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What you need to know about ambulance safety & standards

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What is it that we need to know about ambulance safety? How do we digest the information that's put forward by manufacturers? Does KKK-A-1822 compliance mean the ambulance can endure a crash? What's safe and what isn't? What works and what doesn't? And where do we go to find out?

The interior of this Dlouhy Sprinter from RETTmobil 2008 features a special elevating platform for the stretcher, secure lockdowns for equipment and folding seats. Notice the absence of hazards in the head strike zone.

PHOTO COURTESY KEN BEERS/EMS SAFETY FOUNDATION

A DISCONNECT

Since the 1960s, when we left the Cadillac and went into the "box," we essentially lost the safety oversight of the automotive industry. What has been the status quo in the ambulance vehicle industry since then hasn't matched what's standard in the automotive and transportation industry.

Extensive data now highlights some of the strengths and weaknesses of how we address the transportation safety aspects of EMS. Data currently demonstrate that per mile traveled per vehicle, ambulances are one of the most hazardous vehicles on the road.[1]

Concept vehicles are on the market, but where are the data and automotive safety oversight to support these modifications? Automotive safety experts have raised serious concerns about the safety of these vehicles built outside the purview of technical experts in occupant protection and vehicle crashworthiness.[2]

Would you dare to administer medication that was demonstrated by clinical experts to be unacceptably toxic? Would you use equipment that had been known for 10 years to be unsafe or, worse yet, lethal? No. So why aren't we holding ourselves to the same standard when it comes to the vehicles we ride in every shift?

A SHIFT IN STANDARDS

It might come as quite a surprise, but neither the KKK Ambulance Specification nor the Ambulance Manufacturers Division (AMD) Standards are standards of occupant crash protection or vehicle crashworthiness. In fact, in some areas, they even conflict with current technical automotive safety engineering practices.[3]

KKK- or AMD- compliance doesn't demonstrate that an ambulance is crashworthy or will protect occupants in the rear patient compartment in the event of a crash. Although KKK and AMD default to the Federal Motor Vehicle Safety Standards (FMVSS), these standards have a special exemption for ambulances.[4] So once we're positioned in the rear compartment, just 600 mm (2 ft.) behind the seating reference point of the driver's chair, the FMVSS are largely exempt from protecting us. Thus, our safety choices—such as effectively securing equipment, wearing lapbelts and applying safe vehicle operations—are paramount.

Bigger isn't always better. The rest of the world is moving toward compact vehicles that offer fuel economy and lower price tags. These ambulances are designed by automotive safety experts and create an environment in which providers can easily reach patients and equipment while belted and which are demonstrated to be crashworthy. Fortunately, what has historically been considered safe is being challenged in the U.S., and in a fashion that's strongly driven by data and evidence.

The new Subcommittee on EMS Transportation Safety of the National Academies Transportation Research Board and the interdisciplinary Ambulance Transportation Safety Task Force are holding an Ambulance Safety Summit in November. Also, the non-profit EMS Safety Foundation has taken a delegation to Europe to look at safety practices at RETTmobil and will share highlights from its trip at the 2009

EMS Today Conference and Exposition and via Webinars. These are two examples of how organizations with technical experts are contributing to enhance our understanding of safer ambulance transport.

The importance of this issue is highlighted by the recent National Fire Protection Association focus on ambulance vehicle safety standards.[5] Essential to the development of such vehicle standards is the need for input from transportation, automotive safety, injury and impact biomechanics, and human factors technical experts and data. Creating a standard takes time, even years, and it's imperative to have access to the best safety information available while these processes are underway.

WHERE WE'RE GOING

When it comes to crash safety, the accepted standard is dynamic crash testing, not static pull tests.[1-3] In the automotive world, crash testing is related to real-world injury data. The mechanism and data on how injuries occur in crashes is fed back into the development of the testing, and as a result, to the safety enhancements of the vehicle and, importantly, the standards.

Although dynamic crash testing is the method to test the occupant safety of a vehicle, not all dynamic crash tests are the same. Without standards for how tests should be conducted, some of these tests can be meaningless or misleading. Intrusion into the patient compartment cannot be determined from simple deceleration testing (sled tests). Although being thrown against the bulkhead is a serious hazard, intrusion into the patient compartment is one of the real risks that we face (see crash photo).

For optimal safety, current data suggests a compact vehicle, a well-designed interior with minimal possible injury hazards, forward- and rear-facing seats, and patients secured in over-the-shoulder belts in the longitudinal direction on the stretcher. Also, crashworthy, energy-absorbing features should be designed to address *all* occupants, not just those in the front. All essential equipment should be accessible and effectively secured. Manufacturers should ensure there are no head strike hazards present in the head-impact zone. Squad-bench occupants should wear the lap belt low over the pelvis and avoid using four- or five-point harnesses on side-facing seating. Many serious crashes are frontal crashes, and such harnesses have been shown by the world's leading automotive safety engineers to be highly hazardous when seated sideways.[6]

Other aspects important to the overall safety of the vehicle are enhanced stability control, scientifically proven enhanced visibility markings, and operations policies designed to optimize fleet safety performance, such as the ANSI/ASSE Z.15 Standard.[7] We can learn a lot about fleet safety management from commercial fleet operations and the Federal Motor Carrier Safety Administration.

PHOTO CHUCK SNYDER

This fatal crash in June highlights the need for meaningful vehicle safety testing standards, based on injury and fatality data and crashworthiness performance. The patient and one provider died.

Independent studies demonstrating the effectiveness of aftermarket safety devices are rare. One such device that has been independently validated has demonstrated significant safety benefits in the EMS environment. This device monitors operator safety performance and provides immediate auditory feedback. Study results demonstrate a 1,000-fold improvement in safety proxies and a major decrease in crash rate and severity, as well as an improvement in vehicle maintenance expenses and response times.[8]

CONCLUSION

In the absence of meaningful federal standards, our challenge is to identify best practices in vehicle safety. Watch for new developments in vehicles, technology, policies and standards that will save lives, time and money. First, be sure your purchases pass muster with independent safety experts and have been through meaningful testing. Our providers, patients and the public deserve the safest and most efficient vehicles available. JEMS

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RESOURCES

- National Academies Transportation Research Board: www.trb.org
- Federal Motor Carrier Safety Administration: www.fmcsa.dot.gov
- U.S. General Services Administration: www.gsa.gov/automotive
- Global EMS Forum: www.globalemsforum.org
- Ambulance Visibility: www.ambulancevisibility.com
- Objective Safety: www.objectivesafety.net
- EMS Safety Foundation: www.EMSSafetyFoundation.org