Operationalizing Your Ground Safety Plan

Outline
- How do you develop a ground transport safety plan?
- How do you know your plan is working?
- Highlight how the air and ground safety plans are different.
- How to begin developing and operationalizing a comprehensive ground transport safety plan.
- How to ensure your plan is appropriate and being used by crews.
- How to help develop ways to monitor the plans use and effectiveness.

Objectives
- Educate on the spectrum of hazard and risk related to fleet safety.
- Explain the elements of the new Z-15 ANSI/ASSE standard for fleet safety management.
- Explore the implementation of new transport safety technologies and innovations.
- Instruct on strategies and policies for enhancing fleet safety to minimize risk for patients, providers and the public.

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

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

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”.
- Monitor crash events with common denominators (ie, per 100,000 miles and per trip).

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.

http://www.objectivesafety.net

So…
- what policy changes could enhance transport safety?
- what do you see as obstacles to improving transport safety?
- what are ways to enhance awareness and understanding of transport safety issues?
- what devices could be considered to enhance transport safety?
- how is data on transport safety captured?
- how can you identify predictable and preventable risks during transport?

Medical Transport Leadership Institute, Oglebay, April 29th, 2008

Nadine Levick, MD MPH
CEO Objective Safety LLC, Research Director
EMS Safety Foundation, NY, NY
Challenges to Optimizing EMS Transport Safety
- Disparate and fragmented safety infrastructure
- Lack of a centralized EMS Safety oversight or data
- A large number of small groups of end users, with a mix of volunteers and professionals
- Ambulances are hybrid non-standard vehicles, a truck chassis and an after market box or a modified van
- EMS vehicle safety is not integrated as a part of the transport safety industry

Key Elements to Safety
- Data Capture
- Vehicle Biomechanics and Crashworthiness
- Ergonomics and Biohazards
- Transportation Environment
- Safety Management – evaluation and analysis

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

EMS Transport Safety
- 'patient safety' AND also
- 'provider' and 'public safety'

New paradigm - Integration of EMS
- Public health departments
- Social service agencies
- Community outreach
- Hospitals
- Health care networks / Insurers
- Industry

What’s new
- New automotive safety technologies
  - EVS
  - ITS
  - Monitoring and feedback enhancements
- New expertise
  - TRB
  - ASSE
  - SAE
  - UTRC
  - Ergonomics
  - Industrial Design

Some challenges
- No accepted national safety standards for -
  - EMS fleet management or safety practice
  - Ambulance vehicle rear compartment design and performance
  - Provider occupational injury protective equipment
- Yet convincing data for injury risk and hazard
- Need for patient, provider and public safety focus

So....
- Which vehicle do you want to be in?
- Which vehicle is the best for efficient, and effective patient care?
- Which vehicle provides optimal risk management?
- What is the optimal fleet mix?
- What is the best safety plan?
- What is optimal safety equipment?
- What are the best safety policies?

A very serious gap in data, performance and oversight
- FMCSA Truck safety goals – to decrease the fatality rate of 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008
- EMS crash fatality estimates are - 7.66 - 41.93 fatalities per 100 million ambulance-miles
Issues

- Patient, provider and public safety
- Key issues
  - Essential emergency service
  - Low budget
  - All environments
  - Recruitment and retention issues
  - Technology dark ages
  - Communication, administrative, transportation and health care data challenges

EMS is multidisciplinary

- Primary focus has been physician driven - optimizing acute health care and practice
- But.... NOT optimizing
  - Communications/data – administrative and health care
  - Transportation aspects and safety

Cultivating a Culture of Safety

- At a Service level
  - Communicate
  - Collaborate
  - Educate
  - Regulate

Transport Safety Goals

- Standards for safety
- Practice policy based on Science
- Databases to demonstrate outcome

Absence of standards and oversight

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

New Information 2006-2008

- Enhanced Safety of Vehicles (ESV), June 2007
- American Society Safety Engineers (ASSE), June 2006 & June 2007
- International Ergonomics Association (IEA), June 2006
- Transportation Research Board – EMS Safety address, Jan 2007
- AMD Engineering Public Comments, July 2007
- KKK-F, August 2007
- OSHA September 11, 2007 Federal Register
- SAFETY-LED, 2006
- Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for US Transportation
- State Strategic Highway Safety Plans, October 2007
- State EMS Council Policies
- APHA, Nov 2007
- Transportation Research Board – Inaugural EMS Safety Subcommittee meeting Jan 2008
- NIOSH Emergency Responder Round table March 2008
- OSHA EMS best practices late 2008
- Worker visibility Act, to be implemented, Nov 2008

The EMS Safety Foundation

Intro and Logistics Webinars from December 11th 2007 & Jan 9th 2008
EMS Safety Foundation tab at www.objectivesafety.net

Key 5 Safety Priority areas of focus

Here is what you sent in:  n = 155

- Priority Number one
  - Vehicle ops - 29%
  - Ambulance design - 27%
- Priority Number two
  - Ambulance design - 35%
  - Vehicle ops - 29%
Safety oversight of what and by whom

Vehicle Safety
Vehicle Design
Safety Equipment Design
Testing and Standard development
Safety policies

The National Transportation Safety Board (NTSB)

Safety policies
Vehicle and Safety Equipment Testing and Standard development
Vehicle Safety

The National Transportation Safety Board (NTSB)

The National Transportation Safety Board (NTSB) Recommendations

NTSB: 1979 Accident Report

NTSB 1979 Accident Report

NTSB: 1979 Recommendations never implemented

To NHTSA – Class II & III Priority Action
- [List]
To GSA – Class II Priority Action
- [List]
To National Committee on Uniform Traffic Laws
- [List]

Canada - Corporate Manslaughter

Corporate Homicide Act: 8th April, 2008

Integration and Collaboration


State Strategic Highway Safety Plans

Required as part of the SAFETEA-LU legislation

Focus is the 4 'E's

EMS is a core theme


Emergency Medical Services Dispatch Services
Emergency Medical Services Partnerships
Pre-hospital Training Programs
Road Condition and Incident Response
EMS RESPONDER CRASH PREVENTION

- Undertake a systematic review of other state actions and protocols on ambulance traffic safety measures to identify and prioritize those appropriate for the New York State pre-hospital system.
- Increase education and involvement of EMS providers in principles of appropriate traffic safety techniques.
- Develop and implement ambulance traffic safety protocols at state, regional and service level.
- Review treatment modalities and protocols to identify those that may contribute to injuries resulting from the impact of ambulance crashes.
- Identify methods to provide incentives for adoption by EMS services of protocols that enhance traffic safety.
- Partner with organizations that provide public driver awareness and education campaigns to improve driver awareness of driver responsibility and appropriate response to approaching emergency vehicles.

Policy makes a difference…

- 1991-2000, 302,969 Emergency vehicles were involved in MVCs - 1,565 involving fatalities*
- In PA 1997-2001, ambulances were more likely than similar sized vehicles to be involved in:
  - 4 way intersection crashes (43% vs 23%, p=0.001)
  - Collisions at traffic signals (37% vs 18%, p=0.001)
  - MVCs with more people injured (76% vs 61%, p=0.001)

*Comparison of Crashes Involving Ambulances with those of similar sized vehicles – Adam Ray, Douglas Parker. WEMS 2006

Vehicle Operations Position Statement

- WEMS – October 2007
  1. Emergency Vehicle Operations Policy
  2. Vehicle operations training and evaluation
  3. A program of graduated driver responsibility
  4. Drivers only age 25 and over
  5. Complete stop at an intersection
  6. Restricted use of Red Lights and Sirens
  7. Monitoring of emergency vehicle operations

WEMS covered some key and important policies and procedures

- But…
  - What about hours of service?
  - What about visibility at the scene? For providers and the vehicles?
  - What about protective equipment?
  - What about ambulance design safety?
  - What about reporting of adverse events?

Safety process

- Identify hazards
- Create a safety attitude
- Promote Teamwork
- Provide motivation
- Accomplish established goals

Safety Management

- Culture of Safety
- EMS Practice and Policy
  - Standard operations
  - Safe-driving policy and practice
  - Driver training
  - Seat belt use policy – for providers, patients and passengers
  - Safety monitoring and feedback
  - Stop at red lights and stop signs
  - Emergency Vehicle Operator Course (EVOC)
  - Secure all equipment
  - Use portable communications
  - Notify amused if rear occupants are in vulnerable positions
- Fleet Management
  - Fleet Safety program
  - ANSI/IEEE 15

Safety Plan

- A Safety Culture
- Protective Policies
- Protective Devices
- To prevent a crash
- To the event of a crash
- Monitoring and Analysis
- Continuous Education and Evaluation
**Key Elements to Safety**

- Data Capture
- Vehicle Biomechanics and Crashworthiness
- Ergonomics and Biohazards
- Transportation Environment
- Safety Management – evaluation and analysis

**Vehicle Biomechanics & Crashworthiness**

- Vehicle
- Compact crashworthy vehicles (i.e., vans)
- Non-hostile interiors
- Lock down positions for equipment
- Seat belts for all occupants
- Over-shoulder harnesses for all patients on the stretcher

**Ergonomics and Biohazards**

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

**Transportation Environment**

- Integration with Highway Safety strategies
- Partnership/collaboration and Information sharing
- Intelligent Transportation System (ITS) Technologies
  - On-vehicle performance monitoring & feedback systems
  - Collision avoidance vehicle technologies
  - Signal systems
- Roadside safety design and planning technologies
  - Vehicle positioning and access safety issues
  - Hospital ambulance bay access and egress
- Fleet mix
  - Rapid response vehicles
  - Vans, Trucks, Motorcycles, other

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

- Time from hosptial ED to scene
- Time from scene to hospital
- Time from call to hospital
- Time from arrival to ED
- Time from ED to hospital

**This is about you and your safety**

- What safety practices do you use??
  - Seat belts ?
  - EVOC training ?
  - Equipment lock down ?
  - Helmets ?
  - “Black Box” technology ?
  - Tiered dispatch ?

**EMS Transport Safety IS Complex AND Multidisciplinary**

**Key Issues**

- Mythology
  - That Emergency Medical Service personnel are safe
- Injury Hazards
  - Biological
  - Chemical/Radiation
  - Physical/Mechanical trauma – THE BIG PROBLEM
- Motor Vehicle Crashes are the highest cause of death at work – EMS Top 2 at the 2010 National rate
- An R & D and Regulatory Gap
  - Occupational Health & Safety
  - The problem is in R & D - exposure data are scant!

**What’s missing**

- What data is collected nationally?
  - We have no denominator data
- Absent population-based national injury data or injury mechanics data
- Absent structured transportation safety engineering input
- In 2 & 3 = resultant inability to design and evaluate efficacy of injury interventions
- What oversight is there?
  - Which organizations would determine policy?
Safety process
- Identify hazards
- Raise awareness of safety issues
- Create a safety attitude
- Promote Teamwork
- Provide motivation
- Accomplish established goals

Safety Management
- Culture of Safety
- EMS Practice and Policy
- Driving policy and practice
- Driver selection and training
- EMS Training
- Safety monitoring and feedback
- Stop at red lights and stop signs
- Driver selection and training

Safety Monitoring and Feedback
- Notify driver if rear occupants are in vulnerable positions

Fleet Management
- Fleet Safety program
- ANSI/ASSE Z.15
- Emergency Vehicle Operators Course (EVOC)

What do ambulance crashes really cost?
- Loss of life and injury
- Negative impact on EMS system
- Collisions are the largest liability cost and exceed malpractice or negligence
- Besides the direct financial costs of replacing a damaged ambulance and equipment, there are additional hidden costs incurred:
  - Investigating the ambulance collision
  - Litigation/settlement/lawsuit
  - Medical/disability costs of injured EMTs
  - Hiring of new employees to replace injured personnel
  - Retraining and psychological counseling of personnel involved
  - Increased insurance rates

Expensive....

The inevitable bottom line...

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

Very Scary insurance data

<table>
<thead>
<tr>
<th>Year</th>
<th>Incurred Loss</th>
<th>Medical Incurred</th>
<th>Indemnity</th>
<th>Total Incurred</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
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<td>185</td>
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<td>12.6</td>
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<td>414</td>
<td>13</td>
<td>53</td>
</tr>
<tr>
<td>2004</td>
<td>10.1</td>
<td>405</td>
<td>53</td>
<td>117</td>
</tr>
<tr>
<td>2005</td>
<td>9.8</td>
<td>411</td>
<td>79</td>
<td>117</td>
</tr>
</tbody>
</table>

Workers Compensation Rate increased by 26.5%:
Was $5.86/$100 payroll in 2005-2006
Now it is $7.41 for 2006-2007

A number of potential interventions to enhance safety have been identified:
- Safety Policy
- Safety performance standards
- Vehicle crashworthiness
- Vehicle interior ergonomics
- Personal Protective Equipment design
- Driver selection, training and simulation
- Safety and risk awareness modification
- Risk behavior modification
- Intelligent Transportation Systems (ITS)
Safety concepts out there now
- Fleet Safety Management
  - Z-15
- Enhanced ambulance vehicle design
- Intelligent Transport Technologies - ITS
- Visibility and Conspicuity
- New Safety Standards
- Life Safety Initiatives
- Resources and information

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

Scope of the Z15.1 Standard
- For the safe operation of motor vehicles owned or operated by organizations, including:
  - Definitions
  - Management Leadership Administration
  - Operational Environment
  - Driver Considerations
  - Vehicle Considerations
  - Accident Reporting and Analysis
- 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.

American National Standard
ANSI/ASSE Z15.1-2006
Safe Practices for Fleet Motor Vehicle Operations

What Z15 encompasses
- Safety Program
- Safety Policy
- Responsibilities and Accountabilities
- Driver Recruitment, Selection and Assessment
- Organizational Safety Rules
- Orientation and Training
- Reporting Rates and Major Incidents to Executives
- Oversight

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  - Driver Considerations
  - Vehicle Considerations
  - Accident Reporting and Analysis
- 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.

Safety Program
- 3.2 Organizations shall have a written vehicle safety program that defines organizational requirements for driver and vehicle safety.
- Safety Program shall include the following elements:
  - Safety policy
  - Responsibilities and accountabilities
  - Driver recruitment, selection, and assessment
  - Organizational safety rules
  - Orientation and training
  - Reporting rates and major incidents to executives
  - Communications
  - Vehicle specifications
  - Inspections and maintenance
  - Regulatory compliance management
  - Management program audits

Safety Policy
- Organizations shall establish a formal safety policy that states management’s concern for the health and well-being of drivers throughout the organization.
- The policy shall establish the expectation that drivers comply with all aspects of the organization’s vehicle safety program, as well as obey applicable local, state and federal laws and regulations as they relate to vehicle operations.

Responsibilities and Accountabilities
- A system of responsibility and accountability shall be established throughout the organization in order to ensure effective implementation of the vehicle safety program.
3.2.1.3 The organization shall implement a system that recruits and selects drivers to ensure safe operation and management of the motor vehicle safety program.

3.2.1.4 Organizations shall develop and implement organizational safety rules that address the specific issues for the organization.

All drivers found to be in violation of these safety rules shall be counseled or disciplined in a fair and uniform manner consistent with the organization's policies.

3.2.1.5 A process of orientation and training shall be established in order to ensure safe and effective operation of vehicles.

3.2.1.6 The organization shall implement a system that requires the investigation and analysis of incidents in order to report major incidents, trends, and safety performance to all management levels of the organization.

A system of immediately reporting all major incidents to top management shall be implemented.

5.1. Background Checks. Organizations shall perform applicant background checks, in accordance with applicable privacy laws. Organizations shall have a written policy as to what would disqualify an applicant.

5.2. Driver Management. A driver management program shall be established to help ensure that the driver is following organizational procedures.

5.3 Driver Training Program. Organizations shall complete a driver training program. The training program shall address requirements for new drivers, continuing education of existing drivers, and remedial driver training as required.

5.4. Record Keeping. Organizations shall maintain documentation of the qualifications and driving records of drivers to verify that a driver has received training.

3.2.1.8 Vehicle Specifications. A system shall be established to ensure the proper vehicle is selected for the intended safe use.

3.2.1.9 Inspections and Maintenance. Organizations shall establish a system of vehicle/equipment inspections and maintenance for safe operations.

6.1 Vehicles shall be specified and purchased based on the activities to be performed.
Vehicle Acquisition

- E6.1 Safety considerations include:
  - Suitability for designated process
  - Compliance
  - Cargo capacity and load position
  - Emergency considerations such as:
    - Ease of access, egress, movement within and ability to work
    - Tow hitch
  - Control
  - Safety features such as:
    - Air bags
    - Anti-lock braking systems
    - Collision avoidance systems
    - Exterior mirror systems

Vehicle Inspection & Maintenance

- Vehicle inspection:
  - Vehicles shall be inspected at a frequency, in accordance with the vehicle manufacturer's recommendations, regulatory requirements, and as determined necessary to prevent vehicle incidents.
  - 6.1 Fluids, Vehicle Checks.
  - Vehicle Maintenance.
  - 6.2 Repairs.
  - 6.3 Details of Automotive Service Personnel and Facilities.
  - Vehicle Replacement:
    - To be tracked by a prescribed periodically based
    - Incident reports
    - Failure to follow the need for vehicle replacement includes:
      - Exceedance
      - Development
      - Standards and frequency
      - Emergency
      - Operation
      - Service
      - Safety of vehicle

Incident Reporting & Analysis

- 7.1 Incident Reporting & Analysis:
  - Incident reports shall be used to measure the historical frequency of incidents or
  - Incident rates shall be continuously maintained in order to compare with
    - Incident rates based on service activity:
    - Incident rate based on vehicle mileage:
    - Incident rate based on number of vehicles operated:

- 7.2 Incident Review and Analysis:
  - Incident rate based on vehicle mileage:

  - Incident rate based on service activity:

  - Incident rate based on vehicle mileage:

  - Incident rate based on number of vehicles operated:

Incident Rates

- Incident rate = Number of incidents x 1,000,000
- Incident rate = Number of incidents x 100
- Injury incident rate = Number of incidents with injury x 1,000,000

Vehicle incidents per 200,000 hours = Number of incidents x 200,000

Incidents per 10,000 transports = Number of incidents x 10,000

Driver issues

- Where does ambulance safety feature in EMS education programs – we do know now that it is biggest threat to a medics life and wellbeing

What are the solutions?

- Training?
- Practice Policy?
- Transportation Systems Engineering?
- Automotive Engineering?
- Education of other road users???
...as he had been trained to do...??

What about changing driver behavior in the real world??

This technology is conceptually like a vehicle safety pulse oximeter – that with auditory feedback - can save your life, your coworker's life, your patient’s life, and others on the road.

The “Feedback Box” - A transportation safety monitoring and feedback device

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

MEMS ABC Miles Per Month

MEMS Snapshot

- Serve 500,000 people in Little Rock area
- Deploy 29 units daily
- 58,000 calls per year
- 2,400 square mile service area
- 195 full time / 75 part time uniformed employees
- 1.5 million miles annually
- Mean response time: 6 minutes

Implementation

- Company meetings in Nov 02
- Installed in Mar 03
- Blind data collection thru mid April
- Growls and tones turned on - no key fobs
- Fully deployed in June 03
- Company divided into teams for free lunch
- NO PERFECT DRIVERS WANTED

Monitoring and feedback devices

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

A key to safe ambulance transport

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 YouTube??

The jury is out on
- Opticon
- Simulators

EMS Ergonomics 2005, 2006

December 2007
Prof Issachar Gilad

Range of reach

Ergonomics issues
Gilad 2007

"It seems that the interior design is based primarily on spatial utilization, with little concern for ergonomics. Based on the data and observations of how work is actually performed in the ambulance interior working cell by the variety of personnel who participated in this study, we suggest a few guidelines to enhance the interior design. We believe that these suggestions can reduce the uncomfortable and extreme postures indicated in this study."
Under Way…
Emergency Vehicle Visibility and Conspicuity Study
- Funded by the USFA
- Conducted by IFSTA
- Looking at the effectiveness of reflective markings used on emergency vehicles
- Doing best practice research and working with manufacturers

Recent Visibility Webinar
www.GlobalEMSForum.org

Safety for emergency transport
Policy that reflects SCIENCE

Air EMS is a role model for safety initiatives and focus

Air and Ground EMS
- Major differences in safety culture and approach
- Dichotomy of Safety standards
- Diverse safety oversight
- Absent ground safety regulatory control

An Aviation Safety Plan

Air Safety Approach
- Safety Program Planning
- Evaluating
- Analysis of Safety Performance
- Analysis of Safety Information and Data
- Analysis of Risk Profiles and Plans

Ground Transport Safety?

Haddon/Baker/Runyan Phase-Factor Matrix
as applied to EMS Safety
Transport Safety Guidelines

DO drive cautiously at safe speeds observing

DO NOT drive at unsafe high speeds with rapid

Global EMS Vehicle Safety Standards
v Specifications and Guidelines
- EMS Safety and Performance Standards
  - Australia & New Zealand 435
  - Common European Community (CEN) EN1789
- Non EMS Specific USA Standards
  - [Aviation - FAA/CAA/JAA]
  - 21C – Fleet vehicles safety management
- USA EMS Specification & Guidelines
  - Purchase Specification: IOK & ITEA – AMD
  - Guidelines: NSRFC One and Dents
  - ASTM, CAAS and CAMTS

Australia & New Zealand Ambulance restraint standard AS/NZS 4535:1999
- “Restraint systems shall apply to all equipment and people carried in an ambulance…”
  - Dynamic Testing - 50th & 95th percentile manikins
  - 24G in Forward and Rearward
  - 10G in Transverse

Common European Community (CEN) EN 1789:1999/A1:2003,
European Committee for Standardization
Medical vehicles and their equipment - Road Ambulances
- “Without exception, all persons, medical devices, equipment, and objects normally carried on the road ambulance shall be maintained to prevent them from becoming a projectile when subject to a force…”
  - 50th percentile manikins - T0G in Forward, Rearward, Transverse, & Vertical directions
- Certified by Notified Body and Ambulance Mfg.

USA ambulance purchase specifications
GSA:K KK A-1822 F, Aug 2007
- Static Pull test
- 2200 Lbs. (8G’s) in Longitudinal and Lateral
- No dynamic test
- No definition to manikin mass
- No restraint for equipment
- Voluntary

AMD 2007 – ‘safety testing’
- Ignorant of automotive safety principles – and specifies that a ‘successful test’ is -
  - No structural damage to any load-bearing or supporting members, i.e., torn or broken members, broken or sheared body rivets, bolts, and/or fasteners, shall be evident during the application of the force and after the release of the force.

Some KKK spec info
- Text detail:
  - 151 lines of text, 2 tables and a diagram, over 5 pages
  - Preparation of painting, color and markings
  - 100 lines of text, 1 table, over 2 pages
  - Protection of patients and crew
  - 2½ lines of text

Commission on Accreditation of Medical Transport Systems - CAMTS Accreditation Standards

Pennsylvania Code

Transport Safety Guidelines
EMS/CNTSA fact sheet and AAP Test
http://www.ems-c.org
http://www.ahsna.dot.gov
Knowledge Transfer
(July 2007)
- Commercial Motor Vehicle Driver Training Curricula and Delivery Methods and Their Effectiveness
- Commercial Motor Vehicle Carrier Safety Management Certification
- The Role of Safety Culture in Preventing Commercial Vehicle Collisions
- The Impact of Behavior-Based Safety Techniques on Commercial Motor Vehicle Drivers
- Health and Wellness Programs for Commercial Motor Vehicle Drivers

NAEMT July 2006 Position statement

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

Preliminary Study: Attitudes to Head Protection in EMS

Risk Awareness before & after a 1 hour presentation

Role of a head protective device
- A simple, immediate and inexpensive adjunct – a protective device
- To protect occupants from hazardous interiors
- As vehicle crashworthiness design advances
- As driver training advances
- For when equipment becomes unsecured
- As EMS Safety Standards are developed, for both EMS vehicles and EMS occupational safety

Problems
- No Standards
- Unique safety and hazard protection needs
- A number of less than appropriate devices out there

EMS has unique head protection needs – not well met by a ‘truncated’ fire helmet…

Role of a head protective device

Problems
- No Standards
- Unique safety and hazard protection needs
- A number of less than appropriate devices out there

EMS has unique head protection needs – not well met by a ‘truncated’ fire helmet…
Gets caught and scratched

New EMS helmet prototypes for 2008

R & D
“Ripoff and Duplicate”

Avoid reinventing the wheel at all costs

Where are the best practices that we need to transfer knowledge from

UPS: The ‘Big Brown’

- No left turns – instead make three rights
- Don’t back up
- Don’t employ any drivers under 25 years of age
- Don’t employ anyone with a history of driving convictions

BHP - Key learnings for the organization were:

- Fatalities often have similar underlying causes
- High near miss reporting often correlates with declining injuries or fatalities
- Leadership visibility in the field is vital
- Hazard identification and risk awareness are fundamental to success.

Safety Improvement Roadmap

FMCSA - safety mandate

- Develops and enforces data-driven regulations that balance motor carrier (truck and bus companies) safety with industry efficiency
- Harnesses safety information systems to focus on higher risk carriers in enforcing the safety regulations
- Targets educational messages to carriers, commercial drivers, and the public
- Partners with stakeholders including Federal, State, and local enforcement agencies, the motor carrier industry, safety groups, and organized labor on efforts to reduce bus and truck-related crashes.

FMCSA - Exceptions

- Unless otherwise specifically provided, the rules do not apply to:
  - School bus operations as defined in §390.5
  - Transportation performed by the Federal government, a State, or any political subdivision of a State, or an agency established under a compact between States
  - The occasional transportation of personal property by individuals not for compensation nor in the furtherance of a commercial enterprise
  - The transportation of human corpses or sick and injured persons;
  - The transportation of fire trucks and rescue vehicles while involved in emergency and related operations;

Motor Carrier Management Information System (MCMIS)

- FMCSA operates and maintains the MCMIS
- MCMIS contains information on the safety fitness of commercial motor carriers
- MCMIS is a collection of safety information including state-reported crashes, compliance review and roadside inspections results, enforcement data, and motor carrier census data
- The Crash Profiles use the National Governors’ Association (NGA) recommended data elements reported to FMCSA by states through the SAFETYNET computer reporting system
MCMIS - NGA reportable crash

- Must involve:
  - A truck (a vehicle designed, used, or maintained primarily for carrying property, with a gross vehicle weight rating or gross combination weight rating of more than 10,000 lbs.) or
  - Bus (a vehicle with seats for at least nine people, including the driver)

- The crash must result in:
  - At least one fatality
  - One injury where the person injured is taken to a medical facility for immediate medical attention; or
  - One vehicle having been towed from the scene as a result of disabling damage suffered in the crash.

SafeStat Detailed Summary

- Driver SEA
- Vehicle SEA
- Safety Mgmt SEA

Indicators:

- Safety Data:
  - Driver Violations (Critical & Acute from last CR)
  - Driver OOS Violations (Roadside Inspections)
  - Jumping OOS Orders (Roadside Inspections)
  - Moving Violations (Roadside Inspections)

- Normalizing Data
  - Number of Driver Roadside Inspections
  - # of Drivers (MCS-150 Census Data)

- Safety Data:
  - Vehicle Violations (Critical & Acute from last CR)
  - Vehicle OOS Violations (Roadside Inspections)

- Normalizing Data
  - Number of Vehicle Roadside Inspections

- Safety Data:
  - Safety Mgmt Violations (Critical & Acute from Last CR)
  - HAZMAT Violations (Critical & Acute from Last CR)
  - Enforcement History Closed Cases (Enforcement Database)
  - HAZMAT OOS Violations* (Roadside Inspections)

* Pending HM inspection normalizing data

How are SafeStat scores calculated?

1. Motor Carrier Safety Data
2. Algorithm Calculates Safety Status of Carrier
3. Access SafeStat results for individual carriers via A&I Online.

FMCSA - Hours of Service Regulations

FMCSA HOS – detailed info

Tips for Emergency Vehicle Operations

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

Safety leadership... from the IAFC and USFA

An excellent model
1. Define and advocate the need for a cultural change relating to safety; incorporating leadership, management, supervision, accountability and personal responsibility.

2. Enhance the personal and organizational accountability for health and safety.

3. Focus greater attention on the integration of risk management with incident management at all levels, including strategic, tactical, and planning responsibilities.

4. All must be empowered to stop unsafe practices.

5. Develop and implement national standards for training, qualifications, and certification based on the duties expected to perform.

6. Develop and implement national performance related medical and physical fitness standards.

7. Create a national research agenda and data collection system.

8. Utilize available technology to produce higher levels of health and safety.

9. Thoroughly investigate all fatalities, injuries, and near misses.

10. Grant programs support the implementation of safe practices and/or mandate safe practices as an eligibility requirement.

11. Develop national standards for emergency response policies and procedures.

12. Develop national protocols for response to violent incidents.

13. Must have access to counseling and psychological support.

14. Public education must receive more resources and be championed.

15. Advocacy for the enforcement of codes and the installation of home fire sprinklers.

16. Safety must be a primary consideration in the design of apparatus and equipment.

### The real world

Intersection passenger car stopping distance at 40 mph dry and wet

- **Dry**: Stopped at 44 feet
- **Wet**: Stopped at 220 feet

*Stopping distance: Perception time + Reaction time + Vehicle braking time (varies with age, skill, agility, alertness + vehicle type, tire pressure, road etc)*

They CANT STOP IN TIME

Even at 30 mph & 100 feet away - dry and wet conditions-

- Dry hits at 20 mph
- Wet hits at 20 mph
- Dry hits at 27 mph
- Wet hits at 33 mph
- Dry hits at 29 mph
- Wet hits at 40 mph
- All speeds strike the vehicle

**EMS is emerging in the transport safety arena**

- First and only presentation of ambulance safety research at ESV Congress was 2001
- SAE Top Tec on Military and Emergency Vehicles, USA, September 2001
- Emergency Vehicle Symposium, Australia, Melbourne, May 2003
- Sporadic Ambulance safety research presented at peer reviewed AAAM, ITMA, SAEM, Safe America, World Injury, Asia Pacific Injury Conferences 1999-2005
- Next week at inaugural meeting at 2007 TRB Congress in DC

**USFA Emergency Vehicle Safety Initiative**

**VFIS Summer 2006**

**Where is transport research?**

- 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”
- Monitor crash events with common denominators (ie. per 100,000 miles and per trip)
What do we know works…

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

Clear safety message

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, patients and the public from injury and death

Conclusion

- Ground EMS is way behind air in safety approach
- Absent national safety oversight
- Lacking safety standards
- Inadequate systems safety design
- Poor vehicle safety design
- Prevention is key - the transport environment includes predictable and preventable risks.
- Many good models for safety planning
- Do not ‘reinvent the wheel’ – learn from air, fire, fleet, truck and bus and leading EMS models