us
- How to identify optimal safety improvements
- How to facilitate the integration of new safer practices

Sure a Culture of Safety, but the road map to get there is the key

**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

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

**USA 1980’s Then….**
And NOW….
Equipment hard to reach

Innovation Yes Now…

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

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

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
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 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

March 24 Crash … no fatalities AND April 5 change in policy

Chicago transit agency fires driver after crash

March 24 crash injured more than 40 passengers and sent the eight-car train tumbling over the platform at a high-speed station.

A lot is now possible and for less!

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

Goals

- Cheaper
- Better
- Safer
**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.

**Emergency Medical Services (EMS)**

An important and unique transport system
- Public safety, public health and emergency service
- Is there to save lives

**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.

**911 Call to Hospital/ED Definitive Care Time Intervals**

*Not drawn to scale*

- EMS dispatch time
- EMS response to the scene time
- EMS scene to hospital transport time (X)
- ED EMS bay to hospital/ED definitive care time (Y)

Vehicle related transport time

**Ambulance Transport Safety IS Complex AND Multidisciplinary**

- Epidemiological Data Collection
- Biomechanical Automotive Safety
- Occupant protection/crashworthiness
- Ergonomic Research
- Biohazard/Chem Research
- Communications technology
- Public Safety
- Public Education
- Risk Management
- Transport Policy
- Personal Protective Equipment
- Driver Training
- Safety Technology
- Regulations and Standards
- Fleet Safety Program

**Is there an acceptable rate of morbidity and mortality for pre-hospital transport systems??**
A serious problem...

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

Firstly!

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

A devastating tragedy...

- An ETT down the wrong hole may kill your patient and be a terrible burden for the pts family and for the medic involved

Negative impact on system performance...

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

WE DO HAVE TECHNICAL DATA!!!
Safety performance for Emergency Medical Service systems

- Morbidity and Mortality burden of the system performance
- Much data on medical interventions and relative merit
- Very limited data on system safety

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

USA Occupational transportation fatalities..

- WE HAVE A BIG PROBLEM HERE

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

Fatal injuries among EMTs and paramedics, 2003-2010*

- Tradition and history are major obstacles for change in the USA
- Key areas are:
  - Fleet management tools – dispatch and response
  - Enhancing patient handling safety
Are you self insured???

Very Scary insurance data – the $10 million dollar EMT

<table>
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<th>Year</th>
<th>Payroll $million</th>
<th>Modified Premium $1,000</th>
<th>Incurred Indemnity $1,000</th>
<th>Incurred Medical $1,000</th>
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<td>405</td>
<td>115</td>
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<tr>
<td>1998</td>
<td>9.6</td>
<td>411</td>
<td>13</td>
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<td>51</td>
</tr>
</tbody>
</table>

Workers Compensation Rate increased by 27%

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

Expensive…

Very Expensive

EMS CANNOT Afford to keep paying out like this….

And very Predictable…
- Intersections are lethal environments
So.. The real world for an EMS vehicle approaching a red light

- You think they heard you...
- You know they must have seen you..
- And maybe they did
- ..... But..
- There is NO way humanly possible that they could stop.....

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

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

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

Predictable risks

- Fatal crashes more often at intersections, & with another vehicle (p < 0.001) *
- 70% of fatal crashes EMS crashes during Emergency Use*
- Most serious & fatal injuries occurred in rear (OR 2.7 vs front) & to improperly restrained occupants (OR 2.5 vs restrained)**
- 82% of fatally injured EMS rear occupants unrestrained***
- > 74% of EMT occupational fatalities are MVC related**
- Serious head injury in >65% of fatal occupant injuries#
- More likely to crash at an intersection with traffic lights (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles###

EMS Transport General Concerns

- Consequences can be predictable & likely preventable
- Costs of these adverse events are high in loss of life, financial burden and negative impact on delivery of EMS care
- Other high speed vehicles (eg. racing cars) have a different safety paradigm
- Design of interventions to mitigate injury is predicated on a valid testing model
- Complex both engineering and public health issues
Video in the public domain, July 18, 2014

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 that 10,000 downloads of handouts within the first week!!

Safety Systems, Strategies and Solutions Summit Feb 2012

- ~50 onsite – lead representatives
- Live online participation with international representation
- 7 focus areas and a panel
- >120,000 downloads of presentation handouts
- Multi-Media ‘e-document’ with QR tags
- YouTube overview
What are global best practice models
Making it happen
How can we translate global interdisciplinary best practice initiatives to North American EMS

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, and how do we manage and monitor it?

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

~ 60 mph - not survivable

June 6, 2013

Georgia EMTs and Patient Killed in Crash Involving Scoli

Coffee County EMTs and a 64-year-old patient killed in collision

NTSB: Pilot's texting contributed to copter crash

The Associated Press  -  1 year ago
August 27, 2012 - NYC

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

Published: Monday, August 27, 2012, 4:59 PM   Updated: Tuesday, August 28, 2012, 3:20 AM

By John M. Annunzio/Advance Staff

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

The crash happened on Hyland Boulevard shortly after 2:30 a.m. Monday, near the intersection of South Street in

Your work environment!!

And yes, this meets KKK or NFPA

September 25, 2012

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

Published: Monday, Sept. 25, 2012, 11:30 AM ET

Updated: Monday, Sept. 25, 2012, 3:00 PM ET

By John M. Annunzio/Advance Staff
Training… effectiveness…??

EMT charged with colleague’s death in ambulance crash.

August 2009 – Impaired…

Utah Medic to Stand Trial for Traffic Death

EMT Indicted On Murder Charges

Tammy Brewer Driving Ambulance Involved In Fatal 2008 Crash

Rules/Policies Addressing Known Hazards

Federal Motor Carrier Safety Administration (FMCSA)

Federal Motor Carrier Safety Administration - FMCSA

http://www.fmcsa.dot.gov/
**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

**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

**A tragic emergency health care intervention outcome**

It does happen....
But what about head protection?

New EMS helmet prototypes

Head protection @ EMS Expo

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

Science behind Policy

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

Richard P. Feynman 1988

Patients must be in the over the shoulder harness, medics restrained in seat belts, equipment secured
Policies to protect you too!

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

The impaired/distracted driver
- Impairment
  - Illness
  - Exhaustion
  - Substance
  - Emotion
  - Distraction
    - CELL PHONE !!!!! – (A MAJOR HAZARD)
    - Other technology

Safe Practices for Motor Vehicle Operations
ASSE/ANSI Z15.1 2012

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

http://asse.us2.list-manage.com/track/click?u=c607f19210bc178f7ceb6d716&id=a311862f&c&e=8007d740a6

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

Balance of concerns and risk during transport

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

Communicating risk

2000 Full Vehicle Crash Testing
Pre-impact CTD positioning

Full Vehicle Crash Tests

Test 1 – Right side impact

1. Type I ambulance, Type I collision
2. Target vehicle, Type II ambulance

Test 2 – Frontal

1. Type I ambulance, Type I collision
2. Target vehicle, Type II ambulance

Preparation of test vehicles
Testing the real world

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

Ambulance Safety Research: No longer such a New Field

We should use the best safety practices demonstrated in engineering

ESV July 2009
and in ergonomics

Range of reach. This is a well defined technical science

As well as epidemiological injury data
August, 2011

Advisory Board and Technical Expert Panel
– EMS Safety Foundation, Director of Human Factors and Ergonomics
– Chris Fitzgerald, Injury and Risk Management

The science of Stretcher lifting & loading

Stretcher Load - # 1 (CNLOAD01)
And what is the loading height of your ambulance??

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

Emergency Vehicles – Viewer Awareness

For a timely, appropriate and safe response
- Location
- Size
- Shape
- Speed
- Intended path
But whatever color …. If you run a red light someone will be killed

Roles of diverse disciplines which have bearing on EMS system safety

- Assembling teams across these disciplines

A few key words about restraint systems...

PPE from the stationary environment can be highly hazardous in the automotive setting
Systems safety failure AND dangerous

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

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

Beware some provider restraint systems are dangerous

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

Innovation

Leadership and Innovation

“Being responsible sometimes means pissing people off... By procrastinating on the difficult choices, by trying not to get anyone mad, and by treating everyone equally "nicely" regardless of their contributions, you'll simply ensure that the only people you'll wind up angering are the most creative and productive people in the organization.”

New Technologies, Innovation and You!
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

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

Telematics
- How much technology and data and of what type do you need to improve fleet safety performance

Telematicus

GGD views
A smart phone App that is a safety tool

Telematicus
Fleet Management capability
- Vehicle database
  - Individual vehicle/data
  - Fleet mileage collection/Checklists
  - Link to other systems (SAP, Fleet)
- Maintenance & Service Plans
  - Repair history & Scheduling
  - Action planning
- Reporting
  - Export to Excel for manipulation
  - Scorecards views, Crystal Reports reporting
  - Direct Feedback
Other new tools we have now

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.
Rettmobil 2014, May 14-16

EMS Safety Foundation Delegation seeking out International Innovation
Clever knowledge transfer, a game changer from Dlouhy in Europe

The old expensive and not versatile and the new…

Rapidly and game changing technology and cheaper, better, very versatile
Challenges of change – even if it makes sense

- Innovation demonstration model, INDEMO 1.0, a new knowledge transfer tool

Ambulance Safety Innovation Design Module 1.0

www.INDEMO.info

A full scale interactive physical model was embarked upon, the Innovation Design Module (INDEMO) 1.0 - in which change in ambulance design based on technically sound automotive and ergonomic science and improvement potential could be developed, visualized, demonstrated and evaluated.
Designs so that you can do your work with optimum safety and efficiency.

Based on state of the art science, practice and input from the world’s leading experts in automotive safety and human factors.

Designs that are cheaper, better, safer.

EMS Expo 2013 – EMS Safety Foundation
INDEMO 1.0
Ambulance Safety
Innovation Design Module
Safer, Better, Cheaper!

This project focused on system of safety as a central part of the operational process, not a parallel aspect. Vehicle dimension selection was based on automotive safety testing parameters, the interior layout based on integrating pilot task analyses with a range of ergonomic technical data across a spectrum from seating to reach parameters and across body size range.
Even on twitter...

EMS World Expo

- 84,771 downloads of 2012’s presentation

- Strategies and Solutions for Ambulance Transport Safety Systems
  Sep 10 2013 - Handout:
  [http://www.objectivesafety.net/2013EXPOLasVegasHO.pdf](http://www.objectivesafety.net/2013EXPOLasVegasHO.pdf)

- How to Design Your Next Ambulance
  Sep 11 2013 - Handout
youtube video
http://www.youtube.com/watch?v=q0kPYOzgNyQ&feature=c4-overview&list=UUQj31V_yV1cvd uWyBETc80w
– taken as we were getting set up at EMS Expo

Ambulance Safety Innovation Design Module 1.0
www.INDEMO.info

Key dimensions
1) safety must be inherent to operational process design
2) engagement of appropriate interdisciplinary expertise in systems design and safety analysis is essential
3) an understanding of the complex interplay between patient, provider and public safety from a systems perspective and culture is key to addressing effective and safe operational EMS performance.

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

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

Your electronic handout/resource link

Or if you are < 30 years

This presentation handout

www.objectivesafety.net/PDFHO.htm

Thank you!
Any Questions??
Electronic handout and resources available online
http://www.objectivesafety.net

Thank you!
Any Questions??
Electronic handout available online
http://www.objectivesafety.net