

# Surveillance of Occupational Fatalities, Injuries and Exposures among EMS Personnel Using State-Based NEMSIS Data

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**INTRODUCTION:** The full extent and nature of occupational injuries and exposures among EMS workers is not known because there is not adequate surveillance of this worker population. One potential source for national surveillance data is the National EMS Information System (NEMSIS). Currently, 49 US states and 3 territories routinely collect—often in near-real time—data on the geographic, demographic, clinical, responder (crew), and operational characteristics of all or nearly all responses made by transporting EMS units (ambulances) according to the NEMSIS standards promulgated by the National Highway Traffic Safety Administration (NHTSA). A number of data elements in the latest version of the NEMSIS standards (version 3) are designed to capture information relevant to the safety and health of EMS personnel, including the occurrence and nature of any fatalities, injuries or exposures to the responding crew members and their use of PPE, providing an opportunity for occupational health surveillance. However, states do not send data for these variables to be included in the NEMSIS national dataset. The use of EMS response data as a source for occupational health surveillance, therefore, must involve partnering with state EMS authorities. This opportunity is nevertheless appealing because it takes advantage of preexisting data that was designed to be collected and used to document occupational safety and health of EMS personnel but, until now, has not been utilized for that purpose. Although it is possible to do so, to date there has been no national effort to aggregate NEMSIS data from multiple states for occupational health surveillance of EMS personnel. The National Institute for Occupational Safety and Health (NIOSH) has therefore undertaken a three-year project that will demonstrate the feasibility of, and lay the procedural and methodological groundwork for, the use of state EMS response data for ongoing, national surveillance of occupational injury and exposure among EMS personnel by piloting the concept with two U.S. state partners.

**OBJECTIVE:** To describe the initial quantity, quality, and completeness of data submitted to NIOSH by state partners for the purpose of occupational health surveillance and to report initial injury and exposure rates based on those data.

**METHODS:** NIOSH partnered with two states, State A and State B, which collect all NEMSIS version 3 data elements relating to personal protective equipment (PPE) use by and occupational fatalities, injuries and exposures to EMS personnel: eOther.03, eOther.05, and eOther.06. NEMSIS version 3 captures data on the occurrence of 12 specific categories of three event types: fatality (3 categories), injury (2 categories), and exposure (6 infectious and 1 toxic categories), as well as an “Other” category. NIOSH developed methods and procedures to receive, aggregate and analyze NEMSIS data files shared by state partners on a quarterly basis. Data completeness and quality were evaluated in terms of the proportion of records with missing, “Not Recorded,” or “Not Reporting” values for each occupational health-related data element. Incidence rates were calculated for fatalities, injuries and exposures as the number of events occurring per 10,000 EMS responses. Counts and rates for specific fatality, injury and exposure categories are not reported due to small cell sizes.

**RESULTS:** Both participating states initially submitted data covering the 1-year period November 1, 2016 to October 30, 2017.

State A submitted data for 363,832 EMS responses. PPE data were missing for 19.6% of responses. Data on the occurrence of occupational fatalities, injuries and exposures were missing for 0.7% of responses. Data on the

type of fatality, injury or exposure were missing for 20.3% of responses and 37.2% of all non-missing fatality, injury or exposure values (multiple values are possible for each response) were “Not Recorded” or “Not Reporting.” “None” is a valid, non-missing value for this variable when no crew member fatalities, injuries or exposures occurred on the response. A total of 2,157 fatality, injury, or exposure events were reported, involving 1,464 distinct EMS responses. Dividing by the 361,137 responses for which data on the occurrence of occupational fatalities, injuries, and exposures were available yields an overall rate of 59.7 events per 10,000 EMS responses. Of the incidents for which information of the type of event was available, twenty-three deaths were reported, resulting in an overall fatality rate of 0.63 deaths per 10,000 EMS responses. Two hundred sixty-one injuries were reported for an overall rate of 7.2 injuries per 10,000 responses. One hundred-five infectious or toxic exposures were reported for an overall rate of 2.9 exposures per 10,000 responses. The remaining incidents either did not have an event type recorded or were recorded as “Other.”

State B submitted data for 850,809 EMS responses. PPE data were missing for 80.2% of responses. Data on the occurrence of occupational fatalities, injuries, and exposures were missing for 43.0% of responses. Data on the type of fatality, injury, or exposure were missing for 50.7% of responses and 3.8% of all non-missing fatality, injury or exposure values were “Not Recorded” or “Not Reporting.” A total of 140 injury events were reported, involving 130 distinct EMS responses. Dividing by the 484,961 responses for which data on the occurrence of occupational fatalities, injuries and exposures was available yields an overall rate of 2.3 events per 10,000 EMS responses. No fatalities or exposure events were reported.

**CONCLUSION:** State-based EMS response data collected according to NEMSIS standards is a promising data source for timely occupational health surveillance of EMS personnel. Since the informatics infrastructure and data standards already exists, the use of NEMSIS data for surveillance could be rapidly and efficiently scaled up and potentially extended to nearly every state in the country if the methodology and procedures developed for this project prove feasible in the pilot states. However, the quality and completeness of the data initially submitted by states to NIOSH was poor, with unacceptably high proportions of missing and “Not Recorded” data values. Data quality and completeness is likely to improve over time as states continue to fully implement the NEMSIS version 3 standards and as EMS providers become more familiar with the collection of occupational health data elements. Nevertheless, sustained effort will be required on the part of state EMS authorities to improve data collection quality before the results of surveillance analyses can be considered reliable. Targeted educational interventions promoting the complete and correct recording and reporting of all NEMSIS data elements relating to fatalities, injuries, and exposures to and PPE use by EMS personnel were implemented by EMS authorities and academic partners in both pilot states in December 2017. Follow up promotional activities intended to reinforce the original messaging and to provide feedback on data quality trends to EMS providers are planned in both states in 2018 and 2019.

Demonstrating the feasibility of using state-based NEMSIS response data for occupational health surveillance of EMS personnel in the participating pilot states will ultimately lead to improved national surveillance by encouraging the more complete collection and broader use of this data, either as part of a national system operated at the federal level, by individual states themselves, or by both. When fully implemented, it will also contribute to prevention efforts by better quantifying and characterizing occupational injury and exposure among EMS personnel. For example, by identifying demographic, clinical, operational, and other risk factors for injury and exposure, trends can be identified and targeted interventions can be developed and implemented that will decrease illness, injuries, and fatalities in the EMS worker population. Furthermore, the findings from this project will help to inform and improve EMS safety policy and practice, including safer ambulance design, and proper infection control and PPE practices.