



Geographic insights highlight how to cut ambulance response times

Emergency Medical Services (EMS) plays an important role in health service provision.

It provides communities with a system that oversees the coordination of medical personnel, facilities and equipment to ensure healthcare services are delivered in the most efficient way possible.

Furthermore, it aims to reduce the morbidity and mortality of patients involved in out-of-hospital medical and trauma events.

In a recent study conducted by medical researchers from Singapore General Hospital, SingHealth, Singapore Civil Defence Force (SCDF) and National University of Singapore school of public health, analysis has shown ambulance response time is an important modifier that can potentially help save more lives.



The findings suggested that more ambulances be positioned near activity hotspots at peak times. By doing so, ambulances would reach emergencies more quickly.

This is especially critical for time sensitive medical conditions such as trauma and cardiac arrests – where delays could worsen a patient’s condition.

Researchers explored how a reduction of ambulance response time could improve clinical outcomes as the ambulance crews are usually the EMS system’s first point of physical contact with a patient.

The study revealed that ‘call arrival’ rates vary across different times of the day, and different days of the week. For example, the average call volume for Monday was the highest compared to other days in the week.

Interestingly, the call arrival rates also varied spatially across postal districts. Within each district, the frequency and location of emergency calls were also found to vary across different building types.

In order to cost-effectively improve ambulance response times, researchers used the ArcGIS platform to develop a discrete-event simulation (DES) model for Singapore’s EMS – based on information taken over a six-month period between May and October 2009.

Using advanced geospatial analytics delivered through the ArcGIS platform, researchers were able to model the complexities of Singapore’s EMS, allowing them to study trends and patterns, and evaluate existing operational strategies.

Researchers have found most of the daytime calls come from the commercial and business districts, while calls at night are from the residential areas. In addition, the region that produced the most calls was the east, where the population density is high, while individual neighbourhoods in the northeast generated quite a substantial demand as well.

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These findings were then visualised on a dynamic smart map to show the researchers and stakeholders the demand clusters, intensity maps and hotspots of where the calls were made and the location of the nearest ambulance.

Furthermore, since travel time estimation also forms an important consideration in the model, the ideal travel times were projected using the ArcGIS platform and a correction factor was computed based on the ratio of historical ambulance travel times to the ideal travel time.

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It also underscored the importance of using GIS technology as a simple, mission-critical tool, which can be leveraged to make more informed decisions around the effective and efficient deployment of resources.



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