Advanced Automatic Collision Notification (AACN) Education for EMS Medical Directors

Presenters

- **Paul Stiegler, M.D., FACEP**, Lead Subject Matter Expert; medical director of the Dane County (Wis.) Public Safety Communications Center
- **Robert R. Bass, M.D., FACEP**, Subject Matter Expert; executive director of the Maryland Institute for Emergency Medical Services Systems (MIEMSS) and member of the CDC Expert Panels on FTT and Advanced Automatic Collision Notification

What You Will Learn From This Session

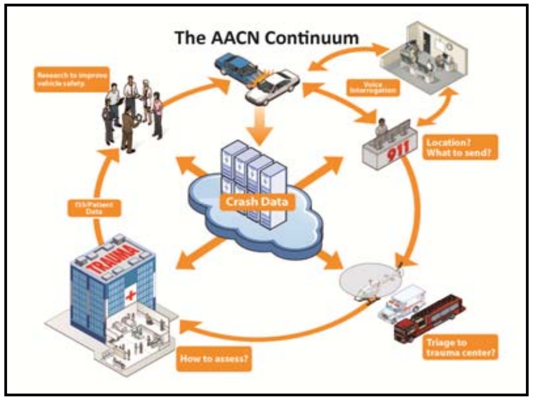
- NHTSA's AACN education project funded by the NHTSA Office of Emergency Medical Services (OEMS).
- Two-year project to develop an outline of the content and other recommendations for a course targeted to EMS medical directors on AACN.
- The course will educate medical directors on AACN and how to implement.
- Final deliverables (course outline and recommendations) due in September 2013.
- The course will be developed after 2013 and may be expanded to target other stakeholders.
- We are here today to seek your input.

What is Advanced Automatic Collision Notification (AACN)?

- Vehicle telematics systems have evolved over the past several decades.
  - Combine and integrate cellular phone technology, GPS location, and data from sensors in the vehicle
- Early pilots of ACN utilized air bag deployment to identify "serious" crashes.
- As technology advanced (2004), more data became available including delta V, principal direction of force, seatbelt usage, multiple impacts, rollover info, and vehicle type.
- These additional data enable a more accurate prediction of the likelihood of serious injury.

Why Should You Care?

- AACN is here (6-7 million cars on the road already) and will continue to rapidly expand with growing public expectations.
- Vehicles with embedded telematics today:
  - OnStar: GM (approx. 24,000 AACN responses/year)
  - Agero: Toyota, BMW, Hyundai, Infiniti, Lexus, Rolls Royce, Mercedes (approx. 11,000 AACN responses/year)
  - 911 Assist: Ford (Bluetooth technology, not telematics)
- This is increasingly impacting EMS systems and, therefore, medical directors.
- EMS medical directors will play a key role in implementation.
- Your feedback is critical to the development of an educational program that will inform medical directors about AACN.



Course Elements

1. Introduction to Advanced Automatic Collision Notification (AACN)
2. The Science Behind AACN and Injury Predictive Algorithms
3. The Role of AACN in Field Trauma Triage
4. Implementation of AACN

Section 1: Introduction to Advanced Automatic Collision Notification (AACN)

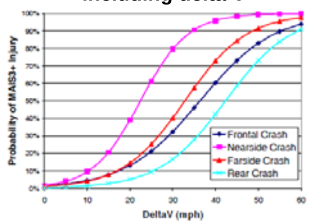
- Early ACN pilots and the evolution to AACN as vehicle telematics systems added more information.
- AACN telematics providers update- What capabilities each one has.
- AACN can provide an accurate location of the crash and has the ability to predict injuries with better accuracy.
- Many potential benefits:
  - Quicker dispatch, better allocation of resources, precise location
  - Improved accuracy of field trauma triage
  - Used to grade the level of assessment at the trauma center
  - Improved crash reconstruction => safer vehicles and better data
  - Potential to improve patient outcomes and reduce costs

Section 2: The Science Behind AACN

Early publications:

- Evanco 1999 – Reduction in response times
- Champion 1999 – Described the emerging technology and potential benefits
- Donnely 2001 – Use of EDR data in crash reconstruction and injury mechanism analysis and postulate potential benefit in field triage and medical treatment
- Hunt 2002 – Described emerging technology and potential benefits
- Augenstein 2002 – Validation of the urgency algorithm in predicting MAIS 3+ injuries in near side crashes

Augenstein 2003 – Identified characteristics of crashes that increase risk of MAIS 3+ injuries including delta V



Annu Proc Assoc Adv Automot Med. 2003

The Science Behind AACN

More recent publications:

- Talmore 2006 – Developed prediction model for head injury
- Lahausse 2008 – Benefit of ACN in reducing response times in Australia
- ACEP 2010 – Position statement on ACN and ITS (supportive)

Identification and Validation of a Logistic Regression Model for Predicting Serious Injuries Associated with Motor Vehicle Crashes

- Multivariate logistic regression model
- NASS-CDS data from1999 - 2008
- Used data available post-crash from telematics providers such as GM OnStar
- Using a cut point of 20% for ISS > = 15, the model sensitivity was 40% and specificity was 98%
- Delta V, seat belt use and crash direction were the most important predictors of serious injury

(Kononen et al, Accident Analysis and Prevention, 2011)

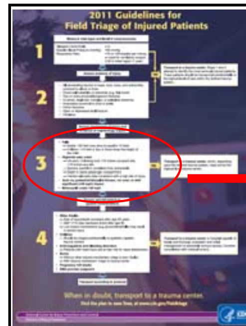
Ongoing Studies

- NHTSA CIREN – Crash Injury Research and Engineering Network
- NASS/CDCC – National Automotive Sampling System/Crashworthiness Data System
- Investigators will continue to study, validate and refine models
- Telematics data will also be used to design vehicles that are safer and, therefore, predictive models will need to be updated
- AACN has the potential to benefit many victims of car crashes

Section 3: The Role of AACN in Field Trauma Triage (FTT)

- Field Trauma Triage Guidelines
  - ACS-COT developed in 1986 with periodic updates since
  - CDC convened National Expert Panel in 2005 with support from NHTSA
- FTT guidelines include a decision scheme that is a four step process that evaluates: 1) physiology; 2) anatomic injuries; 3) mechanism; and 4) special considerations.
- Steps 3 and 4 improve sensitivity of the algorithm, but produce much more over-triage ("over-triage to avoid under-triage").
- The FTT Expert Panel focused on improving the accuracy of the guidelines, particularly with "mechanisms."
- Multiple studies suggest the use of AACN data is more accurate in predicting the likelihood of serious injury than traditional indicators such as "high speed crash," "major auto deformity," and "extrication time > 20 minutes," etc., which were removed.

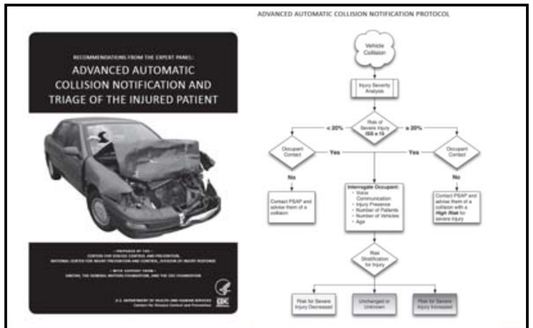
CDC NHTSA EMS



Current Step 3 Mechanisms

- **Falls**
  - Adults: >20 feet (one story is equal to 10 feet)
  - Children: >10 feet or two or three times the height of the child
- **High-risk auto crash**
  - Intrusion, including roof: >12 inches occupant site; >18 inches any site
  - Ejection (partial or complete) from automobile
  - Death in same passenger compartment
  - Vehicle telemetry data consistent with a high risk of injury
- **Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact**
- **Motorcycle crash >20 mph**

Seriously injured patients treated at a trauma center have a 25% reduction in mortality
MacKenzie, et al, *NEJM*, 2006



Panel Recommendation:
AACN Providers Will Communicate the Following to the PSAP

- Risk for serious injury
- Age of occupant(s)
- Presence of absence of injury(ies) based on voice communication
- Number of other vehicles involved, if any
- Location confirmation or any disparity between electronic and voice communications

Injury Prediction Algorithms are being used by GM and BMW

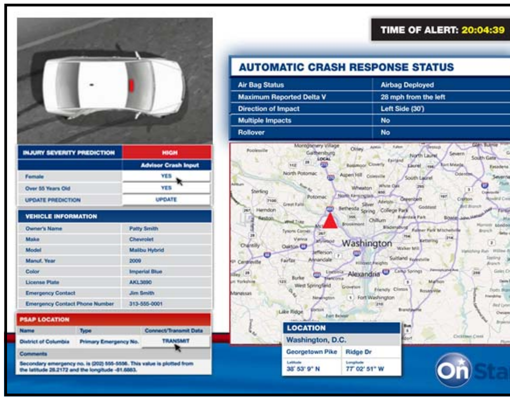
Section 4: Implementation

- Local
  - Medical directors must take leadership role
  - Collaborative effort – must identify key stakeholders (PSAPs, first responders, fire, police, EMS, medical directors, hospitals, trauma centers, and the public)
  - Protocol driven
  - Data must be available real time to PSAPS, responders, and hospitals – consider confidential as medical record
  - Educate on the benefits, added safety, improved efficiency and outcomes
  - Identify barriers and work to mitigate
- Local and national
  - Need for federal standardization of data and notification protocols

Seattle Survey of Regional PSAPs

- Recognize value of AACN for exact GPS location of crash – more important for rural than urban
- Do not want to receive raw CDR data; would prefer a scale which predicts:
  - Need for extrication
  - Risk of Severe Injury
- Concern about false positive activations
- Concern about integration with current CAD systems – do not want a separate system

E. Bulger et al, Seattle CIREN Presentation, 2012



BMW Vehicle Accident Information Card

Ford

- Identifies serious crashes by fuel cutoff and/or airbag deployment.
- Calls 911 directly via owners cell phone which must be on and linked to the vehicle.
- 911 operator will have option to interrogate occupants.
- Probability of injury models unknown at this point.
- This points to the need for federal standardization of the data elements and approach to crash notification protocol.

MPDS Card 34 AACN

- Specifically developed to take information from TSP and determine response code 3
- Available in ProQA
- Response to code determined by local EMS system
- Used in nearly 3,000 agencies worldwide

Course Structure Considerations

- 4 course sections (optional section for local implementation training)
- 15 minutes each
- CE/Test
- Online
- In person/online
- Highly interactive and engaging
- Multimedia
- Speaker's Guide/Toolkit

Q & A

Contact Info

Questions:

- Dr. Paul Stiegler – pmstiegler@gmail.com
- Dr. Bob Bass – rbass@miemss.org
- Laurie Flaherty – Laurie.Flaherty@dot.gov

Course content suggestions:

- Jake Knight – jknight@redflashgroup.com