Published in final edited form as:

J Trauma Acute Care Surg. 2017 August ; 83(2): 237–240. doi:10.1097/TA.0000000000001528.

Population-Based Estimate of Trauma-Related Deaths for Law Enforcement Personnel: Risks for Death Are Higher and Increasing over Time

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Abstract

OBJECTIVE—Trauma-related deaths remain an important public health problem. One group susceptible to death due to traumatic mechanisms is U.S. Law Enforcement (LE). We hypothesized that LE officers experienced a higher chance of violent death compared to the general U.S. population and that risks have increased over time.

METHODS—The National Institute on Occupational Safety and Health (NIOSH) National Occupational Mortality Surveillance (NOMS) is a population-based survey of occupational deaths. It includes data for workers who died during 1985–1998 in one of 30 U.S. states (EARLY period). Additional deaths were added from 23 U.S. states in 1999, 2003–2004, 2007–2010 (LATE period). Mortality rates are estimated by calculating proportionate mortality ratios (PMR). A PMR above 100 is considered to exceed the average background risk for all occupations. All adults >18 years of age whose primary occupation was listed as “Law Enforcement Worker” were included in the analysis.

RESULTS—Law enforcement personnel were more likely to die from an injury compared to the general population (Figure 1). The overall PMR for injury in EARLY was 111 (95% Confidence

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Conflicts of Interest: None

Meeting Presentation:

Oral Presentation at the AAST 75th Annual Meeting. September 2016. Waikoloa, HI

This study was presented at the 75th Meeting of the American Association for the Surgery of Trauma, September 15, 2016, Kona, HI.

Disclosures of Funding Received:

Kristan Staudenmayer’s research is supported by National Institute on Aging, National Institutes of Health; award number 1K08AG04442801A1

Kristan Staudenmayer is also supported by the Betty and Gordon More Faculty Scholarship.

Interval [CI] 108–114, $p<0.01$), and for LATE was 118 (95% CI 110–127, $p<0.01$). Four mechanisms of death reached statistical significance: motor vehicle traffic (MVT)-driver, MVT-other, intentional self-harm, and assault/homicide. The highest PMR in EARLY was associated with firearms (PMR 272, 95% CI 207–350, $p<0.01$). The highest PMR in LATE was associated with death due to being a driver in an MVT (PMR 194, 95% CI 169–222, $p<0.01$). There were differences in risk of death by race and gender. White females had the highest PMR due to Assault and Homicide (PMR 317, 95% CI 164–554, $p<0.01$). All groups had similar risks of death due to Intentional Self-Harm (PMR 130–171).

CONCLUSIONS—The risk of death for US LEOs is high and increasing over time, suggesting an at-risk population that requires further interventions. Targeted efforts based on risk factors, such as gender and race, may assist with the development of prevention programs for this population.

Keywords

law enforcement; injuries; mortality; policing; occupational risk; proportional mortality ratio

Introduction

Recent media coverage of violence towards law enforcement personnel has highlighted the dangers associated with policing. However, media attention fails to describe the entire burden of risk that includes not just violence, but other accidents and self-harm. There is evidence that the life expectancy of police officers is shorter than the general U.S. population. A small study consisting of male police officers from Buffalo, NY, found that mean life expectancy for police officers was 22 years shorter than matched controls. [8] However, the lack of a registry or tracking system to account for the risk of death associated with the profession has limited the ability to draw conclusions about the risks of death for officers across the United States. In fact, while some prominent authors have advocated a comprehensive, public health approach to the problem of “legal intervention deaths” and deaths of law enforcement officers [1], the limitations of our current surveillance and data acquisition systems make a meaningful, direct analysis nearly impossible.

We hypothesized that law enforcement officers experience higher death rates due to traumatic mechanisms compared to the U.S. population and that there has been an increase in the risk of death for law enforcement personnel over time. To address this, we used the National Occupational Mortality Surveillance (NOMS) database.[2] The NOMS is created by the National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, and is a population-based surveillance program to monitor trends in mortality based on occupation and industry while controlling for demographic characteristics. These data were used to determine mortality ratios for law enforcement personnel compared to the general population, and over a two-decade period of time.

Methods

Data Source

The NIOSH National Occupational Mortality Surveillance (NOMS) provides a population-based surveillance of acute and chronic disease mortality associated with occupation and

industry. It is intended to be used to explore the scope of disease by occupation, and can be used to evaluate these risks over time. The program is state-based and includes data for workers who died during the period 1985–1998 in one of 30 U.S. states. Additional deaths were added from 23 U.S. states in 1999, 2003–2004, 2007–2010. Results are provided for these two separate clusters separately by the program. We defined the 1985–1998 estimates as the “Early Period,” and estimates from 1999 and later as a “Late Period.” Deaths are assigned a cause of death using International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes.

Mortality rates are estimated by calculating proportionate mortality ratios (PMR). The Proportionate Mortality Ratio Analysis System (PMRAS) calculates PMRs by comparing the proportion of deaths from a specified cause within a specified occupation or industry group with the proportion of deaths due to that cause among all decedents and age-adjusts after stratification on race or ethnicity. PMRs are helpful when true death rates cannot be calculated. A PMR above 100 is considered to exceed the average background risk for all occupations. All rates presented below represent PMR estimates generated by NOMS.

Patient Selection Analysis

We divided the query into two parts. The first was to determine death rates associated with External Cause-of-Injury code (E-code). The second was to focus specifically on traumatic mechanisms which are common in the U.S. population. The three most common causes for death in the U.S. population due to injury include motor vehicle traffic related deaths, firearm-related deaths, and fall-related injuries.[3] Given that fall-related deaths are associated with advanced age, we focused on motor vehicle traffic related deaths and deaths due to assault, firearms, and self-harm. Of note, Motor Vehicle Traffic (MVT) related deaths were further divided into drivers, passengers, pedestrians, and other. All adults (>18 years) whose primary occupation was listed as “Law Enforcement Worker” were included in the analysis. The population was further divided by sex and race.

Results

Law enforcement personnel were more likely to die from injury or poisoning compared to the general population, and the risks increased over time. For the early period, the PMR was 111 (95% Confidence Interval [CI] 108–114, $p<0.01$), and for the later time period it was 118 (95% CI 110–127, $p<0.01$).

We next queried the rate of death by traumatic mechanisms of injury. The highest death ratio by mechanism for all years was death to drivers in MVTs (PMR 194, 95% CI 169–222, $p<0.01$). Law enforcement deaths due to any MVT (including driver, passenger, other, and pedestrian) and intentional injuries (including Intentional Self-Harm, Assault and Homicide, and Accident Caused by Firearm Missile) were next compared between the early and late time periods. (Figure 1) The highest PMR in the early time period was Accident Caused by Firearm Missile (PMR 272, 95% CI 207–350, $p<0.01$). In the later time periods, death ratios due to Accident Caused by Firearm Missiles were lower; however, this ratio had wide confidence intervals and lacked statistical significance (PMR 138, 95% CI 59–271). The

highest PMR for the later time period was due to being a driver in a MVT (PMR 194, 95% CI 169–222, $p<0.01$).

Three mechanisms had PMRs that were statistically significant across both time periods and therefore could be reliably compared. These included MVT-Driver, MVT-Other and Unspecified Person, and Intentional Self-Harm. For these causes of death, ratios were 14–54% higher in later time periods compared to early time periods.

Mortality ratios for intentional causes of injury were explored by race and sex for the later time period. (Figure 2) Of note, PMR calculations for the mechanism of Accident Caused by Firearm Missile was not sufficiently powered in the later time period when broken down by demographics to be compared so are not included in the analysis. Therefore, only MVT and other intentional injuries were evaluated. White female law enforcement officers had the highest PMR for death due to Assault and Homicide (PMR 335, 95% CI 223–485, $p<0.01$). Black males were less likely to die from Assault and Homicide than the general population (PMR 40, 95% CI 25–61, $p<.001$). Intentional Self-Harm PMRs were higher for males of both races, and for white females.

Discussion

Police officers die at a higher rate than the general population from multiple violent mechanisms, but are at particular risk for death from motor vehicle trauma and self-harm. Common themes emerge across traditional societal boundaries that may represent targets for trauma center intervention. There are several aspects of this study that deserve further discussion.

The first is that mortality rates due to Motor Vehicle Traffic-related incidents are higher than the background population. To our knowledge, this has not been previously described. The higher death rates in law enforcement personnel exist despite a 25% reduction in motor vehicle fatalities among the U.S. population over the last decade[4], as well as marked improvements in distracted driving[5] and vehicle design/safety equipment[6]. In a prior review of the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS), conducted from 1996–2007, the proportion of fatal crashed decreased markedly in the general population. Similar decreases were not seen in law-enforcement related crashes.[7] It cannot be determined if the increased risk of dying by a motor vehicle collision occurs while on the job or off, but regardless, law enforcement officers face a greater risk than the general population creating an opportunity for intervention. Interventions to reduce MVT related deaths have been crafted for other professions. For example, when faced with multiple crash-related business challenges, the United Parcel Service (UPS) made wholesale changes in many aspects of vehicle operations. UPS subsequently became one of the safest and most profitable delivery companies on the planet simply by improving the way their vehicles were operated while on the road. While some work on this front has already been done, our findings suggest police departments around the country should similarly continue to increase focus on addressing this significant cause of death.

Another important finding of this study is that mortality due to intentional self-harm has remained steady and high across both time periods. This is true for females and males, with the only exclusion being black females in more recent years. What is also notable is that intentional self-harm has not changed over the years, in contrast to many of the other mechanisms. These findings are supported by other published work. [8] Working from data collected as a part of the U.S. Department of Justice's Public Safety Officers Benefit program, Violanti et al looked at suicide in law enforcement officers. They found differences in suicide rates by the size of departments, with smaller departments seeming to have higher rates—a striking finding considering they tend to have less in the way of resources for prevention but thought to have closer relationships among a limited number of personnel.[9] Another study out of Israel looked at the role of firearm access and suicide rates in adolescent soldiers. [10] To reduce firearm-related suicides, the military mandated that soldiers not bring weapons home during weekend leave. After this policy, there was a 50% reduction in suicide rates on the weekend; the weekday rate remained unchanged. These findings should spark a discussion around interventions to prevent self-harm for law enforcement personnel.

There are some efforts underway in the US. For example, methods such as better pre-employment screening, the adaptation of improved resiliency training and the destigmatization of mental health have been tried. Unfortunately, these efforts have not been sufficient given the persistence of the disparity in deaths due to this cause.

Another finding of the current study is that death rates due to assaults and homicides are higher for law enforcement personnel than the general U.S. population. This is particularly true for female law enforcement personnel of both races. The reasons for this are not clear and these risks particular to female LEOs have not been previously described in the trauma literature. It is also not clear whether this occurs on the job or off. The higher death rates may be due, in part, to the fact that female law enforcement personnel experience domestic violence more often than the U.S. population. [9, 10] Regardless of how or where these types of death occur, these findings suggest a more in-depth analysis be undertaken as to why this is occurring.

There are several limitations to the current study. Most importantly, the PMR calculations represent population-based estimates of mortality rates. Estimates may be affected by misclassification of occupation or associated cause of death. Furthermore, the NOMS database lacks information on how long the person was employed in law enforcement, or whether the death occurred while in the line duty. However, given that law enforcement personnel are likely to experience the highest risk of death due to a violent cause in the line of duty, the estimates are likely accurate proxies for occupation-related risks. Despite these limitations, the NOMS database is large and covers a wide geographic area, making it a powerful tool to develop mortality ratios.

Conclusions

Police officers in the United States have a higher risk of death from violent causes than their counterparts in the civilian population, and the current study allows for a more targeted

evaluation of these risks. Next steps should involve a deeper dive into specific mechanisms and subgroups in order to better support the critical job of law enforcement.

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Figure 1.
Motor Vehicle Traffic and Intentional Injury Related Mortality Rates for Law Enforcement Personnel.

Figure 2.
Mortality Rates for Law Enforcement Personnel, Late Time Period, by Race and Sex