

## Dynamic Ambulance Deployment to Reduce Ambulance Response Times Using Geographic Information Systems

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**Abstract :** Developed countries are losing many lives to non-communicable diseases as compared to their developing counterparts. The effects of these diseases are mostly sudden and manifest at a very short time prior to death or a dangerous attack and this has consolidated the significance of emergency medical system (EMS) as one of the vital areas of healthcare service delivery. The primary objective of this research is to reduce ambulance response times (RT) of Eskişehir province EMS since a number of studies have established a relationship between ambulance response times and survival chances of patients especially out of hospital cardiac arrest (OHCA) victims. It has been found out that patients who receive out of hospital medical attention in few (4) minutes after cardiac arrest because of low ambulance response times stand higher chances of survival than their counterparts who take longer times (more than 12 minutes) to receive out of hospital medical care because of higher ambulance response times. The study will make use of geographic information systems (GIS) technology to dynamically reallocate ambulance resources according to demand and time so as to reduce ambulance response times. Geospatial-time distribution of ambulance calls (demand) will be used as a basis for optimal ambulance deployment using system status management (SSM) strategy to achieve much demand coverage with the same number of ambulance resources to cause response time reduction. Drive-time polygons will be used to come up with time specific facility coverage areas and suggesting additional facility candidate sites where ambulance resources can be moved to serve higher demands making use of network analysis techniques. Emergency Ambulance calls' data from 1st January 2014 to 31st December 2014 obtained from Eskişehir province health directorate will be used in this study. This study will focus on the reduction of ambulance response times which is a key Emergency Medical Services performance indicator.

**Keywords :** emergency medical services, system status management, ambulance response times, geographic information system, geospatial-time distribution, out of hospital cardiac arrest

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