

USA Ambulance Transport Safety Challenges – what are we really measuring?



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Rationale:

Ambulance service is part of a complex transportation system, which historically and currently operates in a high risk transport operational manner. Measurement of the transport safety of this system has not been a focus of system performance analysis – rather it has been mean response time that has been the outcome measurement. Recent research has highlighted the transport hazards of EMS and ambulance transport systems.

Introduction:

To enhance the system safety of EMS transport, it is key to have a measure of the denominator (fleet size, type) and the numerator ambulance vehicle crashes. This projects objective is to determine the technical challenges in measurement of USA EMS transport safety.

Methods:

Transport safety data capture system guidelines were identified and searched for ambulance references and definitions. Sources for denominator data of vehicle type and number were sought. A review of ambulance fatal crash data by state was conducted over a 10 year period (1996-2006). Ambulance vehicle transport safety based on Fatality Analysis Reporting System (FARS), published studies and sample data was compared with other commercial vehicles from the Federal Motor Carrier Safety Administration (FMCSA) reports and Motor Carrier Management Information System (MCMIS) database (1996-2006).

Results:

No formal national database exist for EMS fleet size, vehicle type or miles traveled. Estimate information for fleet size is compiled by one of the EMS magazines with a figure of ~50,000 vehicles suggested. Search of the transport safety data standard 'Manual for Classification of Motor Vehicle Traffic Accidents' ANSI D16.1-2007 (Fig 1), revealed no reference to 'ambulance vehicles' and 2 references to 'emergency vehicles'. Search of Model Minimum Uniform Crash Criteria (MMUCC) 2008 (Fig 1) revealed 5 references to ambulances. The MMUCC definition for 'ambulance' was both outdated (Fig 2) and confounded with the 'fire truck' definition (Fig 2). Emergency response definition was unclear and variable in its interpretation (Fig 3). There was no definition of an ambulance crash. State based ambulance crash fatality data was absent in 20% of the USA States traffic record data (Fig 4), and the field for identifying ambulance crashes was not delineated for the majority of State traffic data systems. The FARS database uses this state data to compile its national reports. Though commercial vehicles and their miles traveled have increased 20% (1996-2006), the total fatal and injury crashes have decreased 7% and 14% respectively and fatal and crash injury rates decreased 47% and 30% respectively. Ambulances are exempt from FMCSA and MCMIS so such trend data is not available, however the FARS data show no such trend in reduction of total number of fatalities for EMS. Based on comparisons of MCMIS commercial vehicle data with both FARS data and sample data, commercial vehicles had lower crash and fatality rates per vehicle and mile traveled than ambulances.



Fig 2. MMUCC Ambulance and Fire Truck definitions



Fig 3. MMUCC Emergency Response Motor Vehicle Use definitions



Fig 4. Ambulance crash fatalities per State per 100 million population from 1996-2006 FARS - Data capture was absent for EMS transport fatalities for 20% of the nation over 10 years

Discussion:

Much of the epidemiological research on the magnitude of ambulance crash injury and fatality burden in the USA is based on the FARS data set. It is key to ensure and understand the limitations of this data base, to address the adage of 'garbage in garbage out'. Furthermore the absence of true denominator data, poor definitions, absent data and the exemptions from commercial vehicle fleet safety oversight further compound the lack of clarity of the burden of ambulance transport safety issues, and result in a unidirectional bias.

Conclusion:

There is a lack of national data to identify the magnitude and nature of the EMS fleet in the USA and deficiencies in the manner in which ambulance crash and fatality data is captured. Any analysis of data on USA ambulance vehicle collisions should take into account the manner in which this data is captured and be cognizant of the failures of reliable data capture and the potential for a unidirectional bias. Despite this, EMS fleets still have higher crash and fatality rates per vehicle and mile traveled than commercial large truck fleets. Furthermore - it is the responsibility of the leadership in the EMS community to ensure that there is proper EMS-relevant input to the ongoing development and operation of these transport data bases.



Fig. 1 D16.1-2007 and MMUCC 2008 documents

References:

1. MMUCC – Model Minimum Uniform Crash Criteria (MMUCC) 3rd Edition, July 2008
2. ANSI D16- 7th Edition Manual on Classification of Motor Vehicle Traffic Accidents, 2007
3. Federal Motor Carrier Safety Administration, (FMCSA), Large Truck and Bus Crash Facts 2008, March 2010
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