Methodology

I began by sourcing shooting data from the Chicago Tribune’s crime database and joining this information with Chicago neighborhood polygons. I created a buffer two separate buffers—one dissolved buffer around 2016 trauma centers and one buffer around the Holy Cross Hospital. For maps on the left side, I employed the “select by location” between buffers and shooting locations to find the percent coverage (reported in results section).

For the network analysis, I used a road network shapefile to construct possible routes from neighborhood centroids (calculated using each polygon’s latitude/longitude data) and the hospitals. I performed a comparative network analysis on ambulance travel times before and after the center’s opening.

Trauma Coverage after Proposed Holy Cross Site

Ambulance Routes after Proposed Holy Cross Site

Results and Discussion

Approximately 66% of shootings were covered within a 5-mile radius of the 2016 trauma centers. With the proposed Holy Cross center opening in 2018, roughly 84% of shootings would be covered. This represents a 18 percent increase in coverage for shootings, but it also leaves 16% of shootings underserved.

For the 2016 network analysis, the mean travel time from neighborhood centroids within a 5-mile radius of an existing trauma centers was 5.63 minutes. In contrast, the mean travel time for neighborhood centroids outside a 5-mile radius was 10.66 minutes. When accounting for the 5 minute addition to travel times, these figures became 10.63 minutes and 15.66 minutes respectively.

For the 2018 network analysis, an interesting piece of data was the reduction in travel time for neighborhood centroids whose routes were redirected to the proposed Holy Cross trauma center. When these neighborhoods were sent to 2016 trauma centers, they averaged an 8.87 minute travel time (or 13.87 when accounting for 5 minute addition). When directed to Holy Cross, however, they averaged a 4.58 minute travel time (or 9.58 minutes). This represents a 4.58 minute decrease in ambulance travel time.

Some neighborhoods were newly incorporated in Holy Cross’s 5-mile radius, but they were not redirected to the center, indicating that their original route was still the fastest path to a hospital. In contrast, some neighborhoods outside of its radius found a quicker route to the new center. This data highlights the failure of the “5-mile radius” measure to fully predict increased access to trauma centers based on travel time.

Limitations

There are some errors in these analysis. Firstly, the ambulance travel times use distance and speed limits to make rough approximations of actual transport times. Information on traffic and travel speeds for ambulances (as opposed to citizen vehicles) would be helpful in better approximating these figures. Secondly, the network analysis ran ambulance routes from the centroids through common roads, which may or may not reflect actual ambulance itineraries. It is almost certain that ambulances exercise more flexibility in determining routes, which can positively or negatively influence time.

References


Data Sources

City of Chicago GIS Program; ESRI Data; Chicago Tribune Crime Database

Cartographic Information

Brian McGough

Introduction to GIS

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NAD 1983 StatePlane Illinois East

Transverse Mercator Projection