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EMS Occupational Risks

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Two main studies

- Maguire BJ. Hunting KL. Smith GS. Levick NR. Occupational Fatalities in EMS: A Hidden Crisis. *Annals of Emergency Medicine*. 2002; 40(6): 625-632.
- Maguire BJ. Hunting KL. Guidotti TL. Smith GS. The Epidemiology of Occupational Injuries and Illnesses Among EMS Personnel. *Prehospital Emergency Care*. 2005; 9: 405-411.

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Emergency Medical Services Personnel

- 900,000 providers
 - 180,000 full time
 - 154,000 paramedics
- Includes paramedics, emergency medical technicians and other responders
- 31 million responses and 22 million patients treated per year in the U.S.

Research Objectives

- Determine rate of fatal occupational injuries
- Determine the rate of non-fatal occupational injuries and illnesses among EMS workers
- Determine the relative risk of occupational injuries and illnesses for EMS compared to other occupations and the national average

Literature

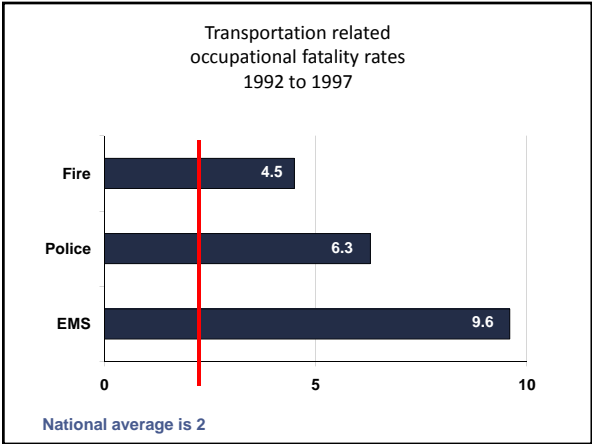
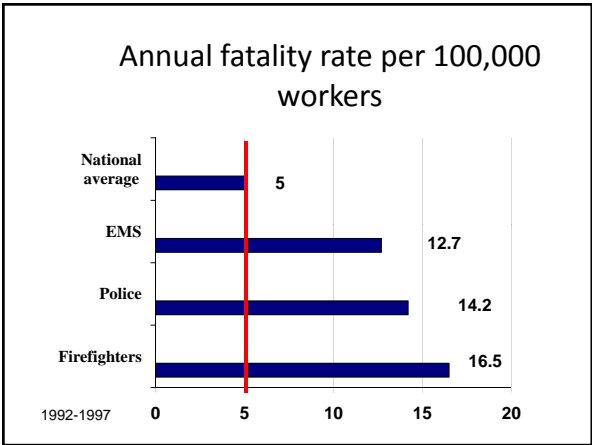
- No prior literature on how EMS rates may compare to BLS.
- Two papers - Gershon et al and Schwartz et al – indications of very high injury rates.

Occupational Fatalities Among Emergency Medical Services Providers

- ### Data sources
- Department of Labor (DOL) Census of Fatal Occupational Injuries (CFOI) 1992 to 1997
 - National EMS Memorial Service (NEMSMS) 1992 to 1997
 - National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS) 1994 to 1997

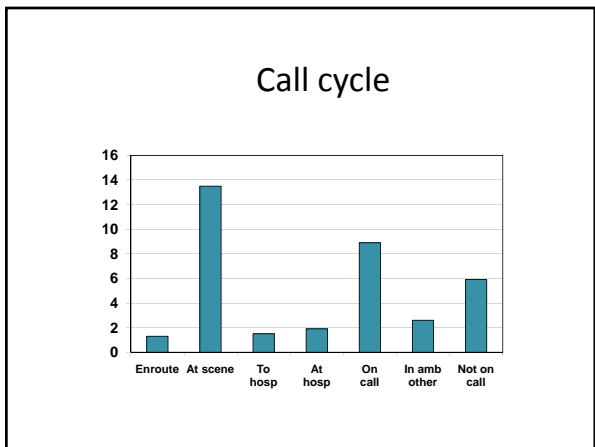
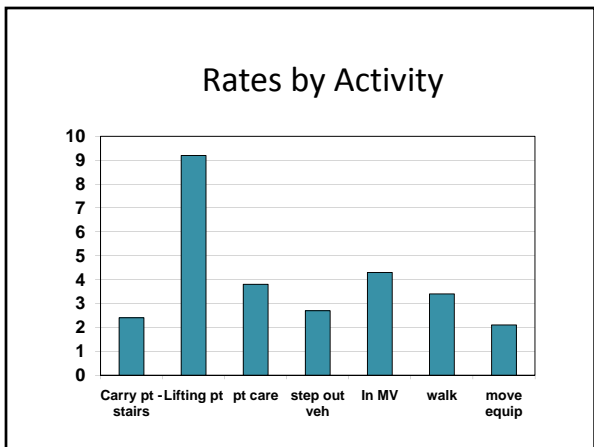
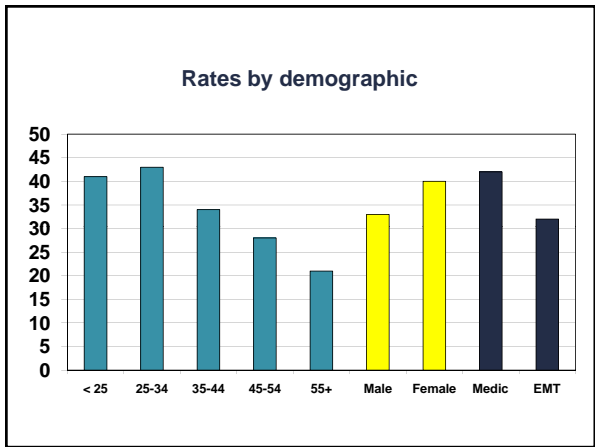
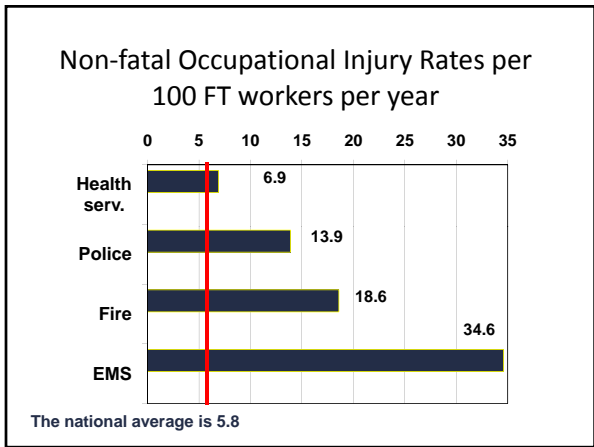
EMS Fatalities Cause/Database	DOL/ CFOI	NEMSMS	NHTSA/ FARS	Fatality Estimate
Ground transportation	67	33	8	67
Air ambulance crash	*	19	0	19
Cardiovascular	*	13	0	13
Assault/Homicide	10	0	0	10
Other	14**	5	0	5
Total	91	70	8	114

* Does not meet DOL publication requirements
** There were 14 deaths other than ground transportation and assault (DOL policy precludes the identification of cells with fewer than five cases.)



Non-Fatal Occupational Injuries and Illnesses Among Emergency Medical Services Personnel

- ### Research Data
- Two urban EMS agencies
 - 1998 to 2002
 - 502 cases
 - 409 workers
 - 2.8 million hours worked



Comparisons to National Average

- Comparison to the national average by nature, body part, source and event
- 285 EMS cases with lost work days only
- Rates per 10,000 ft workers
- Department of Labor national rates for 2000
- (select categories included on slides)

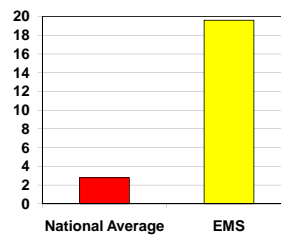
Nature	Cases	EMS rate	National rate	Relative Risk
Fractures	13	91.9	12.7	7.2
SS&T	176	1,243.9	79.2	15.7
Multiple trauma	39	275.6	6.5	42.4
Total trauma	276	1,950.6	166.3	11.7
Total diseases	9	63.6	11.4	5.6
Total	285	2,014.2	181.1	11.1

Body part	Cases	EMS rate	National rate	RR
Back	88	621.9	44.7	13.9
Knees	30	212.0	14.2	14.9
Ankles	19	134.3	9.1	14.8
Multi	37	261.5	15.8	16.6

Source	EMS cases	EMS rate	National rate	RR
Health care patients	108	763.3	8.1	94.2
Floors/walkways	18	127.2	30.3	4.2
Stairs	10	70.7	2.7	26.2
Stretchers	16	113.1	0.3	376.9

Event	EMS cases	EMS rate	National rate	RR
Overexertion	121	855.2	49.5	17.3
Overexertion - lift	84	593.7	27.9	21.3
Slip/trip	13	91.9	5.7	16.1
Transportation	34	240.3	7.9	30.4
Assault	8	56.5	2.6	21.7

Relative risk of injury with lost work days



- The risk for EMS workers is seven times higher than the national average

Most costly

Average cost per event

- Nature of Injury
 - SS&T: \$2,100
- Body part
 - Shoulder: \$3,200
- Source
 - Bodily motion: \$3,200
- Event
 - Overexertion: \$4,700

Overall costs

- Average cost per case = \$1,600
- Cases per 100 full time employees per year = 35
- Average injury cost per year per 100 full time employees = \$56,000
- Cost per year for 180,000 EMS workers = \$100,800,000

Lost work time

- Average of seven lost work days per incident
- 35 incidents per 100 full time workers per year = 245
- EMS lost work days in U.S. per year = 441,000

Transportation risks



- Fatality rate five times higher than the national average
- Injury rate 30 times higher than the national average

Haddon's Matrix for EV Collisions			
	Human/Host	Vehicle/agent	Environment
Pre-event (pre-injury)	Fatigue Poor driver training Impaired hearing Alcohol/subs abuse Non-use of seatbelts Distractions, Stress Poor driving skills Diesel fume exposure Smoker, Speed	Poor maintenance Poor design Inappropriate tires or tire pressure Lack of functional seatbelts Lack of driver's compartment airbags	Poor visibility Hazardous conditions Urban vs. rural - Inadequate agency policies and/or enforcement - Inadequate funding for research and prevention.
Event	Employee's health Resistance to energy	Protruding objects Sharp corners Unsecured equipment	Lack of vehicle restraint walls/rails on road side
Post event	Employee's health Priority given to other's care over self care	Presence of hazardous materials	Availability of ambulances Trauma Center

Fatigue

- 21 hours of wakefulness produces impairment of the same magnitude as a 0.08% blood alcohol concentration [i];
- the legal limit for commercial drivers in the U.S is 0.04% BAC [ii].

[i] Arnedt JT, Wilde GJ, Munt PW, MacLean AW. How do prolonged wakefulness and alcohol compare in the decrements they produce on a simulated driving task? *Accid Anal Prev.* 2001; 33(3): 337-44.

[ii] CDC. National Center for Chronic Disease Prevention and Health Promotion. *Alcohol and Public Health.* <http://www.cdc.gov/alcohol/faqs.htm#13>. Accessed June 27, 2005.

The faces of fatigue



Joseph "Neal" Sherman died when the exhausted driver of the ambulance fell asleep and went off the road; Neal was 25.



Asleigh Neale Sherman sits at the gravesite of the father she never met.

<http://www.detnews.com/2003/specialreport/0301/27/a01-68890.htm>



Heather Brewster

In July 1997, Heather Brewster's car was rear-ended by Sookim Hong, a medical resident who'd just finished a 36-hour hospital shift. Brewster suffered massive brain injuries and was in a coma for weeks. The accident left Brewster permanently disabled: she now walks slowly, doesn't remember much of what she used to and has been declared incompetent by the courts.

Brewster's family is suing Hong and the hospital that employed her at the time.

<http://www.npr.org/templates/story/story.php?storyId=4512366>

The other victims



An ambulance went through an intersection in Brooklyn, N.Y., and smashed into this car driven by Angela Igwe. Three of Igwe's four children, Akintunde Morak, 2, Olusegun Morak, 5, and Damilola Morak, 7, were killed.

The ambulance driver pleaded guilty to criminally negligent homicide



<http://www.detnews.com/2003/specialreport/0301/27/a01-69705.htm>

Assaults

- EMS assault fatality rate seven times higher than for health care workers
- Non-fatal assault rate 22 times higher than the national average
- Risk likely varies by gender and age group
- Some interventions may increase risk

Suicide

- No data
- Rate could be many times higher than the national average

Summary

- The overall rate of injuries and illnesses among EMS workers is six times higher than the national average
- The rate of lifting injuries is 21 times the national average
- The rate of transportation injuries is 30 times higher than the U.S. average
- Violence -related injuries is 22 times higher than the national average

Conclusion

- The research documents a clear and immediate public health emergency faced by the many thousands of EMS personnel who put their lives on the line every day in order to provide emergency medical services to the citizens of their communities.

Immediate interventions must be initiated to mitigate this problem

Challenges

- Problems with existing data
- No standard terminology
- No linkages to other databases
- Poor awareness of problem
- Limited resources
- Untested “solutions” such as ballistic vests

Recommendations

- Improved databases (local and national) with uniform data
- Money for research
- Injury epidemiology research
- Development, implementation and evaluation of risk reduction interventions
- Mechanism to develop and share best practices related to training/education, enforce/enact and engineering (including patient transfer equip, PPE and clothing/footwear).

Similarities between EMS and Public Health

- ◆ Assessment
 - EMS - History and vital signs
 - Public Health
 - History – literature review and historical evidence
 - Vital signs – current rates

A team approach

- EMS personnel
- Managers
- Epidemiologists
- Engineers
- Physicians/nurses
- Local officials

Pinnellas County



The four Es of injury prevention

- Education
- Engineering
- Enactment of policy/legislation
- Enforcement of policy/legislation

Determine priorities

- Highest rate
- Most serious
 - Lost work days
 - Termination
- Most costly
- Cost benefit analysis

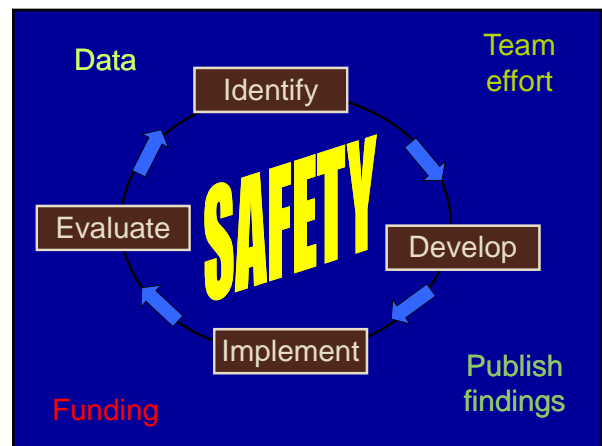
The cost

- “For every one dollar invested in safety there is a savings of three to six dollars”
 - Liberty Mutual Research Institute for Safety*.

*The ROI of Safety. Business Week. September 12, 2005

The steps

- Identify problem
- Develop interventions
- Implement
- Evaluate
- Repeat

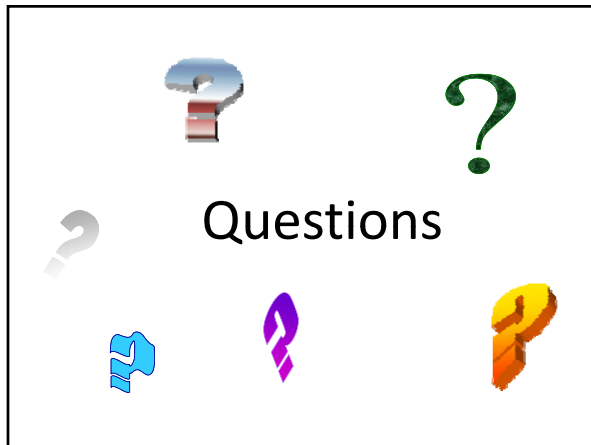


State, local and agency leadership actions

- Support research
- Evaluate culture
- Develop and implement standards
- Encourage and promote safety
- Get involved!

A personal approach

- No smoking
- Five hours of exercise per week
- Healthy diet
- Sleep
- De-stress



References

Maguire BJ, Hunting KL, Smith GS, Levick NR. Occupational Fatalities in EMS: A Hidden Crisis. *Annals of Emergency Medicine*. 2002; 40(6): 625-632.

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Maguire BJ, Walz BJ. Current Emergency Medical Services Workforce Issues in the United States. *Journal of Emergency Management*. 2004; 2(3): 17-26.

Related research

- Maguire BJ, Porco FV. An Eight Year Review of Legal Cases Related to an Urban 911 Paramedic Service. *Prehospital and Disaster Medicine*. 1997; 12(2): 83-86.
- Maguire BJ, Porco FV. EMS and vehicle safety. *Emerg Med Serv*. 1997; 26(11): 39-43.
- Maguire BJ. Ambulance Safety in the US. *Journal of Emergency Management*. 2003;1(1):15-18.
- Maguire BJ. Preventing Ambulance Collision Injuries Among EMS Providers: Part 1. *EMS Manager and Supervisor*. 2003; 5(2): 4.
- Maguire BJ. Preventing Ambulance Collision Injuries Among EMS Providers: Part 2. *EMS Manager and Supervisor*. 2003; 5(3): 4-7.

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