

# Transportation barriers to care may increase likelihood of emergency surgical intervention

October 4 2020

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Transportation barriers, such as personal access to a vehicle or public transportation, disproportionately affect minority communities, according to results of a new study presented at the virtual American College of Surgeons (ACS) Clinical Congress 2020.

The study was performed by researchers at the University of Colorado at Aurora who used [geographic information systems](#) (GIS) to better understand traffic paths to hospitals offering elective and emergency surgical care throughout Denver. They tracked public transportation routes across census tracts and found areas with higher minority populations have nearly double the travel time burden to [health care facilities](#) when using public transportation.

Facilities with acute surgical capacity (emergency department, [intensive care unit](#), and acute care surgery services) were identified within a 20-mile radius of the city center. Travel times were then estimated from the center of each census tract to the nearest facility by the shortest route. Using this method, the researchers determined [travel times](#) for individuals traveling by both car and public bus for a Monday morning appointment, weighted by percentage of the population in each census tract without vehicle access according to the American Community Survey.

For the 144 census tracts within Denver, the researchers found patients traveling by car were likely to spend approximately 12 minutes time driving to a health care facility as opposed to 33 minutes each way when

traveling by public transportation. The overall drive times weighted by lack of vehicle access across the city are estimated to be 11 minutes by car and 28 minutes by bus. Additionally, census tracts with higher minority populations and higher populations without access to a personal vehicle saw approximately 3 minutes in increased travel time by bus for every 10 percent increase in the minority population.

## **Impact of Transportation Access on Medical Care**

Barriers to health care access like race, income, and having insurance are well-documented, but structural barriers, like geography, can act in similar ways. In Denver specifically, freeway routes dividing the city and communities have shut residents off from resources to which they were previously able to walk. Prior work by the same group found that lack of health care coverage was not a significant barrier to [surgical care](#) where the majority of patients who presented emergently had some health care coverage, and many of the patients had sufficient coverage such that they had already been scheduled for elective surgical consultation, or even surgery itself.

Regardless of type of health care coverage, patients who presented emergently tended to live in areas of higher social vulnerability and were overwhelmingly non-white. Qualitative data derived from narrative data in the charts revealed that a common factor leading to emergent presentation included difficulties arranging transportation. In fact, approximately 3.6 million people in the United States forgo [medical care](#) due to transportation issues, such as lack of vehicle access, inadequate infrastructure, long distances, and lengthy travel times to reach services. As a result, procedures that could be treated in an outpatient appointment can frequently run the risk of becoming emergency situations.

Transportation patterns in areas where people don't have access to a

vehicle can add 30 or more minutes to travel to an appointment. "When you factor in that people have to take additional time off from their jobs to go to an appointment to get elective care, and add in the fact that a lot of people have jobs where they don't have a lot of paid time off or the ability to take off that much time in a day, you may be looking at them having to take an entire day off to be able to make it to an elective surgical appointment. So, you're adding barrier after barrier, and these things tend to compound themselves," said study coinvestigator Catherine Velopulos, MD, MHS, FACS, a health services researcher and associate professor of surgery at the University of Colorado School of Medicine.

The findings also suggest a double effect of transportation barriers. Not only are some patients facing a greater barrier in terms of the percent of the population that has access to a private vehicle, but those same populations also have longer public transportation times per mile to acute care surgical facilities.

## **Using GIS to improve health care access**

Census data can be used with GIS mapping to collect information about the environment, allowing local governments to identify communities with disproportionate transportation burden to acute care surgical services. By identifying where increased burden exists, cities can make structural changes to accommodate these needs.

"Place truly matters. Where you're located and where you live affects your health care outcomes," said coinvestigator Heather Carmichael, MD, a surgical resident at the University of Colorado School of Medicine. "If you can identify where patients are coming from, that gives you a lot of information about the environment that they're in that can affect their health care outcomes. And location of residence may be easier to determine in a research setting than in individually collecting

each of those sociodemographic variables for an individual patient."

Understanding this combined data helps communities focus on where best to place resources like outreach programs and other forms of health care navigation, like Colorado's Non-Emergent Medical Transportation services, as well as to reevaluate traditional bus routes and pick up locations to better suit the needs of the community.

"A lot of people's access to the health care system is through surgical disease," added Dr. Velopulos, "And it's important for us as surgeons to recognize that we have a duty to improve access to care all around because it makes our patients healthier and our surgical outcomes better, and it allows us to reach our patients at an earlier point in their disease."

**More information:** When More is Less: Increased Time Burden and Disparity in Access to Surgical Care by Transportation Means. Scientific Forum, American College of Surgeons Clinical Congress 2020, October 3-7, 2020.

Provided by American College of Surgeons

Citation: Transportation barriers to care may increase likelihood of emergency surgical intervention (2020, October 4) retrieved 18 April 2024 from <https://medicalxpress.com/news/2020-10-barriers-likelihood-emergency-surgical-intervention.html>

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