Ambulance Crashes: Protect Yourself & Your Patients

By Les R. Becker, PhD, NREMT-P

This article describes a common-sense approach to staying safe while riding in an ambulance. The information is based on a recent study that's soon to be published in the journal *Accident Analysis and Prevention*. My research team (from the Pacific Institute for Research and Evaluation, Calverton, Md.) examined crash injury and fatality characteristics of the occupants of ambulances, fire apparatus and police vehicles for the period 1988 through 1997.[1]

We used two, large, national databases: 1) the Fatality Analysis Reporting System (FARS), a census or exact count of vehicle crash fatalities in the United States; and 2) the General Estimates Systems (GES), a statistically valid sample of police-reported, nonfatal vehicle crashes.

We classified ambulance crashes on the basis of response mode (emergency vs. nonemergency), restraint use, seating position (front seat vs. other seating positions) and injury severity. We employed a four-step scale to classify injuries: 1) no injury; 2) possible/nonincapacitating injury; 3) incapacitating injury; and 4) fatal injury.

The first step was to count and classify the cases. We identified 305 fatal ambulance crashes for 1988–1997, 71 ambulance occupant fatalities and an estimated 9,465 injuries. To ensure inclusion of all fatal cases, we substituted into our analysis the exact counts of fatalities from FARS for the estimates of fatalities from GES.

Unrestrained occupants riding in positions other than the front seat accounted for 52% (37/71) of ambulance occupant fatalities, with restrained occupants riding in the back accounting for an additional 20% (14/71). Thus, 72% (51/71) of reported fatalities to ambulance occupants occurred to those riding in the back, but only 40% (307/768) of total ambulance occupants in fatal crashes were in the patient compartment. (*Note:* See the full study for estimates of the total number of individuals riding in these ambulances when the crashes occurred.) Table 1 (p. 25) shows the results of this analysis.

The next step involved calculating the relative risk of injury or fatality to various categories of ambulance occupants. The complete results of the ordinal logistic regression analysis are complex and appear in our research paper in *Accident Analysis and Prevention*. Significant highlights:

- The fatality risk for restrained ambulance occupants involved in a crash was nearly four times lower than for unrestrained ambulance occupants;

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From 1988 to 1997, there were 305 fatal ambulance crashes in the United States, accounting for 71 deaths and 9,465 injuries.

- The risk of suffering an incapacitating injury for *restrained* ambulance occupants was nearly 6.5 times lower than for *unrestrained* ambulance occupants;
- The risk of fatality vs. no injury for rear occupants of an ambulance was more than five times greater than for front-seat occupants;
- Ambulance occupants traveling nonemergency were nearly 2.7 times more likely to be killed than occupants traveling emergency; and
- Ambulance occupants traveling nonemergency were nearly 1.7 times more likely to suffer an incapacitating injury than occupants traveling emergency if involved in a crash.

Based on the findings, what's the important message? Ambulance occupants who use restraints (lap or lap-shoulder belt combinations) are more likely to survive a crash and do so with less injury than those who do not. Also, front-seat passengers fare better in crashes than do patient compartment occupants.

What are the implications for safety practices aboard ambulances? Common sense is an important ingredient of prehospital care and a key to preventing injury. Three recommendations:

1. EMS personnel should use safety restraints whenever feasible;
2. Ensure your patients are properly restrained with cot straps or seatbelts; and
3. Individuals accompanying patients on an ambulance transport should ride in the front seat of the ambulance whenever possible.

What are the implications for prehospital response, care and transport? The findings for emergency vs. nonemergency response are not an endorsement of aggressive emergency driving. More study is needed to enable interpretation of these findings in a responsible, appropriate fashion. But the other findings can readily serve to inform prehospital practice.

It has been known for at least 10 years that EMS personnel tend to

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not use safety restraints when performing care in the patient compartment.[2] In addition, EMS personnel in at least one study reported that they believe they must work unrestrained 41% of the time, on average, to provide appropriate patient care, with the amount of unrestrained time increasing with the severity of the call.[3]

A 1996 EMS community consensus document on the role of EMS providers in primary injury prevention indicated that the first duty of EMS providers is to protect themselves.[4] The injury risk results reported here suggest that EMS providers should consider rethinking their individual approaches to prehospital care. Care that can be initiated on scene without compromising overall patient care is care that might not have to be initiated while unrestrained in the back of a moving ambulance.

How much of the care provided en route can actually be provided

TABLE 1: The Injury Severity of Ambulance Occupants Involved in Crashes: 1988–1997
(Estimated from GES and FARS Data, based on police report ratings)[1,2]

			Injury Severity									
			No Injury		Possible/ Non-Incapacitating		Incapacitating		Fatal[3]		Total Occupants	Total Vehicles Involved in Crashes
			Frequency	%	Frequency	%	Frequency	%	Frequency	%		
Emergency Call	Front seat	Restrained	27,873	88.28	3,305	10.47	390	1.24	4	0.01	31,572	23,474
		Unrestrained	2,479	79.92	607	19.57	13	0.42	3	0.10	3,102	
	In the back	Restrained	3,071	86.34	475	13.35	5	0.14	6	0.17	3,557	
		Unrestrained	3,094	68.38	882	19.49	531	11.73	18	0.40	4,525	
Routine Trip	Front seat	Restrained	11,585	86.03	1,562	11.60	313	2.32	7	0.05	13,467	12,492
		Unrestrained	829	66.16	198	15.80	220	17.56	6	0.48	1,253	
	In the back	Restrained	1,600	97.92	26	1.59	0	0.00	8	0.49	1,634	
		Unrestrained	1,717	64.21	741	27.71	197	7.37	19	0.71	2,674	
Total			52,248	84.57	7,796	12.62	1,669	2.70	71	0.11	61,784	35,966

1 Cases in which information about at least one of the variables presented in the table was missing were discarded.
2 These totals do not include injuries to unrestrained ambulance occupants caused by "near misses"—the rapid application of ambulance brakes to avoid a crash, but not resulting in a crash, hence not reported to police and, thus, not included in GES.
3 Fatal injury counts from FARS data.

while wearing a seatbelt? Probably more than you think. *Examples:*

- With a properly positioned captain's chair, you can manage your patient's airway while remaining seatbelted; and
- If you position a cardiac monitor or pulse oximeter for unobstructed viewing before you begin transport, you can also monitor your patient while remaining belted.

Changes in provider practice that increase the amount of time providers spend wearing a seatbelt without compromising patient care will improve provider safety and reduce the toll of death and injury from ambulance crashes.

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For an overview of additional research on this topic, visit www.jems.com.

SARS Alert

As this issue goes to press, President Bush has just issued an executive order adding severe acute respiratory syndrome (SARS) to the list of communicable diseases for which a person can be quarantined. That increases the number of diseases subject to possible quarantine to eight. To date, SARS has infected more than 2,270 people, killing 79. The illness has spread to 16 countries, including the United States.

At press time, Julie Gerberding, MD, director of the Centers for Disease Control and Prevention, reports that no one has yet been quarantined for SARS in the United States. In Canada, however, Toronto EMS reports that 140 of its paramedics have been quarantined, and two paramedics and a supervisor have been hospitalized with the illness after contact with suspected SARS patients.

In response to these developments, the CDC has initiated surveillance for cases of SARS among recent travelers and their close contacts. Also, the International Association of Fire Chiefs issued a statement encouraging all fire departments that provide EMS or respond to medical calls to take appropriate infection control measures to limit the spread of this disease.

Early manifestations of the illness include flu-like symptoms, such as fever, myalgia, headache, sore throat, dry cough, shortness of breath or difficulty breathing. In some cases, these symptoms are followed by hypoxia, pneumonia and, occasionally, acute respiratory distress requiring mechanical ventilation, and death.

The CDC recently issued interim guidelines for the EMS transport of SARS patients. In general, services should transport SARS patients using the minimum number of EMS personnel and without non-SARS patients or passengers in the vehicle. Receiving facilities must be notified prior to transport of SARS patients to facilitate preparation of appropriate infection control procedures and facilities.

Providers should place a surgical mask on patients in whom SARS is suspected and use contact precautions, donning gloves, gown and eye protection. The CDC also suggests airborne precautions, including an N-95 filtering disposable respirator (or respirators of equivalent filtering efficiency) where feasible. Where respirators are not available, health-care personnel evaluating and caring for suspected SARS patients should wear a surgical mask.

To view the CDC's EMS guidelines, visit www.cdc.gov/ncidod/sars/emtguidance.htm. To learn more about the disease, visit www.cdc.gov/ncidod/ sars/clinicians.htm. At that location, the CDC has created a special section on SARS for clinical providers. It contains case definitions, clinical descriptions, diagnosis and evaluation procedures, exposure management, isolation and infection control information, treatment options, reporting requirements and references.

—Keri Losavio

Note: Information for this report was obtained from www.cnn.com, www.cdc.gov/ncidod/sars/clinicians.htm and other sources.