EMS Fleet Telematics and Safety Technology Tools

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EMS Transport Surprising FACTS

- 97% are routine
- ONLY 3% are life threatening critical
- 25% there is NO Patient TRANSPORTED

Vehicle/Fleet Safety
Occupant protection
Driver performance monitoring and feedback
Hours of service
Driver/provider wellness and fitness
Driver/provider impairment
Public safety

Impact biomechanics
- Crashworthiness
- Vehicle design
- Occupant protection

Transport Medicine

- Transport Medicine
- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety
Transport Ergonomics

- Operational tasks
- Human factors analysis
- Range of reach
- Patient loading and unloading

Fleet safety

- Operational policies – dispatch, safety
- Fleet mix
- Vehicle selection – safety, ESC, loading height
- Driver performance and monitoring
- Scene safety
- Visibility and conspicuity
- Safety measurement and management

Evidence in clinical studies vs evidence in engineering

Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proven with randomised controlled trials

When it comes to engineering, the laws of physics prevail...

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

Oodont C, S Smith, J D P DeM
The Laws of Physics Prevail...

Philosophiæ Naturalis Principia Mathematica, July 1687

Change and Innovation

- Improved data systems for injury
- Enhanced data on denominator
- New technologies
- New policies/standards
- Interdisciplinary collaboration

R & D
“Ripoff and Duplicate”

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

TRB MISSION

- To provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal.

Special role for EMS at TRB

- One of the Key 4 E’s
  – Engineering
  – Education
  – Enforcement
  – Emergency Medical Services

Transportation Research Board is an excellent resource... we should be using it!!
ANB10 (5) TRB EMS Subcommittee Mission

- 'Bridging the gap between what we do and what is known - Enhancing ambulance transport safety through shared knowledge of technical data'.

Fragmentation Panacea

ANB10(5) is an independent platform for:
- Bringing fragmented information together
- Uniting diverse disciplines
- Focus on technically robust information

2012 EMS Safety Systems, Strategies and Solutions Summit

- One Day event, 30 presentations
- Held in Washington DC, Keck Center
- Simulcast Live to EMS Today
- Live Webinar Access - globally
- Over 100 participants live across 3 continents
- Greater than 10,000 downloads of handouts within the first week!!

The 2012 TRB EMS Safety Summit

print this page & your smart phone will play the 8 sessions from the eTags! (even in B&W)
- Opening Address: A.J. Heightman
- Safety Developments Update – N. Levick
- Research needs assessment forms explained – E. Frazer
1: Data and Recent Initiatives
2: Transport, Human Factors - Bridging Diverse Disciplines
3: Testing and Standards
4: New systems safety technology solutions & telematics
5: Fleet management strategies
6: Innovative Vehicle Design
7: Operationalizing Safety
8: Panel: How to optimize the safety of your existing fleet
Wrap up – from Prof. Art Cooper

The 2012 TRB Safety Systems, Strategies and Solutions Summit

a GRATIS resource for anyone, anywhere in world, and also via your smartphone

4: New systems safety technology solutions
5: Fleet management strategies & telematics
Its out there NOW

- TRB 2012 Summit – addressed the key and interdisciplinary applied solutions issues, in one day – please seek that information out. www.objectivesafety.net/TRBSummit2012.htm
- There have been two prior TRB Summits held, 2008, 2009 and both with vehicle engineering and transportation systems technical expertise
- See www.trb.org, and for the Summit archives: www.objectivesafety.net/TRBSummit2008.htm
www.objectivesafety.net/TRBSummit2009.htm

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

Newly Revised ANSI/ASSE Z15.1-2012 Standard is now available.
- These practices are designed for use by those having the responsibility for the administration and operation of motor vehicles as a part of organizational operations.

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
Telematics and cloud computing: hey you, get onto my cloud!

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

How?
- Deployment technology tools
- Invehicle telematics
- Smartphone telematics

A lot is now possible and for less!
- Driver behavior
- Vehicle behavior
- Roadside ITS
- Fuel consumption/Economics
- Resource modeling

Since 2009
- New perspectives
- New technologies
- New generations focus
- New vehicles
- New platforms
- New policies/standards
- New international models
Rules/Policies Addressing Known Hazards

- Federal Motor Carrier Safety Administration (FMCSA)
  - Cell phone use – November 2011
  - Hours of Service – December 2011

DOT HOS Rules

- Limits established for on-duty hours
- Establishes minimum levels of off-duty time: 8 hours if on duty less than 12 hours FRA or if over 12 hours then 10 hour off-duty time
- Commercial airline pilot can fly up to 100 hrs/month
- Adopts 60/70 hour weekly maximum for truck drivers, 10 hour off-duty time

Federal Motor Carrier Safety Administration - FMCSA

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

Nov 2011, Hand Held Cell Phone Ban


Dec 2011, New FMCSA Hours of Service


When is it safe to do what...?

- What are your policies???
  - If your patient is pink, warm and talking?
  - Are you required to notify the driver if you are out of your seat belt?
  - Are ‘routine procedures’ putting you at risk?
Policies to protect you too!

Policy makes a difference…

DOH NYS, 2012
Advisory on patient care in a moving ambulance
www.EMSSafetyFoundation.org/2012-04_NYSAdvisory_on_Patient_Care_In_a_Moving_Ambulance.pdf

Pennsylvania Department of Health Operations 123– BLS– Adult/Peds
Effective 07/01/11 Protocol 123

- EMS VEHICLE OPERATIONS/SAFETY
- EMMCO WEST REGIONAL PROTOCOL
- Criteria:
  - A. All EMS operations, including incident responses and patient transports.

Balance of concerns and risk during transport

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

Communicating risk
Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

Data…

- What is your transport safety record in your service?
- How can you improve if you don’t have a meaningful measure of safety performance?
- Transport safety is not guesswork, it is a science

What we need to consider, where is the ‘bang for buck’ in ambulance transport safety

- Where is the low hanging fruit?

Whats out there?

- Integrated systems with mapping, safety and economy
- Deployment systems
- Driver management systems
- Intelligent transport system

Fleet Management technologies

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

ACETech/Ferno
ACETECH™ Web
- Mapping, reports, alerts, hotspots, vehicle data

Fleet eyes

ZOLL systems

Telematicus

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

Optima: Demand/Resource analysis and modeling and base location planning
Northrop Grumman

Marvlis

- The dashboard calculates:
  - current percent of demand coverage
  - three closest vehicle recommendations for recent incidents
  - realistic travel time estimates for each possible responder

Marvlis

- The web interface:
  - individual choice of reference maps
  - integration of AVL/ARL and other live feeds
  - native Android client
  - creation/update of spatial data direct to ArcGIS Server
  - customization options to extend functionality

Priority Dispatch

Overview of these fleet management approaches
ZOLL systems
Data Collection & Driver Feedback System
- Onboard computer installed in each vehicle to assess driving performance
- Audible feedback puts drivers in control of performance

ZOLL systems
Data Upload and Reporting
Data collected onboard is transferred via wireless data hub to ZOLL online for reporting and analytics.

ZOLL systems
5% of Drivers Cause 95% of Problems
- Identify safe, efficient drivers and provide additional incentives and rewards.

ZOLL systems
ABC’s of Safe Driving
- Driver grading system
  - Average miles
  - Between
  - Counts (violations)

ZOLL systems
Other events and behaviors monitored
- Braking, acceleration and side/sway forces
- Emergency lights and sirens
- Engine RPM
- Engine idle time (indicates wasted fuel)
- Distance driven
- Turn signals
- Numerous others—what’s important to you?
**The “Feedback box”**

Driver behavior monitoring and feedback device

- **ZOLL systems**
  - Extensive Indirect cost savings
    - Fewer out of service vehicles
    - Improved transport times
    - Decreased administrative lost in managing unsafe behaviors
    - Decreased legal burden
    - Automatic system wide data
    - Insurance benefits

**ZOLL systems**

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**

I – blind data, no growls
II – grows & tones ON unidentified data capture
III – identified data

**Unit 302 Accident**

- **Telematicus**
  - **Global Green Drivers**
    - “Low Cost Safe Driving Platform”
Telematicus
Smart phone Data terminal features

- The smartphone is capable of detecting:
  - Vehicle motion and speed via both the accelerometer and changes in GPS and GPRS location
  - Has the capacity to identify harsh braking
  - Software configuration can also disable the use of texting and non-emergency calls whilst the vehicle is in motion.

Telematicus
A smart phone App that is a safety tool

GGD views

Telematicus
Fleet Management capability

Vehicle database
- Individual vehicle/ data
- Fleet mileage collection/Checklists
- Link to other systems (SAP, Fleet)

Maintenance & Service Plans
- Repair history & Scheduling
- Action planning

Reporting
- Export to Excel for manipulation
- Scorecards views, Crystal Reports reporting
- Direct Feedback

Telematicus
Safety Capability

Driver Alarm
- Instant SMS & Email location

Driver Risks
- Scorecards and Graphs
- Automated Messages
- Training

Trip playback
- Speed, Braking, Acceleration

Incident Recording
- Accident/Breakdown
- Photographs

Installation to vehicle

Connected vehicle becomes an IP point, data access
**AMD1**  
A core part of the OEM technology is Infotainment where there are opportunities for advertising and pay for media (music, video) services.

Given a lead in this area and openness (points of integration) for other categories of application including social media, travel, insurance/safety/risk management the Smart Phone becomes a useful platform for user interaction removing the costs of display in lower value marques. It will be resisted or dismissed by the more expensive marques e.g. Mercedes.

*DoreA, 11/9/2011*

**AMD2**  
For safety simply adding OBDII with minimal cost of install provides "high resolution" acceleration analysis.

*DoreA, 11/9/2011*
Telematicus

GGD Data Capture
- Real time
- Key details
- Photographs
- Details on application

Business System
- Individual records linked to drivers and vehicles
- Action planning and assignment
- Attachments e.g. photos

Reports
- Launch accident reporting process
- Launch for manipulation and planning

Telematicus

“So What”
- Capability
- Computing Power
- Convergence
- Costs

Telematicus

“Capabilities”

Emergency Vehicle Intelligence with

ACETECH™

The ACETECH System provides system wide, on-board intelligence that improves the efficiency and safety of your emergency vehicles and staff, while reducing your operating costs.

Four Modular Functions

1. Vehicle operations center
   - Driver & vehicle operations
2. Patient Compartment
   - Mobile trauma bay environment; passive support
   - Communication, temperature, lighting, securement & access, storage, & overall interiorly & exterior safety
3. Medic platform — work environment & safety
   - Seating, operating areas, reach & access
4. Patient platform — care & safety focused
   - Cot & restraint system, patient care accessories
ODBII is not really a fixed install. It’s a bit of a hybrid but does give “high resolution” acceleration data. I think the duty of care picture needs to show Smart Phone as well as handheld. This leads to £5 + £2 (OBD11) giving £7 as good competitor for £13 black box. Otherwise the £13 black box seems to offer good value for money. Plus the accelerometer in the Smart Phone offers the potential for accident detection just like the black box. An area yet to be explored.

DoreA, 11/9/2011
ACETECH Core Benefit

1. Integrated/Modular Solution
2. ROI
3. Vehicle Performance
4. User Power
5. Service
   - Affordability
   - Excellent warranty
   - Reliable
   - Modular design
   - Forward thinking
   - Product/OEM Support

ACETECH-ECO-Run

This graph indicates battery drain when engine is off and on-scene lighting was active. Auxiliary battery dropped to 11.5 volts (pre-programmed ECO-RUN start) in approximately 2.7 hours.

ACETECH-Web

- Mapping, reports, alerts, hotspots, vehicle data

ACETECH-Safety System Benefits ROI

- The following is a partial list of benefits that may be realized through a properly managed vehicle safety program.
  - Fewer collisions
  - Fewer collision/near collision related injuries
  - Reduced insurance premiums
  - Fewer lawsuits
  - Reduced repair costs
  - Fewer towing bills
  - Reduced light duty
  - Increased vehicle life
  - Less time spent investigating incidents- more time for beneficial activities
  - Improved image
  - Improved financial performance

ACETECH-Geo Fencing

- Set boundaries for vehicle travel and to receive automatic notification when a vehicle leaves this boundary
- Important in theft control.
- Maintain vehicles at expected locations thereby reducing response times, speeding events and fuel expense.

ACETECH in the Future

- Advanced camera systems. Use of cameras to improve safety and security is not new. Camera systems include:
  - Rear view
  - Side View
  - Front view
- Cameras may also be used to provide real time consult with on-line medical control.
Niagara Region Demographics
Population: 430,000 (12 Municipalities)
Niagara region: 1850 square km
Ambulance call volume: 75,000 (annually)
Mileage: 2,000,000 km driven annually
26 Peak Vehicles

Acetech
Integrated Vehicle Intelligence System
Fully integrated, vehicle performance monitoring and control system with on-board intelligence.
- Safety Systems
- Eco-Run Module Benefits
- Asset Protection Benefits

Safety System (Integrated into AVI)
- Speeding infractions, Unbelted, Unsecured occupants
- Lights and siren compliance
- Create Driver Safety Reports- provide feedback to employees
- Set pre-defined speed limiters

Niagara EMS
Decrease in Speeding Infractions

Optimize your fuel efficiency and reduce your carbon footprint
- Reduce idle times by as much as 40% to lower your fuel consumption and costs
- Reduce carbon emissions and contribute to a greener environment
- Prevent flat batteries
- Reduce engine wear and reduce maintenance costs while extending vehicle & engine life
- Monitor driver behaviour to reduce excessive rpm for additional reduction of fuel consumption
Niagara Summary
Automatic Vehicle Informatics (AVI) Benefits

- Protect assets with theft protection and geo-fencing
- Reduce engine wear and reduce maintenance costs while extending vehicle & engine life
- Modify driving behaviors with real time dashboard and full featured reports, and automatic updates on driving violations
- Improve fleet efficiency and operations with remote vehicle diagnostics & real time Fleet Management
- Track information through web-based interface or integration with established Fleet Management

Safety Technology
Sunstar: A System Perspective

Marvlis System Overview
Front End Technology

Prior to Marvlis: We used history and geography
Since Marvlis: We have data based on Year, week, day, minute (17 years)
We now "weather" the "storms" with more efficiency

Utilization of Marvlis

- Improved response times
- Helps determine post plans
- Forecasts
- Routes

Dynamic Service Area

- Blue overlay shows us what parts of the county are covered
- Takes into account dead ends, traffic, geography, waterways
Fleet Eyes Overview
Back End Technology

Fleet Eyes Functionality
- Weather
- Traffic
- Routing
- Speed
- Tracking
- Area Resources

Fleet Eyes/Geo-Fencing

Route Review

Real Time Tracking

Call Details
Road Safety Overview
Retrospect Technology

Monthly Driver Reports
• Identifies high risk behaviors
• Provides real time feedback to driver
• Provides reports for employee evaluation

Measuring Our Success at Sunstar Paramedics

Sunstar Summary
Through these technologies:
✓ Realized dramatic change in our drivers attitude toward safety
✓ Have evidence based data to use for individual driver training and refresher courses
✓ Are able to identify drivers that fail to align themselves with our mission of safety

Ambulance Safety Innovation
Design Module 1.0
www.INDEMO.info
the future you can have right now!!!
Better, safer and cheaper
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

Conclusion

- EMS transport has serious hazards and safety issues
- Major advances in EMS safety research, technology infrastructure and practice over the past 5 years
- Development of substantive EMS safety standards is a necessity and a reality
- Multidisciplinary safety issues that EMS cannot solve internally
- New tech tools can increase fleet safety management
- Failure to transfer knowledge from transportation, automotive safety and new technology is unacceptable and dangerous
- EMS is still way behind the state of the art in vehicle, transportation, new technologies and occupational safety

Thank you! Any Questions??

Electronic handout and resources available online
http://www.objectivesafety.net