

Ambulance Patient Compartment Safety and Design Standards

Ambulance crashes are a serious hazard for responders and patients

Statistics indicate emergency medical services (EMS) responders have a fatality rate of 12.7 deaths per 100,000 workers, a rate three times greater than the average for workers in any other occupation. Ambulance crashes cause more than half of these deaths.



Rendition of an ambulance interior configuration showing a forward-facing worker seating area with equipment console (Photo: NIOSH)

EMS and patient deaths or serious injuries occurred at a high rate within the ambulance patient compartment and were directly associated with the lack of use of installed restraint systems; faulty designs that limited access to the patient; improperly restrained patients and equipment; un-padded or intrusive head impact hazards; and potential structural deficiencies within the frame of the compartment or elsewhere in the ambulance.

EMS professionals from the Department of Homeland Security's Science and Technology Directorate (S&T), the InterAgency Board, and national EMS associations expressed the need for safer ambulances. The EMS community urged S&T to bring interagency and research and development partners together to design a new type of ambulance that would create a safer working environment.

Increased collaboration led to the design of new ambulance standards

S&T, along with partners at the National Institute of Standards and Technology (NIST), the National Institute for Occupational Safety and Health (NIOSH), and representatives from the EMS and the manufacturing community are developing ambulance patient compartment design

and safety standards in several areas:

- New seat and restraint standards
- New patient cot and restraint standards
- Equipment mounting requirements
- Supply/drug cabinet retention requirements
- Compartment integrity-interior delethalization

S&T will work with equipment manufacturers to conduct research, development, and testing of stakeholder-approved designs. Testing will include computer modeling and simulation, as well as crash dummy tests.

The data from these tests will be used to establish standards with the Society of Automotive Engineers (SAE); in turn, SAE-approved standards will be submitted for inclusion in the Second Edition of the National Fire Protection Association's (NFPA) 1917 standard.

S&T, NIOSH, and NIST will jointly publish the Ambulance Safety and Design Guide, which will provide human factor guidelines and other criteria. EMS providers will be able to use the guide to write and submit ambulance design



criteria to manufacturers as part of their ambulance purchasing requirements. The guide will also include lessons learned and best practices for improved transportation, as well as a driver's guide.

Standards will directly impact patient and EMS personnel safety

This three-year project has improved design standards for ambulances and has assisted manufacturers by advancing research, design, and equipment safety. This most recent body of work builds on previous test and evaluation efforts at NIOSH by including results from automotive style crash testing, computer modeling, and simulation in the safety and design standards and guidelines.

