The Loren Marshall Foundation and the Anchorage Fire Department Present:

The Annual Resuscitation Conference

1st Annual Resuscitation Conference
Anchorage, Alaska, June 2nd, 2007

Strategies for Managing Ambulance Fleet Safety Issues

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

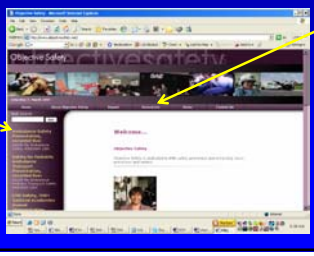
Outline

- Review of the EMS fleet safety issues, risk management and economics
- Comprehensive review of the new Z-15 ANSI/ASSE fleet safety standard and other guidelines
- Update of the latest technology and other tools for optimizing fleet safety and a profile of safety technologies under development.
- Incentives and strategies involved in implementing safety developments to enhance fleet safety

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

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?

Anchorage Daily News

Paramedic injured in crash is recovering

An Anchorage Fire Department ambulance rushing a patient to the hospital was struck by a Dodge pickup this morning, injuring three paramedics, according to the Anchorage Police Department.

The Dodge broadsided the ambulance, which had lights flashing and sirens on, hitting it in the back around 8 a.m. as the medic vehicle was crossing the Glenn Highway at Airport Heights Drive. Onboard the ambulance were seriously injured patient Antonio Malaval, his wife, Gail Malaval, and four Anchorage Fire Department personnel: driver Eric Tuett, 31, EMT Jess Werner, 40, and paramedics Dave Wallace, 43, and Tony Brugliera, 36.

Brugliera, who was riding with Malaval in the back of the rig, was hospitalized with a head injury and is in stable but guarded condition. Werner and Wallace were treated for minor injuries and released. Clifton Tyler, 42, the driver of the pickup, and

What do ambulance crashes really cost ?

- Loss of life and injury
- Negative impact on EMS system
- Collisions are the largest liability cost and exceeds 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 and others
  - increased insurance rates

New paradigm - Integration of EMS

- Public health departments
- Social service agencies
- Community outreach
- Hospitals
- Health care networks / Insurers
- Industry

EMS Transport Safety

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

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

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

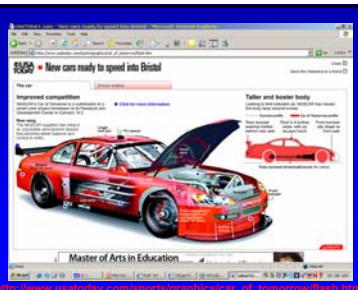
Ergonomics and Biohazards

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

Best Practice…..? The technology described in your junk mail is far more advanced than that used in EMS



http://www.usatoday.com/sports/graphics/car_of_tomorrow/flash.htm

A peer reviewed tragedy

- Persistent disconnect between automotive safety science and EMS transport safety approach
- Pre-hospital and Emergency Care 2004
  - *"EMS vehicle drivers are advised to approach the intersection, slowing to ensure that traffic has stopped and making eye contact with other drivers before entering the intersection."*
- In the modern era of road safety to suggest that a strategy of "eye contact" to be made at an intersection with a driver traveling at ~ 40mph in the hope that this would result in a safety intervention, is at best frightening

Guidelines – standards

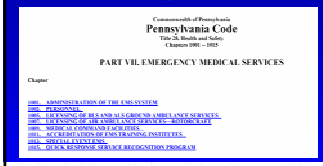
- Transport safety
- Practice protocols
- Occupational Health and Safety

Risk Awareness before & after a 1 hour presentation

	Pre %	Post %	P value
Perception of the rear compartment as a high risk for serious injury	43	76	<.0001
Likert Score* of 10, (10=highest) for the concern for safety in the rear of the ambulance	36	72	<.0001
Self-report of always wearing a seat belt	14	19	NS
Considering wearing a limited motion safety harness	81	97	<.0001
Wearing a helmet in the patient compartment	31	81	<.0001

* Likert Score for safety concern, increased from a median of 8 pre to 10 post, p<.0001

Pennsylvania Code


Commonwealth of Pennsylvania
Pennsylvania Code
Title 28, Health and Safety
Chapters 1001 – 1025

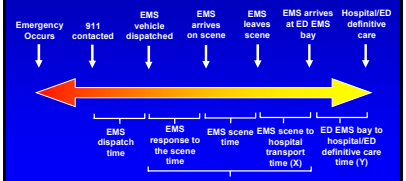
PART VII. EMERGENCY MEDICAL SERVICES

Chapter

1001. ADMINISTRATION OF THE EMS SYSTEM
1003. PERSONNEL
1005. LICENSING OF BLS AND ALS GROUND AMBULANCE SERVICES
1007. LICENSING OF AIR AMBULANCE SERVICES – ROTORCRAFT
1009. MEDICAL COMMAND FACILITIES
1011. LICENSING OF EMS PROFESSIONAL TRAINING INSTITUTES
1013. MEDICAL EVENTS STAND
1015. QUICK RESPONSE SERVICE RECOGNITION PROGRAM

(c) Accident, injury and fatality reporting. An ambulance service shall report to the appropriate regional EMS council, as a form or manner prescribed by the Department, an ambulance vehicle accident that is reportable under 75 Pa.C.S., and an accident or injury to an individual that occurs in the line of duty of the ambulance service that results in a fatality, or medical treatment at a facility. The report shall be made within 24 hours after the accident or injury. The report of a fatality shall be made within 4 hours after the fatality.

911 Call to Hospital/ED Definitive Care Time Intervals*



*Not drawn to scale

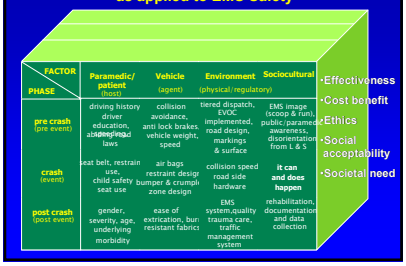
What's missing

1. What data is collected nationally?
   - We have no denominator data
   - We have incomplete numerator data
2. Absent population based national injury data or injury mechanics data
3. Absent structured transportation safety engineering input

   1+ 2 +3 = resultant inability to design and evaluate efficacy of injury interventions

4. What oversight is there?
5. Which organizations would determine policy?

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



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

Safety data on EMS transport and its oversight

- EMS vehicle crash rates are in excess of similar sized vehicles
- EMS worker transport fatality rates are well above other emergency services
- Is exempt from Federal Motor Vehicle Safety Standards (FMVSS), and not covered by other national transportation system safety oversight (ie. FMCSA)
- Almost non existent ergonomic research or data
- The findings of limited research conducted to date suggest EMS transportation safety is in need of urgent focus and has been left behind commercial truck and bus safety.

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)

This is happening out there NOW….


Is a license enough for ambulance drivers?

Extent of EMT training questioned by widower

By DAVID DOEGE

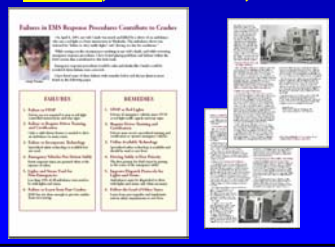
Cindy Theune

Quotable

"It's no different than someone who delivers pizzas."

- Gregg Theune, crash victim's husband, on training

Gregg Theunes Appeal to his Senator, December 29, 2005


Failures in EMS Response Procedures Contribute to Crashes

FAILURES

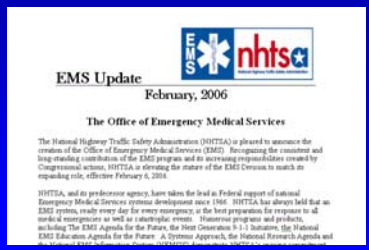
REMEDIES

2007….

- 'Pizza delivery truck' approach has got to go
- As do the religious 'beliefs' about occupant protection
- Z15.1 – we must at least know what we are doing and have consistent and meaningful safety programs and practices

Safety oversight of what and by …. whom

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


EMS Update

February, 2006

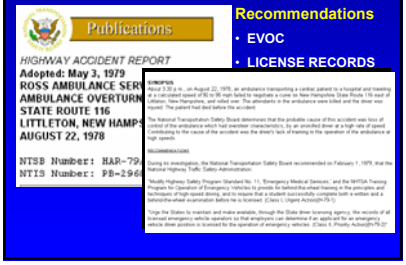
The Office of Emergency Medical Services

The National Transportation Safety Board (NTSB)


About the NTSB

History and Mission

NTSB 1979 Accident Report


Publications

HIGHWAY ACCIDENT REPORT

Adopted: May 3, 1979

ROSS AMBULANCE SERV

AMBULANCE OVERTURN

STATE ROUTE 116

LITTLETON, NEW HAMPS

AUGUST 22, 1978

NTSB Number: HAR-79

NTIS Number: PB-296

Recommendations

- EVOC
- LICENSE RECORDS

NTSB: 1979 Recommendations never implemented

- To NHTSA – Class II & III Priority Action
  - Extend Federal Motor Vehicle Safety Standards (220, 221, 301) to include ambulances and other emergency vehicles
  - Extending FMVSS re: padding and restraints
- To GSA – Class II Priority Action
  - Maintenance of handling
  - Loading instructions
  - Body structural integrity
  - Anchorage for all equipment
  - Occupant protection
- To National Committee on Uniform Traffic Laws
  - Modify criteria


Federal Motor Carrier Safety Administration

Research and Technology Forum - January 9, 2007

What about FMCSA's Mission

- Office of Research and Analysis is committed to reducing the large truck-related fatality rate from 2.8 per 100 million truck-miles in 1996 to 1.65 by 2008.

Mission

- The mission of FMCSA's Office of Research and Analysis is to reduce the number and severity of commercial motor vehicle (CMV) crashes and enhance the efficiency of CMV operations by:
  - Conducting systematic studies directed toward fuller scientific discovery, knowledge, or understanding
  - Adopting, testing, and deploying innovative driver, carrier, vehicle, and roadside best practices and technologies
  - By expanding the knowledge and portfolio of deployable technology, the research and technology program will help FMCSA reduce crashes, injuries, and fatalities and will deliver a program that contributes to a safe and secure commercial transportation system.

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 rate 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

- Did someone design this system as a stationary one - that didn't move??
- This IS acute health care, communications AND transport

EMS is multidisciplinary

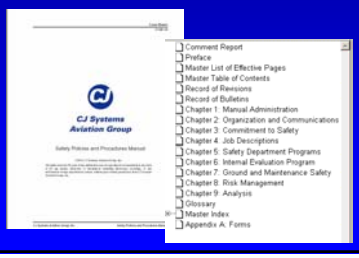
- Primary focus has been physician driven - optimizing acute health care and practice
- But…. NOT optimizing
  - Communications/data – administrative and health care
  - Transportation aspects and safety

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 ?

Unique workplace

- In vehicles
- At roadside and other emergency scenes

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
  - Tiered dispatch
  - Safe driving policy and practice
  - Driver selection and training
  - Seat belt use policy - for providers, patients and passengers
  - Safety monitoring and feedback
  - Stop at red lights and stop signs
  - Emergency Vehicle Operators Course (EVOC)
  - Secure all equipment
  - Use portable communications
  - Notify driver if rear occupants are in vulnerable positions
- Fleet Management
  - Fleet Safety program
  - ANSI/ASSE Z.15

Safety Plan

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

Creating a Safety Culture

within a company must start with upper management's commitment to safety

- Awareness
- Training
- Incentive

Safety leadership… from the IAFC and USFA

IAFC NEWS ALERT
FOR IMMEDIATE RELEASE
Contact: IAFC Communications Department
International Association of Fire Chiefs
703/273-0911
www.iafc.org

The IAFC and the USFA Develop Model Policy and Procedures Guide for Emergency Vehicle Safety

Fairfax, Va., October 20, 2006… The International Association of Fire Chiefs (IAFC) and the Department of Homeland Security's United States Fire Administration (USFA) announce the release of a *Guide to Model Policies and Procedures for Emergency Vehicle Safety*. This innovative, web-based educational program is aimed at reducing the impact of vehicle related incidents on the fire service and the communities they protect. The guide provides in-depth information for developing policies and procedures required to support the safe and effective operation of all fire and emergency vehicles, as well as privately-owned vehicles, which are the leading cause of volunteer firefighter on-duty fatalities responding and returning to emergencies.

Integration and Collaboration

EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

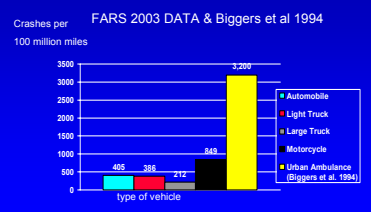
EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- EMERGENCY MEDICAL SERVICES DISPATCH SERVICES
- EMERGENCY MEDICAL SERVICES PARTNERSHIPS
  - Increase the participation and role of Regional EMS Councils in local and regional highway traffic safety boards and/or organizations
- PRE-HOSPITAL TRAINING PROGRAMS
  - Train EMS providers in the use of the new medical protocols; provide funds and/or other support to certified EMS Course Sponsors to train EMS providers in the use of these protocols; and collaborate with Regional EMS Councils and/or Regional Emergency Medical Advisory Committees (REMAC) on the development and implementation of training programs
- ROAD CONDITION AND INCIDENT RESPONSE
  - Provide a placeholder for regional and/or county EMS representatives in municipal DOT emergency management plan development and implementation

EMS Transport Safety Strategies - 2006-2007 New York State Strategic Highway Safety Plan

- 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

Risk Exposure Rates

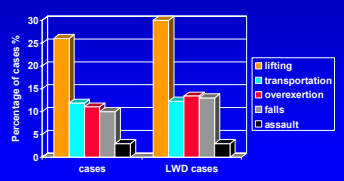


EMS Injuries*

- Higher than the injury rate for any private industry published by DOL
- 34.6 injuries/100 fulltime workers per year
- 1.5 x that of fire fighters
- 5.8 x that of health services personnel
- 7 x the national average

** Maguire, Hunting, Guidotti & Smith, Occupational Injuries among Emergency Medical Services Personnel, Prehospital and Emergency Care Oct/Dec 2005*

And the injury events..



Cultivating a Culture of Safety

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

Transport Safety Goals

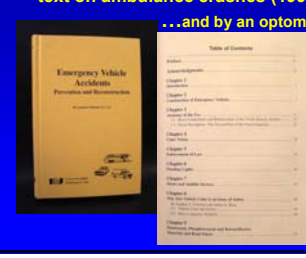
- Standards for safety
- Practice policy based on Science
- Databases to demonstrate outcome

Absence of standards and oversight

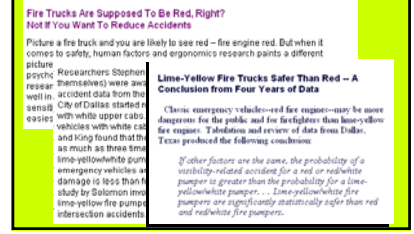
- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No safety performance standards
- Absent national safety oversight

The first and only published scientific text on ambulance crashes (1995)

…and by an optometrist

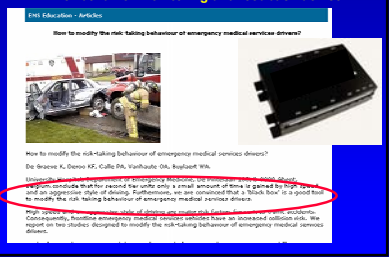


We've known for 10 years that red fire trucks are twice as likely as lime yellow trucks to crash at an intersection



The "Black Box"

Driver behavior monitoring and feedback device


EMS Education - Articles

How to modify the risk-taking behaviour of emergency medical services drivers?

How to modify the risk-taking behaviour of emergency medical services drivers?

De Greeve K, Ilenso KF, Calle PA, Vanhaute OA, Buylaert WA.

Unlike the popular perception of emergency medical services personnel as reckless, cowboy-like drivers, we can conclude that for second tier units only a small amount of time is gained by high speed and an aggressive style of driving. Furthermore, we are convinced that a "Black Box" is a good tool to modify the risk-taking behaviour of emergency medical services drivers.

High speed and an aggressive style of driving are routine risk factors for motor vehicle accidents. Consequently, frontline emergency medical services vehicles have an increased collision risk. We report on two studies designed to modify the risk-taking behaviour of emergency medical services drivers.

Purpose of 'Black box' Program

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

The "Black Box" - A transportation safety monitoring and feedback device

This technology is conceptually like a vehicle safety 'pulse oximeter' – that with auditory feedback - can save your life, your coworkers life, your patients life, and others on the road

How the Device Works

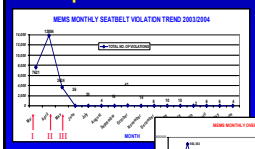
- Computerized monitoring device installed on each vehicle to measure parameters
- Each driver has individual key "fob"
- Data collected every second
  - including: vehicle speed and performance, driver behaviors and emergency mode
- Auditory feedback of warning 'growls', and penalty tones
- Data downloaded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

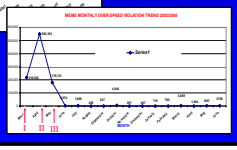
Monitoring and feedback devices

- 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 inservice or retraining after the initial introduction period.

Demonstrated Effectiveness

Monthly Seat Belt 2003-2004 and Over Speed Violation Trends 2003-2004



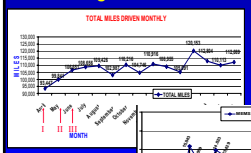


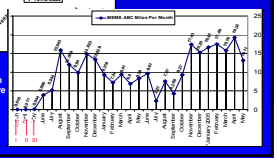
I – blind data, no growls

II – growls & tones ON, with unidentified data capture

III – identified data

Total Miles Driven Monthly 2003-2004 and Average Between Count Miles 2003-2005





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A key to safe ambulance transport

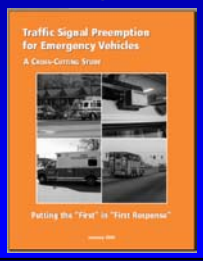
Other monitoring devices

- 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

The jury is out on

- Opticon
- Simulators

Data, but is it generalizable



EMS is emerging in the transport safety arena

- First and only presentation of ambulance safety research at ESV Congress was 2001
- SAE Toptec 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

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

Safety for emergency transport

Policy that reflects SCIENCE

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 <u>less than appropriate</u> devices out there

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

Awkward to use

Gets caught and scratched

Key Helmet Features

New EMS helmet prototypes for 2006-2007

Securing equipment

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

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

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

EMS CANNOT Afford to keep paying out like this….

Transport related aspects of EMS

- dispatch of EMS vehicles
- transport policies and protocols
- vehicle fleets and vehicle design
- vehicle and fleet standards
- Intelligent Transportation Systems technology
- driver selection/training
- shift length and wellness
- driver performance monitoring and feedback
- roadside and road design
- integrated traffic safety technologies
- scene safety and visibility
- safety data capture
- safety oversight

Policy Changes

CPR?

EMSNetwork

Tuesday, May 01, 2007 | #1 EMS News Source | www.emsnetwork.org

The onset of this advanced knowledge, training and skills drastically reduced the necessity for the ambulance to "race" back to the hospital. Highly skilled care can now be rendered immediately upon the crews' arrival at the patients' side and remain uninterrupted until arrival at the emergency department. The days of needing to travel 80-100 mph to "save" the patient are now gone, at least it should be. Studies time and time again confirm that CPR is best performed in the ambulance at speeds of 25 mph or less. While we are on the issue of CPR, statistics have shown that survival rates (patient walks out of the hospital) for "out-of-hospital" CPR is less than 2%. There are very, very few instances now when CPR should be performed in a speeding ambulance. Prolonged CPR in an ambulance is CONTRAINDICATED (should NOT be performed), due to the risks involved for the crew. An older, very wise ER doctor once told me, "Tom, dead is dead", and I can't argue that point.

New York too…

Date: Tuesday, March 20, 2007 11:29 AM
To: bulch, bullman@metro.com; Debbie Jones; Eric K. Gonzales; kfleeter@neb.org; Gleaner, George ; martin@fdny.nyc.gov; rlenk@dbdactivesafety.net; darbyny@aol.com
Subject: Minutes of 3/20/07, Medical Article & Thursday Agenda
Attach: EMSSafetyCultureg-mch-4-07.doc (31.3 KB); New_Up_AmEMSCultureofSafety_Dec_2006 CD.doc (95.4 KB)

I'd like to make several interim recommendations to the Ed & Training Committee. Please let me know your thoughts on them:

- Create a 1 day preconference workshop on EMS Safety for Vital Signs 2007
- Request BEMS to begin a formal tracking of EMS injuries
- Request SEMAC to consider creating a list of necessary EMS interventions. EMS providers would only be unbelled in the back to perform these tasks
  - By EMS Leadership Class and NCC colleagues came up with the following list
    - Airway Management (Suction, Manual Management, OPA/NPA/BAD insertion specially excluding placement of an ET tube)
    - Ventilation of Patient (including application of CPAP)
    - Administration of Medication
    - Hemorrhage Control
    - Chest Compressions
    - Childbirth (only until you can pull over) or childbirth complications
    - IV/IO Insertion for Medication Administration or Necessary Fluid Bolus
    - Facing/Multi-Function Patch Application
    - Control of Restrained Patient
    - Patient Position for Pain Control

The difficulty in this list is trying to regulate "good clinical judgment", but I'd like to get people to thinking about sub vs. basalls

Important changes underway

Current M.O.M language:

Section 2: Treatment Protocols
Introduction

General Guidelines for the Treatment and Transport of Patients

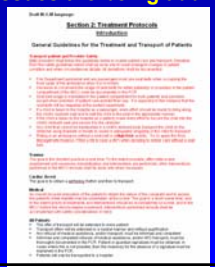
Trauma
The goal is the shortest possible scene time. To the extent possible, after initial scene assessment and necessary stabilization is performed, all other interventions are performed in the MICU enroute.

Cardiac Arrest
The goal is to obtain a perfusing rhythm and then to transport

Medical
An overall focused evaluation of the patient to obtain the nature of the complaint and to assess the patient's vital stability may be undertaken at the scene. To the extent possible, all other interventions should be done enroute to hospital. If immediate transport is not deemed safe, the MICU is generally the best place to perform the necessary procedures

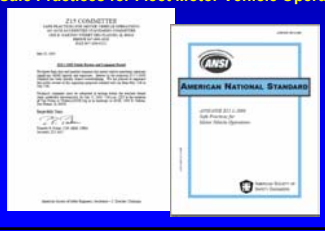
All Patients
- The offer of transport will be extended to every patient
- Transport offers will be extended in a neutral manner and without qualification
- Any refusal of medical assistance, and/or transport, must be informed and competent
- Informed and competent refusals of medical assistance, and/or AFC transport, must be thoroughly documented in the PCR. Patient or guardian signatures must be obtained. In cases where this is not possible, then the reason(s) for the absence of a signature must be explained in the PCR
- Patients will only be transported to a hospital

Key issues are being addressed



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

Scope of the Z15.1 Standard

- For the safe operation of motor vehicles owned or operated by organizations, including:
  - Definitions
  - Management Leadership Ad-ministration
  - Operational Environment
  - Driver Considerations
  - Vehicle Considerations
  - Incident 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 account-abilities
  - Driver recruitment, selection, and assessment
  - Organizational safety rules
  - Orientation and training
  - Reporting rates and major incidents to executives
  - Communications
  - Vehicle specifications
  - Inspections and maintenance
  - Reward and recognition
  - 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.

Driver Recruitment, Selection and Assessment

- 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.

Organizational Safety Rules

- 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

Orientation and Training

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

Reporting Rates and Major Incidents to Executives

- 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.

Oversight

- 3.2.1.10 Regulatory Compliance Management. Organizations shall have a system in place to monitor federal, state, and local regulations in order to comply with all regulations and implement any policy / procedure change in a timely manner.
- 3.2.1.11 Management Program Audits. Organizations shall have an auditing process that monitors compliance with regulations and the organization's motor vehicle safety program.

Operational Environment

- 4.1 Occupant Restraints.
  - Organizations shall establish a policy addressing the use of occupant restraints, including the use of safety belts (seat belts/shoulder harness).
- 4.2 Impaired Driving.
  - Organizations shall establish a policy regarding the use of drugs and alcohol as well as any other conditions that may adversely affect the ability to safely operate a motor vehicle.
- 4.3 Distracted Driving.
  - Organizations shall have a policy regarding potential distractions while driving.
- 4.4 Aggressive Driving.
  - Organizations shall have a policy regarding aggressive driving.

Z15 Vehicle and Driver aspects

- Operational Environment
  - 4.1 Occupant Restraints.
  - 4.2 Impaired Driving.
  - 4.3 Distracted Driving.
  - 4.4 Aggressive Driving.
- Driver Qualifications
- Vehicle
- Vehicle Acquisition
  - E6.1 Safety Considerations
- Vehicle Inspection & Maintenance
- Incident Reporting & Analysis

Driver Qualifications

- 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 assure that the driver is following organizational procedures.
- 5.3 Driver Training Program.
  - Organizations shall establish a driver training program. The training program shall address requirements for new drivers, continuing education of existing drivers, and instances where remedial training shall be required.
- 5.4 Record Keeping.
  - Organizations shall maintain documentation of the qualifications and driving records of drivers. And to verify that a driver has received training.

Vehicle

- 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 purpose
  - Crashworthiness
  - Cargo capacity and load position
  - Ergonomic considerations such as:
    - Ease of access, egress, movement within and ability to work from/in the vehicle
    - Specifications based on weight, size, and configuration of cargo to be loaded/unloaded that will: minimize forward bending and contact stress with the bumper; reduce extended reaches; and allow loads to be lifted close to the body
  - Safety features such as:
    - ABS
    - Front and side airbag systems
    - Stability systems
    - Rear vision or detection devices
    - Collision avoidance devices
    - Event data recorders
    - Night vision devices
    - Exterior mirror systems

Vehicle Inspection & Maintenance

- 6.4 Vehicle Inspection.
  - Vehicles shall be inspected, at a minimum, in accordance with the vehicle manufacturer's recommendations, regulatory requirements, and recognized standard practices.
- 6.5 Periodic Vehicle Checks.
- 6.6 Vehicle Maintenance.
- 6.6.1 Scheduled Maintenance.
- 6.6.2 Repairs.
- 6.6.3 Qualified Automotive Service Personnel and Facilities.
- 6.7 Vehicle Replacement.
  - Organization-operated vehicles shall be replaced periodically based upon formal procedures.
  - Factors affecting the need for vehicle replacement include:
    - Total mileage
    - Maintenance cost and frequency
    - Condition of vehicle
    - Operational requirements
    - Operating environment
    - Hours of service
    - Safety of vehicle

Incident Reporting & Analysis

- 7.1 Reporting of Vehicle Incidents and Collisions.
  - Incident and collision reporting procedures shall be developed and followed to collect information sufficient to support analysis and review of motor vehicle incidents, for the purpose of taking corrective action to prevent future incidents.
- 7.1.1 Organizational Responsibilities
- 7.1.2 Driver Responsibilities.
- 7.2 Incident Review and Analysis.
  - A process shall be developed to systematically review and analyze incidents. The objective of this process is to identify the root cause and any contributing factors that led to the incident, to prevent future occurrences.
- 7.2.1 Analysis of Causal and Contributing Factors.
- 7.2.2 Determination of Preventability.
- 7.2.3 Incident Review Report.
  - Incident reviewer(s) shall prepare and deliver a report to persons with authority to implement the changes necessary to prevent the incident from recurring. The report shall document the causal and contributing factors for the incident.

Incident Reporting & Analysis

- 7.2.4 Corrective Action for Incidents Preventable by the Driver.
  - For incidents determined to have been preventable by the driver, corrective actions shall be developed and implemented in a timely manner. Records shall be kept to verify that the prescribed action was taken.
- 7.2.5 Corrective Action for Other Factors.
  - Corrective actions shall be implemented to address factors related to the driver, the vehicle, or the operating environment. Records shall be kept to verify that the prescribed action was taken.
- 7.3 Data Analysis.
  - Organizations shall collect data needed to calculate rates for tracking safety performance over time. Organizations shall identify the most appropriate rates based on patterns of vehicle use and the nature of motor vehicle operations.
- 7.3.1 Motor Vehicle Incident Rates.
  - Incident rates shall be used to measure the historical frequency of incidents or collisions.
- 7.3.2 Reporting Periods:
  - Incident rates shall be continuously maintained in order to compare with historical or industry experience and to track progress over time.

Incident Rates

- Incident rate based on number of vehicles operated:

  Incident rate = Number of incidents x 100 / Number of vehicles
- Incident rate based on vehicle mileage:

  Incident rate = Number of incidents x 1,000,000 / Vehicle mileage
- Injury incident rate based on vehicle mileage:
  - Injury incident rates, the most frequently used indicator of incident severity, are useful for tracking events that have the potential to affect financial or operational performance of the operating unit.

  Injury incident rate = Number of incidents with injury x 1,000,000 / Vehicle mileage
- Incident rates based on service activity:
  - Motor vehicle operations that pose injury risks other than those associated with driving should also use the service activity as the basis of a safety performance rate. The number of deliveries, stops, or loads should be considered as appropriate indicators of performance.

  Incidents per 10,000 transports = Number of incidents x 10,000 / Number of transports
- Vehicle injury rates based on work hours:

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

Z15-2006
Some new challenges

- Crash reporting to whom?
- Crashworthiness to what standard?
- Ergonomics based on what ergonomic requirements?
- Driver selection/training and monitoring - based on what guidelines?

Legal Perspectives on Z.15

ANSI Z15.1 Standard: A Tool for Preventing Motor Vehicle Injuries and Minimizing Legal Liability
By Adele L. Abrams, Esq., CMSP
Law Office of Adele L. Abrams P.C.

Motor vehicle crashes that occur on American roadways have historically been the leading cause of occupational fatalities in this country. In the decade between 1992 and 2001, more than 13,000 civilian workers died in such incidents – accounting for 22 percent of all injury-related deaths. According to the Occupational Safety and Health Administration (OSHA), every 12 minutes someone dies in a motor vehicle crash, every 10 seconds an injury occurs and every 5 seconds a crash occurs.[1]

Employers whose workers are involved in such crashes have tremendous liability exposure, especially if the individuals injured or killed are third parties (non-employees), where no worker's compensation liability shield exists as an exclusive legal remedy. They bear not only the worker's compensation costs for their employees, and the potential damage awards from third party tort claims, but also the costs of equipment replacement and the indirect costs of workforce disruption and lost productivity associated with such incidents.

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??

Challenges of absent formal safety standards

Choose the Best Option

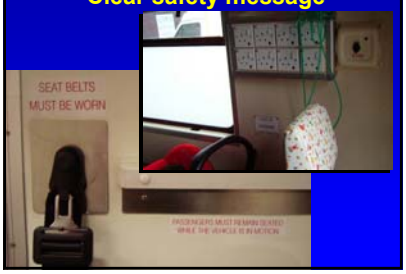
New Australian vehicles

http://www.ambulance.nsw.gov.au/statistics.html

Flexibility to manage two patients

UK Ambulance vehicles

Clear safety message



Sweden initiatives

Norway initiatives

Other successful models

Fleet Mix ?

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?

For our current fleet

- Have a written and implemented 'safety program'
- Secure all equipment
- Secure occupants
- Don't drive through red lights
- Use properly implemented "Black Boxes"
- Monitor crash events with common denominators (ie. per 100,000 miles and per trip)

Future

- Vehicle design
- PPE
- Practice policy
- Data/Monitoring/Oversight

Current and Future Research

- Epidemiology
- Ergonomic hazards
- PPE & Head protection
  (Bio/Chem/Radiation hazard)
- Transport
  - Vehicle/Occupant automotive testing
  - Vehicle design innovation
  - Driver behavior (Real time and Simulated)
  - Intelligent Transportation Systems
- Operations tracking
- Data systems/reporting systems
- Enhanced Practice policies evaluation

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 simple and available solutions out there now

- Intersection Policy
- PPE
- Black boxes

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