Workload Disparities Among EMS Crew Members: An Analysis of Team Configurations with Respect to Professional Certificates and Shift Dynamics

Setareh Darvishi
Faculty: Laila Cure
Department of Industrial Engineering, College of Engineering

Objective We sought to use one-year worth of operational data of a medium-sized urban ambulance service coupled with assessments of workload to determine: 1) whether there are significant differences between the workload experienced throughout a shift by members of the same crew but with different professional certifications, 2) if workload differences exist across different stations, and 3) to develop crew configuration and station recommendations to minimize the workload of EMS clinicians. Method We mapped one year of an emergency medical services system's dispatch data to members' workload estimates measured using the Visual, Auditory, Cognitive and Psychomotor (VACP) approach. Then, we compared the workload estimates at different stations and shifts considering the lead or support roles that members often assume. Results Paramedics experience higher time-weighted average workload when assigned a basic emergency medical technician (EMT) partner, regardless of call volume, across several shifts at different stations, and lead crew members experience higher time-weighted average workload levels compared to support members overall, and across all the four different shifts. We also found that workload estimates for members on homogeneous crews were generally lower than for those on heterogeneous crews across various shifts and stations, suggesting a more balanced workload distribution due to the equal professional certifications of members. These results helped outline crew configuration recommendations for all stations and shifts in the collaborating systems, along with more generalizable variables, such as minimum number of staffed crews, shift type, and 30-day moving frequency of calls requiring a fast response using lights and sirens response, which we found to significantly impact the recommended crew configurations using logistic regression and decision tree algorithms. Conclusion The workload of ambulance crew members depends on crew configuration and station assignment, not just call volume. Ambulance service administrators and operations management personnel should consider these factors when making assignment decisions to inform a more refined approach in support of clinicians' well-being. Keywords: Emergency Medical Services (EMS), workload analysis, crew configuration.