Session: The Future of EMS in Canada – Defining the New Road Ahead

Ambulance Safety – Where is the State of the Art?

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New York Downtown Hospital
Cornell University, New York, USA

This morning's Scope

- Key Issues
  - Crash and Safety Data
  - Oversight
- Guidelines – standards
  - EMS, International and fleet
- Transport safety management
  - Protective devices/programs
    - To prevent a crash
    - In the event of a crash
  - Safety Culture
- Future
  - Goals
  - Data
  - New Safety Seminars
  - New vehicles
  - New technologies
  - Futuristic vehicles
  - New policies
  - New practices
  - New Standards

EMS Casualties

- The number of casualties is more than we can bear, even one is too many
- I believe we can become safer
- Safer for patients, the public and our providers

Safety Leading Edge

- Globally leading operational safety program
- 85% reduction in transport risk and hazard over 5 years

First in the Galaxy!!!

Dan Berry (1948-1998)

Dan E. Berry, P.ENG. (1948 - 1998)

- Dan Berry graduated in mechanical engineering from Queen's University, Ontario in 1972, embarking on a career in mining, transportation and EMS
- In 1990, Dan joined the Emergency Health Services Branch of the Ontario Ministry of Health.
- In 1991 Dan initiated a series of projects to evaluate the handling, stability and crash worthiness characteristics of ambulances as they relate to the safety and comfort of patients and paramedic crews
  - Frontal and lateral crash testing of van and modular ambulances was complete at Transport Canada facilities in Blainville, Quebec.
  - Further safety improvements as the result of analysis of the extensive information base of Ministry ambulance accident statistics, a program of user survey feedback and research of industry initiatives.
- The ambulances now in operation in Ontario are a confirmation of the professionalism and innovative skills of Dan Berry.

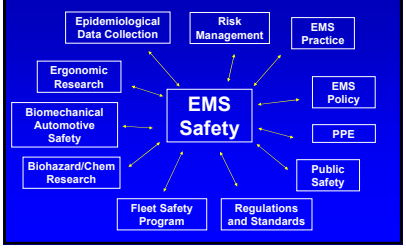
Key Issues

- Mythology
  - That Emergency Medical Service personnel are safe
- Injury Hazards
  - Biohazard
  - Chemical/Radiation
  - Physical/Mechanical trauma – THE BIG PROBLEM
- Motor Vehicle Crashes are the highest cause of death at work – EMS has > 2X the mean national rate
- An R & D and Regulatory Gap
  - Occupational Health and Safety
    - the workplace is in a vehicle – exposure data are scant
  - Automotive Safety
    - a vehicle is the work place – 'exempt' from automotive research and regulation

In a nutshell

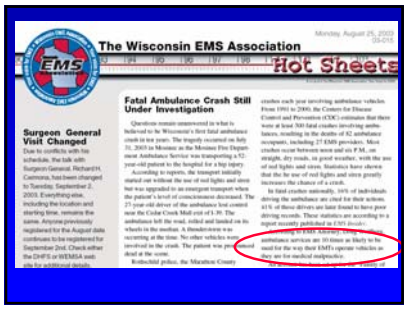
- No accepted national safety standards for -
  - EMS fleet management or safety practice
  - Ambulance vehicle rear compartment design and performance
  - provider occupational injury protective equipment
- Yet convincing data for injury risk and hazard
- Need for patient, provider and public safety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

EMS Safety IS Complex AND Multidisciplinary



Safety oversight of what and by …. whom

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


The Wisconsin EMS Association

Hot Sheets

Fatal Ambulance Crash Still Under Investigation

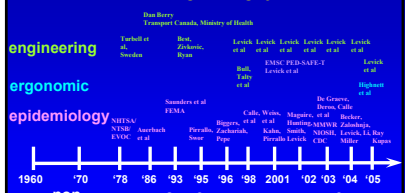
Surgeon General Visit Changed

the EMS process

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

TIME & PLACE

Ambulance Safety Research: A New Field



This is not acceptable

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

*FARS/BTS 2004-5

Predictable risks

- More often at intersections, & with another vehicle (p < 0.001)*
- 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#
- 70% of fatal crashes EMS crashes during Emergency Use#
- More likely to crash at an intersection with traffic lights (37% vs 18% p=0.001) & more people & injuries/crash than similar sized vehicles##

*Kahn CA, Pirralo RG, Kuhn EM. Prehosp Emerg Care 2001 Jul-Sep;5(3):261-9
**Becker, Zabalnhja, Levick, Li, Miller, Acc Anal Prev. 2003
***Maguire, Hunting, Smith, Levick, Annals Emerg Med Dec 2002
#NIOSH, 2003
##Ray AM, Kupas DF. Prehosp Emerg Care 2005 Dec; 9:412-415
##NHTSA, 49 CFR Parts 571, 572 & 589 Docket no. 92-28; notice 7.

EMS Provider Fatalities

- 12.7 fatalities/100,000 EMS workers
- Greater than 2 X the national average (5.0 fatalities/100,000)
- Similar to Police (14.2/100,000) and Fire Fighters (16.5/100,000)

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

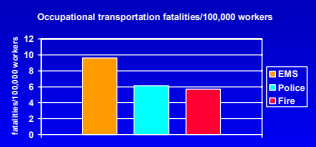
and what is killing EMS ?

EMS personnel fatalities*

- 74% transportation related
  - 1/5 of ground transport fatalities were struck by moving vehicles
- 11% were cardiovascular
- 9% were homicide
- 4% needle sticks, electrocution, drowning and other

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

A word about occupational transportation fatalities..



- WE HAVE A BIG PROBLEM HERE

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

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*

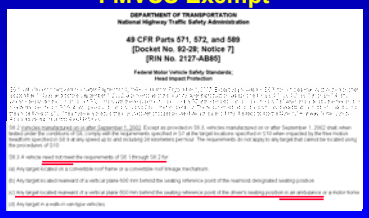
Concerns

- 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

Background: Problems

- No reporting system or database specifically for identifying ambulance crash related injury
- Rear passenger compartment, > 60cm behind driver - exempt from Federal Motor Vehicle Safety Standards (FMVSS)

USA Ambulances: FMVSS Exempt



DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration

49 CFR Parts 571, 572, and 589
[Docket No. 92-28; Notice 7]
[RIN No. 2127-AB85]

Federal Motor Vehicle Safety Standards;
Head Impact Protection

DENVERPOST.com

2 women die as ambulance hits semi on I-76

The tragic toll?

- 2 Fatalities – Medic and the patient's mother
- 3 injuries – 1 critical requiring an airlift

But what is the hidden and real toll?

Predictable

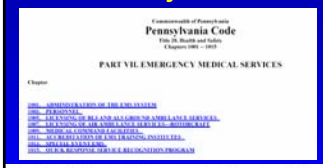
DENVERPOST.com

Ambulance driver had citations

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

Pennsylvania Code


Commonwealth of Pennsylvania
Pennsylvania Code
Title 28. Health and Safety
Chapters 1001 – 1015

PART VII. EMERGENCY MEDICAL SERVICES

Chapter

1001. ADMINISTRATION OF THE EMS SYSTEM
1003. PERSONNEL
1005. ATTENDING OR BLEAD ALS GROUND AMBULANCE DEBUGES.
1007. ATTENDING OR AIR AMBULANCE BUREAUS. BUTTOR KIT
1009. MEDICAL COMMAND FACILITIES.
1011. ACCREDITATION OF EMS TRAINING INSTITUTES.
1013. SPECIAL EMS CARE.
1015. 911 & RESPONSE SERVICE RECOGNITION PROGRAM

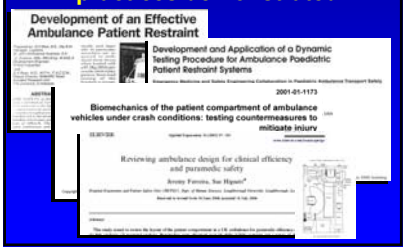
(a) Accident, injury and fatality reporting. An ambulance service shall report to the appropriate regional EMS council, in a form or manner prescribed by the Department, an ambulance vehicle accident that is reportable under 75 Pa.C.S., and an accident or injury to an individual that occurs in the line 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 8 hours after the fatality.

Firstly!

- An accident ?
- or

a predictable and preventable event

We should use the best safety practices demonstrated


Development of an Effective Ambulance Patient Restraint

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

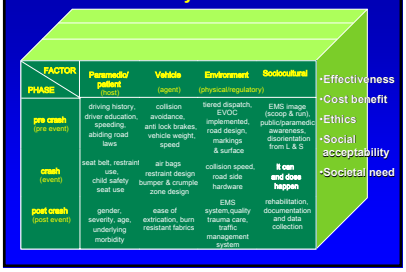
2001-01-1173

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

Reviewing ambulance design for clinical efficiency and paramedic safety

Jenny Ferreira, Sue Hignett

Haddon/Baker/Runyan Phase-Factor Matrix



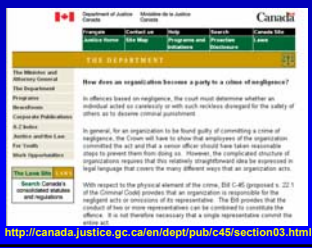
EMS Research /Data Vacuum

- ? total no. of ambulances
- ? total no. of medics
- ? total no. of runs (per age & severity)
- ? total pt. miles (per age & severity)
- ? true crash fatality rate per mile
- ? crash injury rate
- ? adverse events

Canadian Challenges

- Increasing call volume
- Safety Policies/Controls
  - Engineering controls
  - Administrative controls
  - PPE
- Legal responsibilities
  - C45
- Data collection

C45 - A criminal offence to not act in a way that protects the worker


Department of Justice Canada — Ministère de la Justice Canada
Canada

THE DEPARTMENT

How does an organization become a party to a crime of negligence?

In offences based on negligence, the court must determine whether an individual acted so carelessly or with such reckless disregard for the safety of others as to deserve criminal punishment.

In general, for an organization to be found guilty of committing a crime of negligence, the Crown will have to show that employees of the organization committed the act and that a senior officer should have taken reasonable steps to prevent them from doing so. However, the complicated structure of organizations requires that this relatively straightforward idea be expressed in legal language that covers the many different ways that an organization acts.

With respect to the physical element of the crime, Bill C-45 (proposed s. 22.1 of the Criminal Code) provides that an organization is responsible for the negligent acts or omissions of its representative. The Bill provides that the conduct of two or more representatives can be combined to constitute the offence. It is not therefore necessary that a single representative commit the crime on

http://canada.justice.gc.ca/en/dept/pub/c45/section03.html

Surveillance – not a new concept


Public Health Agency of Canada — Agence de santé publique du Canada
Canada

Public Health Agency of Canada (PHAC)

Health Surveillance and Epidemiology Division, Centre for Health Promotion

Injury Surveillance On-Line

HOME MAPS CHARTS GLOSSARY HELP

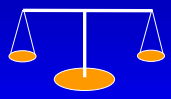
The following pages of this website will provide you with the most current injury statistics in Canada. You will be able to look at injury mortality and hospital separations by province and territory, by age group, and over time. You will also be able look at injuries and the circumstances of injuries treated in the emergency departments of the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP). Both graphs and tables will be displayed and

Concepts to consider
"Cycle of Surveillance"

- Data collection
  - locally, nationally
- Integration
  - sourced from police, EMS, Fleet services
- Analysis and interpretation
  - in a standardized manner, easily understood by all
- Surveillance product
  - Alerts, advisories, annual reports
- Dissemination
  - sending the results to need to know agencies employers, manufactures, policy makers.

No need to reinvent the wheel...

Balance of concerns and risk during transport



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

"Are our policies killing people?"

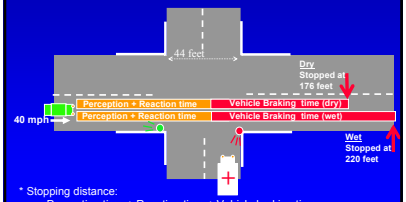
- 1991-2000, 302,969 Emergency vehicles were involved in MVCs - 1,565 involving fatalities*
- In PA 1997-2001, ambulances were more likely than similar sized vehicles to be involved in*:
  - 4 way intersection crashes (43% vs 23%, p=0.001)
  - Collisions at traffic signals (37% vs 18%, p=0.001)
  - MVCs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

**Comparison of Crashes Involving Ambulances with those of similar sized vehicles – Adam Ray, Douglas Kupas, PEC Dec 2005;9:412-415*

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…..

The real world
Intersection passenger car stopping distance* at 40 mph dry and wet



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

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??

Daily American Republic

Ambulance driver in fatal crash is charged

KENNETT, Mo. (AP) -- An ambulance driver from the Missouri Bootheel was charged Friday with two counts of involuntary manslaughter for an accident that killed a patient in the ambulance and the driver of the other vehicle.

The accident happened Sunday on Missouri 164 near Kennett in Dunklin County.

Patrick White, 23, of Poplar Bluff, was driving an ambulance for Poplar Bluff Regional Medical Center. The Missouri State Highway Patrol said White failed to stop at a stop sign and struck a 1992 Buick driven by Dorothy Worrell, 64, of Hornersville.

The ambulance's siren and emergency lights were not on, the patrol report said.

Worrell and a patient in the ambulance, William Braden, 66, of Wappapello, were killed.

White suffered minor injuries. His co-worker in the ambulance, James Simpson, 43, of Pocahontas, Ark., was taken to a hospital in Memphis, Tenn., with serious injuries.

Bond for White was set at $10,000.

What a novel idea…

Just Launched …

Anecdotal crash log

www.emsnetwork.org

Automotive Safety World

Protective devices/concepts

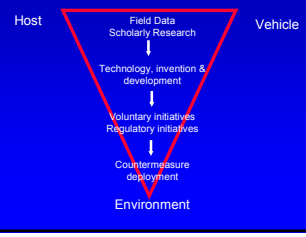
In the event of a crash

- Vehicle crashworthiness
- Seat/seat belt systems
- Equipment lock downs
- Padding
- Head protection

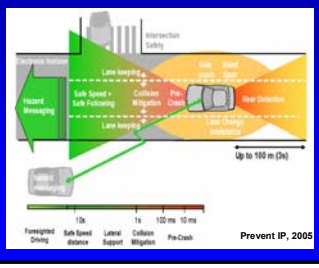
To prevent a crash

- Driver feedback
- Driver monitoring
- Driver training
- Vehicle technologies
- Tiered dispatch
- Appropriate policies

Automotive Injury Triangle and Safety Development



Intelligent Transport Safety Systems



Guidelines – standards

- Transport safety
- Practice protocols
- Occupational Health and Safety

The 'workplace' IS a vehicle

- Providers often in vulnerable positions during transport.
  - Bench seat
  - Captains chair
  - Standing or kneeling

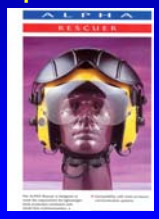
View of Ambulance interior from Rear

Rollover Crash Kills Medical Technician

Ambulance Runs Off I-66 and Rolls Over, Injuring Two Employees and a Patient

It does happen….

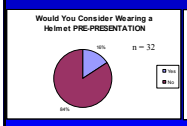
But what about head protection?

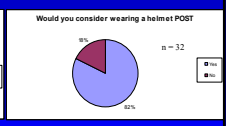


Role of a head protective device

- 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

Preliminary Study:
Attitudes to Head Protection in EMS





All Hazards approach to key Helmet Features

Real world

- We do know from large samples that the most common reason for medics to get up is to get to the radio
- We do know that CPR enroute to the hospital is a very rare event – too small in frequency to even evaluate using national data bases, and often with non survival out come when it does occur

New EMS Helmets for 2006

Hmm…

This looks cool AND SAFE!

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

Crash Prevention

- EVOC
- Tiered Dispatch
- The "Black Box"
- Intelligent vehicle design
- Appropriate policy

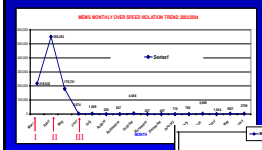
The "Black Box"

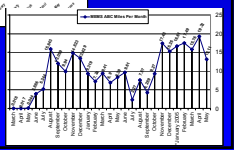
Driver behavior monitoring and feedback device

Purpose of 'Black box' Program

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

Demonstrated Effectiveness





I – blind data, no growls

II – growls & tones ON unidentified data capture

III – identified data

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

Technical Research

- Based on reliable and real world field data
- Cost effective and practical
- Involve low cost development – University engineering and transportation research centers

TRB TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Active Projects

(all due late 2006)

- 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 Crashes
- The Impact of Behavior-Based Safety Techniques on Commercial Motor Vehicle Drivers
- Health and Wellness Programs for Commercial Motor Vehicle Drivers

What needs to happen NOW

- Data
  - Epidemiology
  - Ergonomic
- Safety oversight

Air EMS is a role model for safety initiatives and focus

Kids are not little adults

- Behavior
- Communication skills
- Fear
- Development
- Size and shape
- Biomechanics

in a collision at 35 mph (60 km/hr), an unrestrained 15 kg child is exposed to the same forces* as in falling from a 4th story window

*550 kg/force in 0.03 sec

Crash Occupant Protection

- collision speed
- direction of impact
- vehicle stiffness and mass
- compartment size & projectiles
- passive protection
- head protection
- occupant restraint/belts

USA EMS Risk/Hazards

- Predictable risks
- Serious occupational hazard
- Predictable fatal injuries

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 automotive safety industry

Challenges to Optimizing EMS Transport Safety

- Rear compartment exempt from FMVSS
- Complex automotive safety area bridging acute clinical care, public health, public safety and automotive safety
- Very recent history as a research issue
- Limited fiscal support for cross disciplinary EMS transport safety research

Future

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

What to do about navy blue?

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 - 10 G in Forward, Rearward, Transverse, & Vertical directions
- Certified by Notified Body and Ambulance Mfg.

Commission on Accreditation of Medical Transport Systems - CAMTS Accreditation Standards

2006 revision underway

camts

Commission on Accreditation of Medical Transport Systems

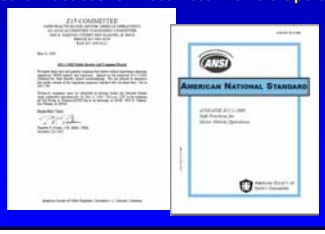
Commission on Accreditation of Ambulance Services - CAAS

USA ambulance purchase specifications GSA:KKK-A-1822E, 2002

- Static Pull test
- 2200 Lbs. (8G's) in Longitudinal and Lateral
- No dynamic test
- No definition to manikin mass
- No restraint for equipment
- Voluntary

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

Z15 Incident Rates

- Incident rate based on number of vehicles operated:
  Incident rate = $\frac{\text{Number of incidents x 100}}{\text{Number of vehicles}}$
- Incident rate based on vehicle mileage:
  Incident rate = $\frac{\text{Number of incidents x 1,000,000}}{\text{Vehicle mileage}}$
- 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 = $\frac{\text{Number of incidents with injury x 1,000,000}}{\text{Vehicle mileage}}$
- 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 = $\frac{\text{Number of incidents x 10,000}}{\text{Number of transports}}$
- Vehicle injury rates based on work hours:
  Vehicle incidents per 200,000 hours = $\frac{\text{Number of incidents x 200,000}}{\text{Number of hours worked}}$

Safety Management

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

Creating a Safety Culture

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

- Awareness
- Training
- Incentive

Multidisciplinary collaboration and the way forward

- Development of interdisciplinary teams
  - healthcare professionals
  - safety engineering expertise
  - regulatory bodies
  - manufacturers
- Safer practices save lives, time and money

The Crash Event - Crash Testing

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

The right test for the desired outcome

- Protecting the vehicle alone may not protect the occupants
- Crash tests using crash test pulses not specific to ambulance vehicles may give misleading results
- Crash tests of restraint or other equipment using crash dummies not designed for that purpose, may give misleading results, or worse - may suggest that a dangerous or unsafe device may be safe

Dynamic Safety Testing

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

If we know this – and its published….

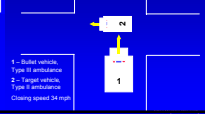
Why do we do this?

Full Vehicle Crash Tests - 2000

Test 1 – Right side impact

1 – Target vehicle, Type I ambulance
2 – Bullet vehicle, Type II ambulance
Closing speed 44 mph

Test 2- Frontal



1 – Bullet vehicle, Type III ambulance
2 – Target vehicle, Type II ambulance
Closing speed 34 mph

USA design initiatives

New Australian vehicles

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

Other successful models

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?

Safety Enhancements Being Implemented

- EVOC
- Tiered dispatch
- Monitoring & Feedback devices
- Helmets
- Optimized ambulance vehicle design
- New Standards

Some simple and available solutions out there now

- Intersection Policy
- PPE design and policy
  (personal protective equipment – from an 'All Hazards' approach - not just chem/biohazards)
- Black boxes

Current fleet

- 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)
- Have a written and implemented 'safety program'

Current and Future Research

- Epidemiology
- Ergonomic hazards
- Bio/Chem/Radiation hazard
- PPE & Head protection
- 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

Very Important Principles !

1. A culture of safety
2. Drive cautiously
3. Wear your belts & restrain all occupants
4. Secure all equipment
5. Integrate scientific data into your policies and procedures

- Unrestrained occupants and equipment are a potential injury risk to all occupants

small changes can make a BIG DIFFERENCE

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

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

PREDICTABLE PREVENTABLE and NO ACCIDENT

Conclusion

- Major advances in EMS safety research, infrastructure and practice over the past 5 years
- New technologies for vehicle design, occupant PPE and equipment restraint and driver performance are now available
- Development of substantive EMS safety standards is a necessity and a reality
- Enhanced cross disciplinary collaboration in development of safety initiatives now exist
- EMS is still way behind the state of the art in vehicle safety and occupant protection

And….

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

Thank you! Any Questions??

http://www.objectivesafety.net