1 TITLE

2 Use of proactive risk management to reduce emergency service vehicle incidents

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21 **ABSTRACT**

Background: Emergency service vehicle incidents (ESVIs), including rollovers, and collisions with other vehicles and fixed objects, are a leading cause of death among US firefighters. Risk management (RM) is a proactive approach to identifying and mitigating occupational risks and hazards. The goal of this study was to assess the effect of RM in reducing ESVIs.

26 Methods: Three fire departments (A, B and C), representing urban and suburban geographies, and 27 serving medium to large populations, participated in facilitated RM programs to reduce their ESVIs. 28 Interventions were chosen by each department to address their department-specific circumstances and 29 highest risks. Monthly crash rates per 10,000 calls were calculated for each department an average of 28 30 months before and 23 months after the start of the RM programs. Interrupted time series analysis was 31 used to assess the effect of the RM programs on monthly crash rates, and Poisson regression was used to 32 estimate the number of crashes avoided. Economic data from Department A were analyzed to estimate 33 cost savings.

Results: Department A had a 15.4% (P=0.30) reduction in the overall monthly crash rate immediately post-RM and a 1% (P=0.18) decline per month thereafter. The estimated two-year average cost savings due to 167 crashes avoided was \$253,100 (95%CI= \$192,355 – \$313,885). Department B had a 9.7% (P=0.70) increase in the overall monthly crash rate immediately post-RM and showed no significant changes in their monthly crash rate. Department C had a 28.4% (P=0.001) reduction in overall monthly crash rate immediately post-RM and a 1.2% (P=0.09) increase per month thereafter, with an estimated 122 crashes avoided.

41 Conclusions: Proactive RM programs have the potential to reduce ESVIs in the fire service and their
42 associated costs, but the results may vary based on the interventions chosen and how they are
43 implemented.

44 **KEYWORDS**

- 45 Risk Management, Fire Service, Safety and Health, Traffic Accidents, Time Series Analysis, Crash
- 46 Prevention, Outcomes, Evaluation