



AMBULANCE

# Rural ambulance crashes:

Tragedies en route to the hospital.



AMBULANCE

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# Case Study

## ➤ Rural Car Crash

- Elderly male with moderate orthopedic injury
- Transported to local Critical Access Hospital
- No orthopaedist available at local hospital

## ➤ Transfer

- 60 Miles, Secondary Roadway
  - Steep shoulders, narrow roadway, blind curves/hills, steep pass
- Ambulance using lights and sirens

## ➤ Crash (r. front wheel off roadway, over correction, rollover)

## ➤ Results

- Patient death
- EMT injury
- Devastation of volunteer service

The background of the slide is a blue-tinted image of an ambulance. The word "AMBULANCE" is printed in large, bold, white letters across the top of the ambulance's hood. To the left of the word is a white Star of Life symbol. The ambulance's front grille and headlights are visible below the hood. A red horizontal band is positioned across the middle of the image, containing the text "Medicine's 1st Rule" and "Primum Non Nocere" in white. The word "AMBULANCE" is also faintly visible in large letters at the bottom of the image, partially obscured by the red band.

# Medicine's 1<sup>st</sup> Rule

## Primum Non Nocere

# Magnitude of the Problem

- 1991-2000\*
  - 300 fatal crashes
  - 82 deaths in ambulance
  - 275 others
- Dispatch data\*\*
  - 6500 crashes/year
  - 10 people per day injured
  - 1 person killed every 10 days



\*Proudfoot (2003)

\*\*Ambulance driver fatigue a danger,  
National Academies of Emergency  
Medical Dispatch on-line  
[www.emergencydispatch.org/articles/  
driverfatigue.html](http://www.emergencydispatch.org/articles/driverfatigue.html)

# Describing Rural Differences

## Pennsylvania

- Study of 1745 ambulance crashes over 4 years
- 311 in rural areas/1434 in urban areas
- Rural crashes
  - Single vehicle
  - Due to environmental or vehicle factors
- Urban crashes
  - Involve intersections, other vehicles
- Injury severity similar in urban and rural
- Abstract by Ray and Kupas, American College of Emergency Physicians, Annual Meeting 2005



# Attributes of Vehicles

- Increasingly Larger
  - F-450
  - Analysis by vehicle type
    - More people per crash
    - More injuries by crash\*
- High Center of Gravity
- Difficult to Secure Patient, EMT \*\*
- Sharp corners
- Loose Equipment



\*Ray, A.M. and Kupas, D.F. (2005)  
Prehospital Emergency Care, 9(4) 412-415.

\*\* Proudfoot, S.L, et al. (2003)  
Ambulance Crash Related Injuries –  
U.S. 1991-2002, MMWR, 52 (8) 154-156.

# Attributes of Drivers

- Rural EMS workforce
  - Older
  - Trained at EMT-Basic
  - Volunteer
  - Variable training requirements, e.g. EVOC
  - Infrequent Use of Any/All Skills
  - Most highly educated (non-EMS) segment of workforce



**\*\*Patterson, D., and Sanddal, N.D.  
(in press)**



# Attributes of Roadway

- Similar to other “rural roadway” descriptions.
  - Narrow
  - Limited shoulder
  - Steep barrow pits
- Rural crashes\*
  - More likely to occur on snowy roads
  - nighttime without street lighting



\*\*Ray and Kupas (2005) Abstract, American College of Emergency Physicians, Annual Meeting

# Technological “Fixes”

- Black Box\*
  - Increases occupant safety system use
  - Decreases hard braking
  - Decreases speed
    - Does not increase response time
- Drive cam, reportedly similar results



ROBERT PEEBLES PHOTO  
A mid-morning accident on north bound Hwy. 29 just north of Hwy. 121 sent one Piner's Ambulance employee to the hospital with minor injuries after the ambulance ran off the roadway and crashed head-on into the guard rail.

\*\*Levick, N.R., & Swanson, J. (2005) Managing risk and reducing crashes: Implementing a driver performance measuring device in ground ambulances. *Prehospital Emergency Care* 9(1) 108-112.

# ITS Opportunities

- Vehicle
  - Ergonomic improvements
  - Heads-up display
  - Dynamic restraint systems for patient care
  - Collision avoidance systems
  - Roadway (lane) centering systems



Frank Hinchey / Columbus Dispatch  
Delaware County, Ohio, officials voted to stop ambulances from speeding after Mae Lowe was killed on Sept. 1, 1998, when her car was struck by this vehicle, going 71 mph. Officials have since revoked their decision.

# Roadway

- Condition warning systems
- Lane centering systems
- Animal on roadway indicators
- Traffic flow/delays monitoring



# Human Factors

- Next generation black boxes
- Ergonomic improvements
- Simulators for training/retraining
- New/better “hands-on” training



# Summary

- Emergency medical personnel are more likely to be killed in on the job crashes than either fire or police vehicles (9.6/100,000 EMS, 4.5 Fire, 6.3 Law)
- 3 times more non EMS personnel (patients, other vehicle occupants, pedestrians) die as a result of ambulance crashes than EMS providers themselves.
- Significant highway safety issue.
- Opportunities abound for research and collaborative problem solving.

# Additional Information

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