EMS Ambulance Placement Analytics

Results of NOLAlytics project

City of New Orleans

June 6, 2017

Executive Summary

- EMS partnered with OPA to create a data-driven ambulance placement policy that aimed at improving the reliability and equity of timely response to emergency calls
- Leveraging advanced analytics, open source software, and a pro bono partnership with LSU, OPA provided EMS a no-cost map of optimal posting locations for both day shifts and nights shifts that is scalable to resource levels
- Testing shows that the new protocol enhanced equity in response times across districts and benefited the historically poorest served districts (4th district/West Bank) the most. Fourth district response time compliance improved 15% under the new ambulance placement protocol
- Overall, there was a modest, but statistically significant improvement in overall response time compliance during the night shift
- During the day shift, when there are typically fewer ambulances available, response time compliance held flat

Problem

- Service calls up 12% between 2014 and 2016
- Response times have fallen from 80% of code 3 calls <12 minutes (2014) to 72% of code 3 calls <12 minutes (2016)
- Response times in outer reaches of the city, especially the 4th district (Algiers) and 7th district (New Orleans East) lag from rest of the city

Proposed solution

- Revise EMS' ambulance placement protocols to improve coverage of likely calls
- Goal: Maximize area of city within acceptable (<12 minute) time threshold
- Assumptions learned from user engagement:
  - Low elasticity of movement of ambulances while waiting for calls. Not practical to have a different scenarios as each ambulance becomes available
  - Desire for low-tech solution – paper map is best
  - Realistic locations include existing set plus hospitals, police and fire stations

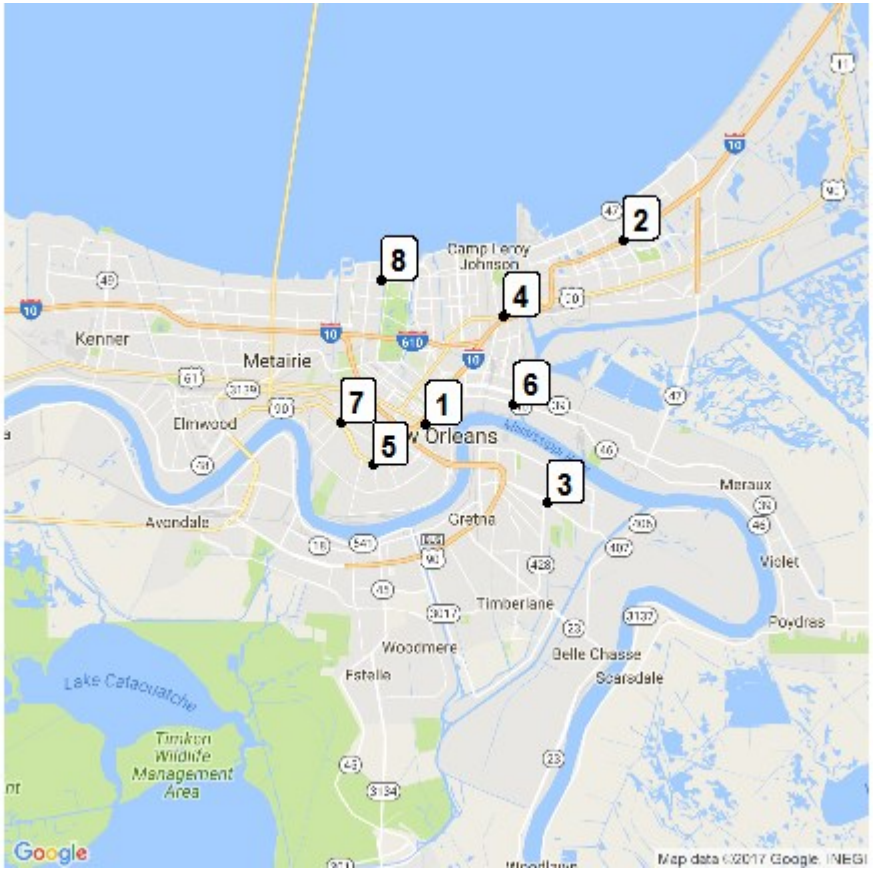
Methodolgy

Developed in conjunction with LSU Analytics program

- Given modal ambulances available (3), find combination of candidate location points that cover most historic call points (3 yrs EMS 911 calls) within 8 minute drive time (from ESRI's network analysis tool for high-traffic and low-traffic scenarios)
- Data:
  - EMS 911 calls (3 yrs)
  - High traffic and low drive times (ESRI network analysis)
  - Candidate locations – existing locations plus fire, police stations and ambulances
  - Analysis conducted in R (less ESRI drive time polygons)

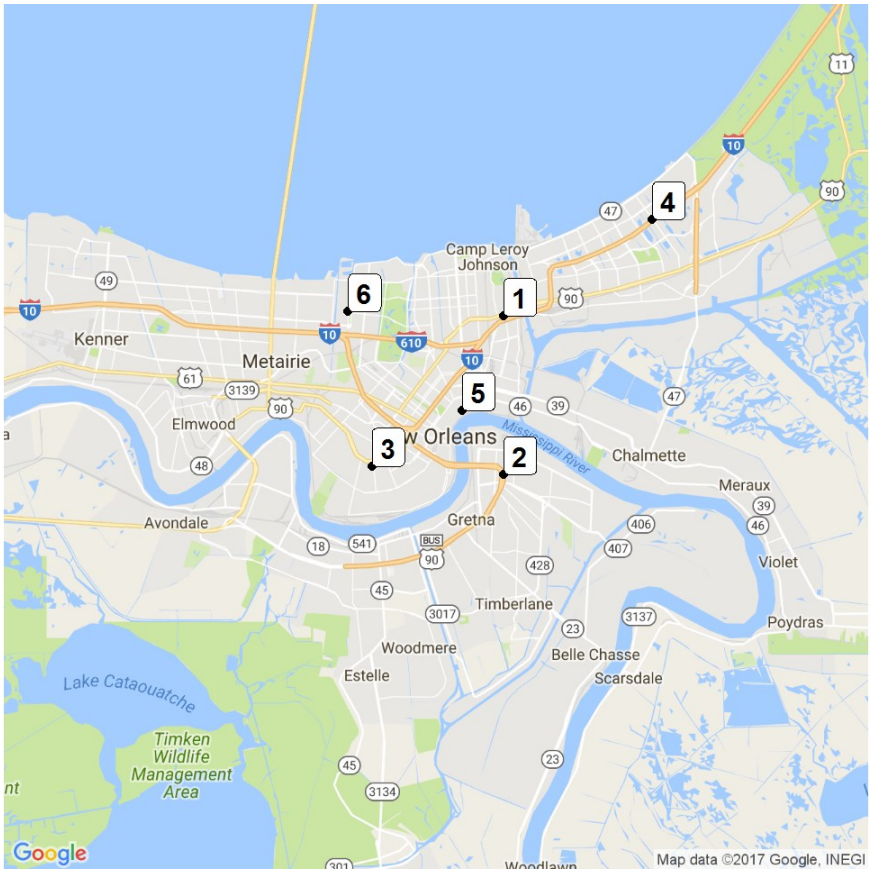
New maps

Day time (assumes high traffic and day time demand)



New maps

Night time (assumes low traffic and night time demand)



Reflections on maps

- The day time map for the most part confirmed existing intuition about the best places to put ambulance (first Tulane Medical Center, then NO East, then West Bank)
- The night time map proposed a substantially different list that what was used previously (first Gentilly, TMC unused)

Reflections on maps

Prior Locations Used

Posting locations include:

a. TMC / ILH Hospitals
b. Holiday and Gen DeGaulle
c. CCC Tolls
d. I-10 and Read
e. I-10 and Downman
f. I-10 and Bullard
g. Touro Hospital
h. Ochsner-Baptist Hospital
i. 5000 Old Gentilly
j. Elysian Fields / N. Miro
k. Harrison / Ponchartrain Blvd

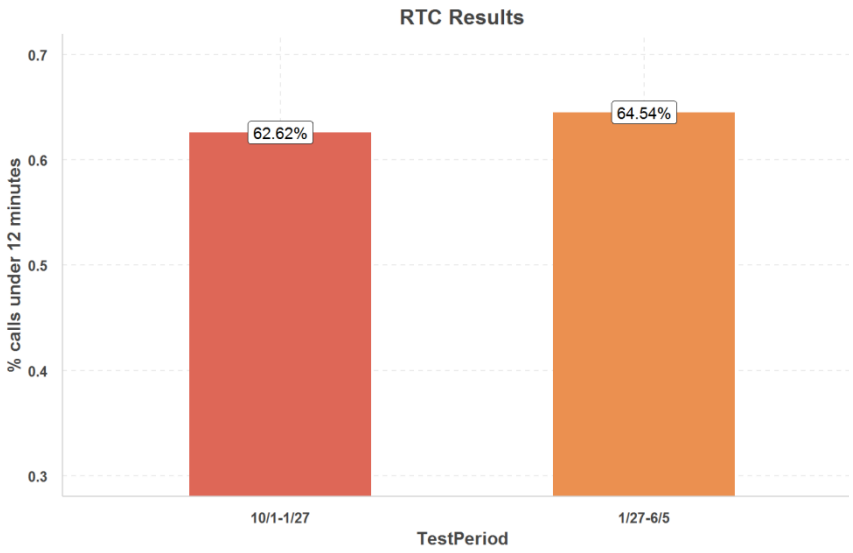
Posting decisions will be based on availability of resources, traffic patterns, shift change and known events / incidents impacting traffic flow; ie: Mardi Gras.

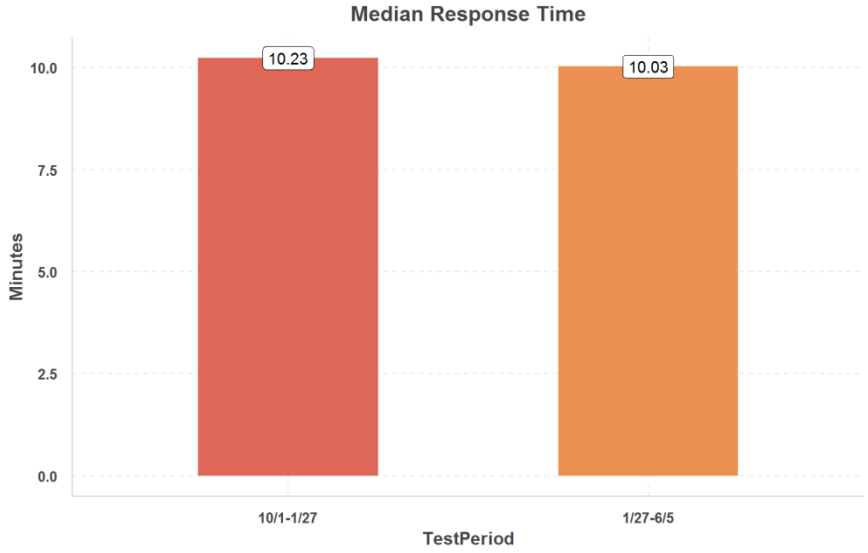
New Dayshift List

Name	Address	Primary Location	Rank
Tulane Medical Center		X	1
I-10 and Read Blvd		X	2
Holiday and DeGaulle		X	3
Old Gentilly/5000			4
Baptist			5
ENGINE 24	1040 POLAND AVE.		6
SQUIRT 25	2430 S. CARROLLTON AVE.		7
SQUIRT 13	987 ROBERT E. LEE BLVD.		8

Results from testing

Night time protocol results in faster response times

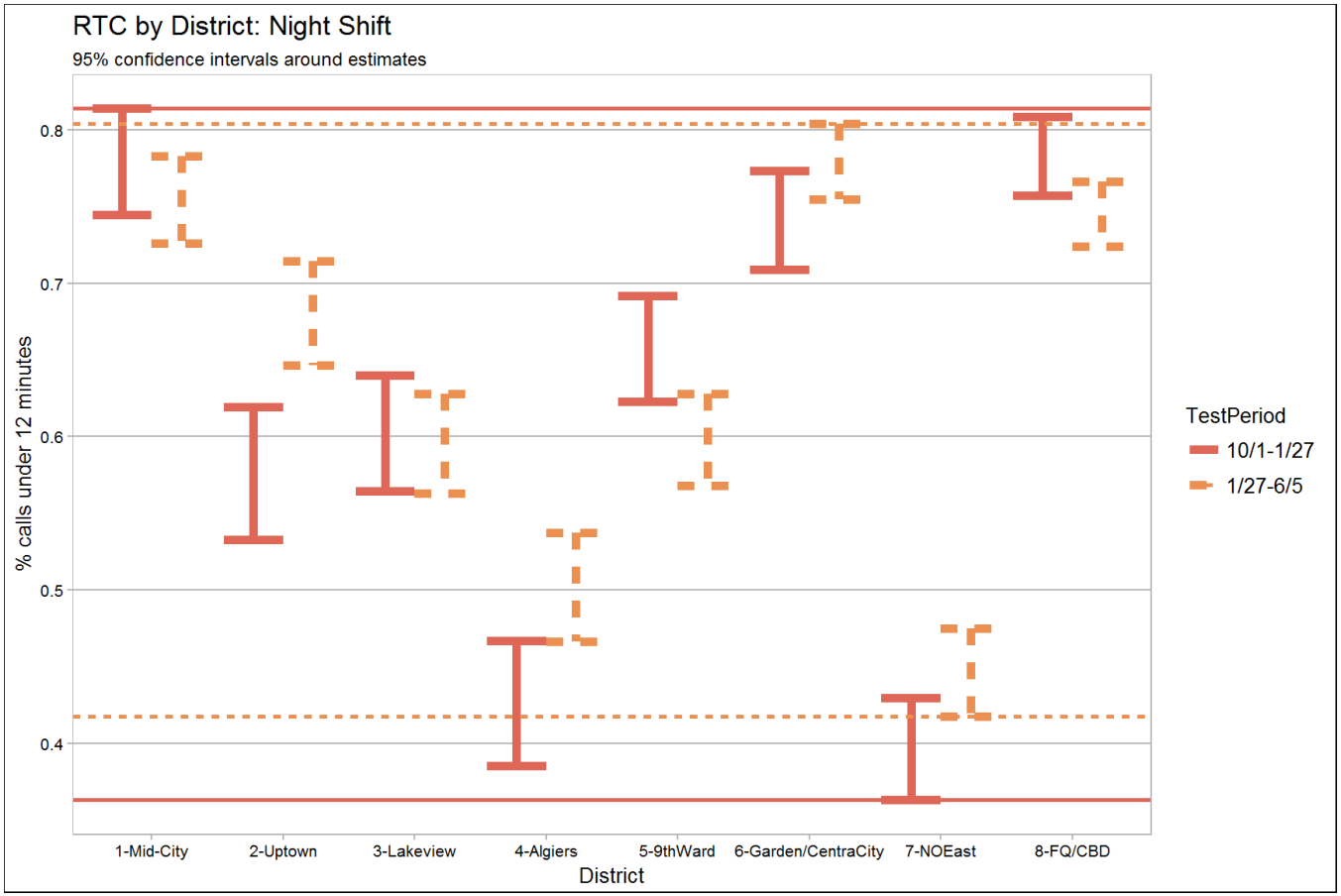




Results for testing

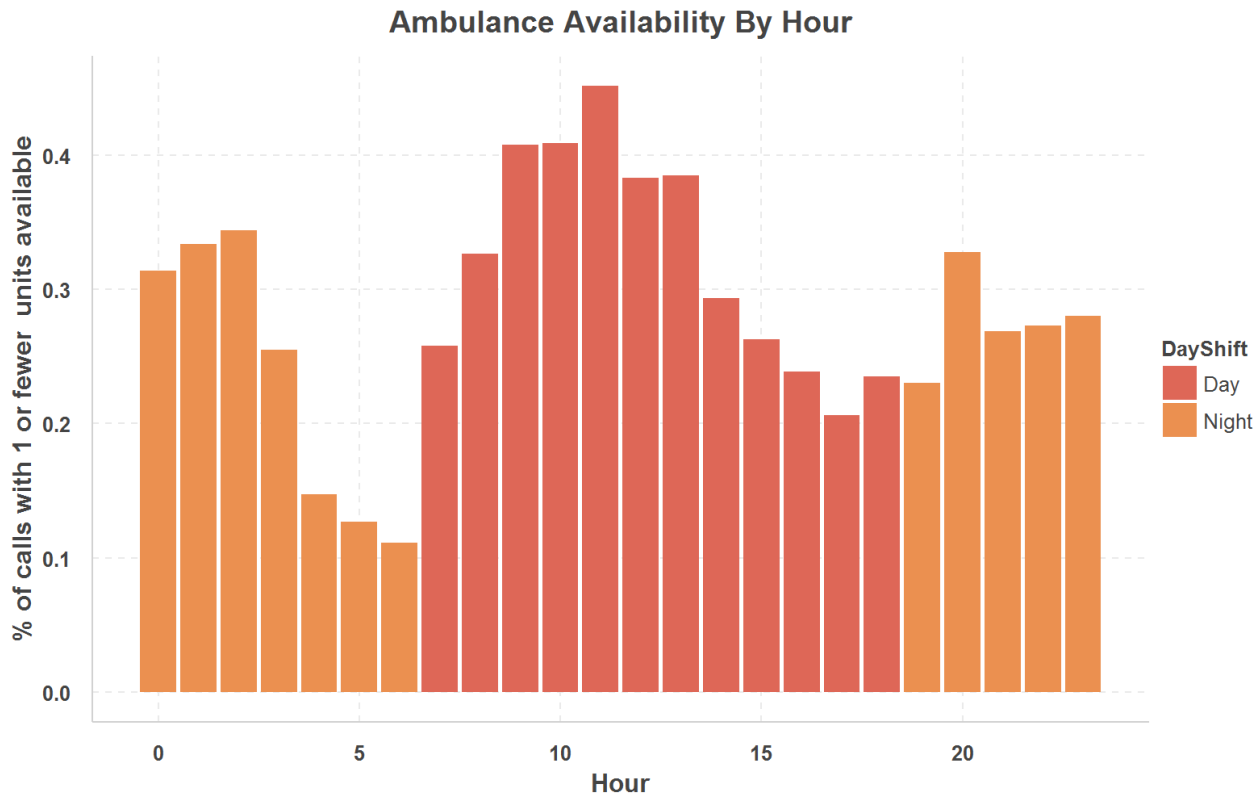
Night time protocol benefits the poorest performing districts the most, promoting equity

	10/1-1/27	1/27-6/5
maxRTC	78.4%	78.0%
minRTC	39.6%	44.6%
spread	38.8%	33.5%



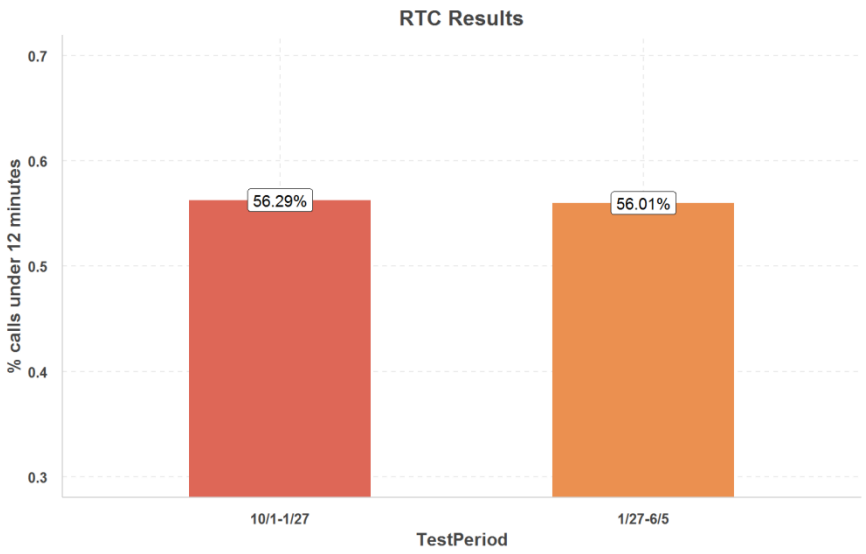
Daytime Testing

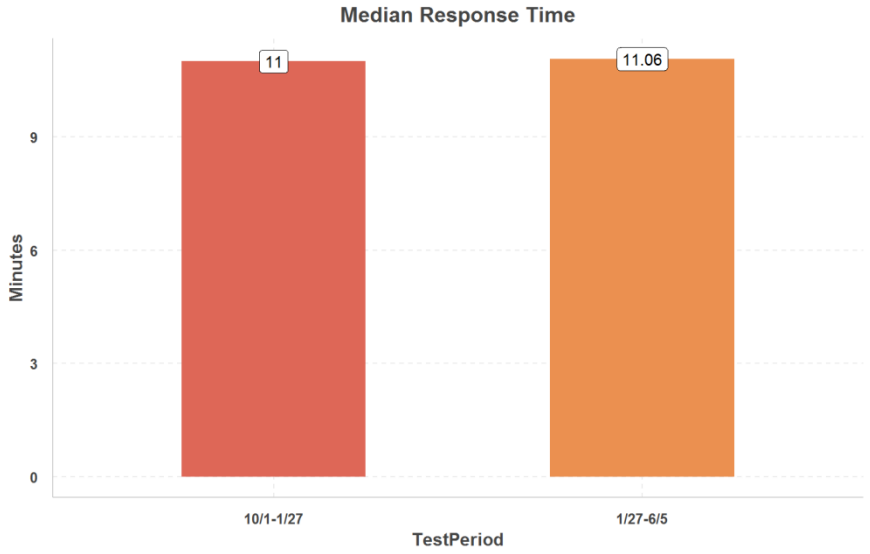
The question of where to position units is only relevant when there are units available to post, but there are typically less than 2 ambulances available for much of the day shift.



Daytime testing

As expected, there was no statistically significant changes to overall response times.

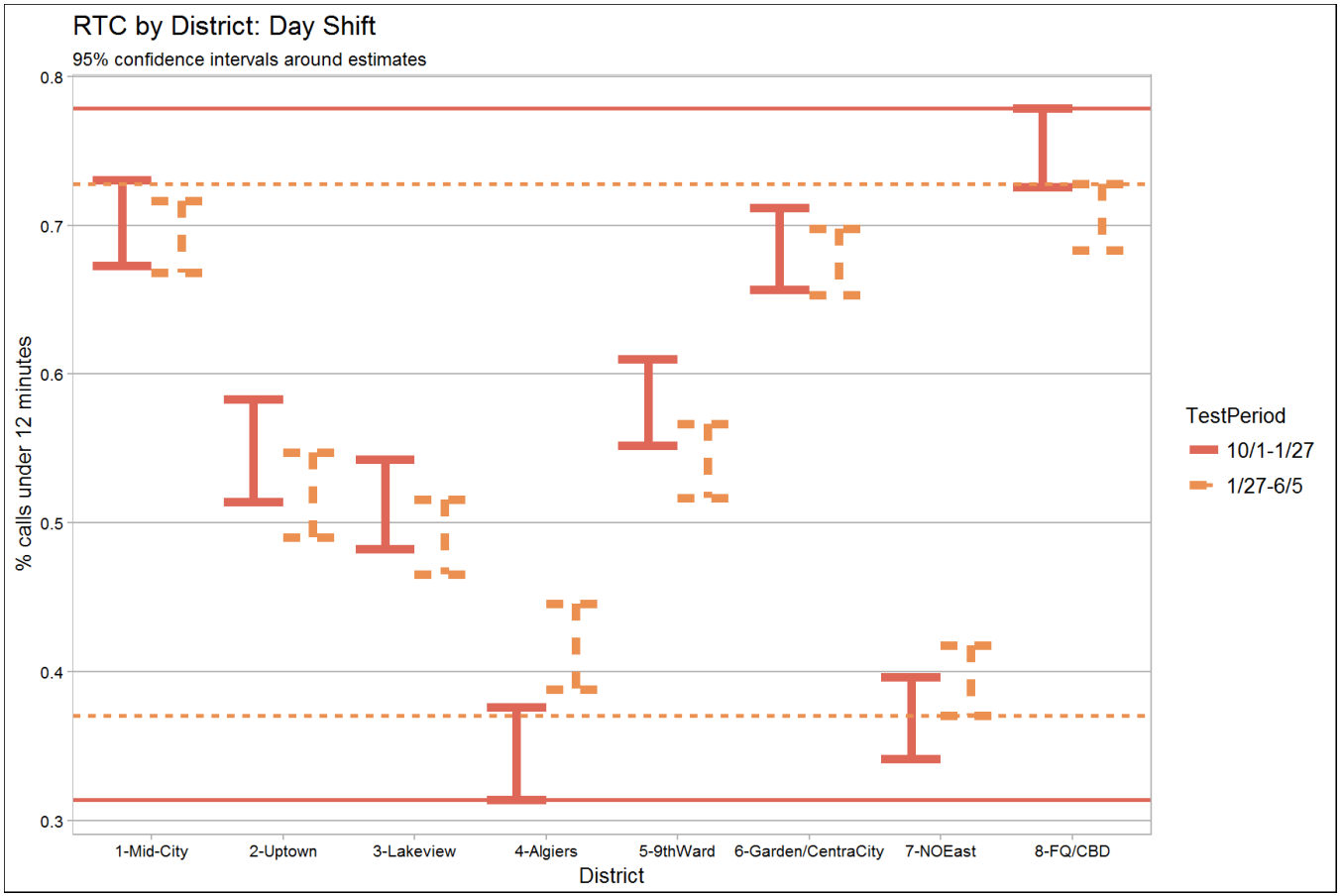




Daytime

But equity among districts improved

	10/1-1/27	1/27-6/5
maxRTC	75.3%	70.6%
minRTC	34.4%	39.4%
spread	40.9%	31.2%



The initiative benefited the areas of the city (West Bank and New Orleans East) that suffered from slower response times the most