Standards

Boone County Joint Communications says its goal is to dispatch every 9-1-1 EMS call it receives in two minutes or less. From David's data analysis, we see this goal isn't met a lot of times.

The national standard for response time ((call received by PSAP — arrived to patient) varies from source to source. The only true national standard I've seen was a response that takes no longer than 8 minutes and 59 seconds, but that doesn't really apply to rural areas, where the goal simply isn't feasible. I've also seen more lax standards from reputable references that cite 12 minutes as the hard limit for life-threatening calls. I've left messages with members of the Office of EMS (through the Department of Transportation to iron this out). I've also left messages with members of MO's state EMS advisory council to find out what our state goal is.

I haven't been able to find a national standard for dispatch time (call received by PSAP — arrived to patient), so I've also asked officials with the Office of EMS about that.

According to Reuters, the length of time between a call for help and the arrival of emergency medical services is about eight minutes in the U.S., but that rose to 14 minutes in rural areas (where about 10 percent of patients waited nearly 30 minutes), researchers have found.

Software changes/updates in Boone County

Prior to 2018, the different public safety agencies in Boone County (e.g. Boone County Fire Protection District, Columbia Fire Department, Columbia Police Department, etc.) each used a different system to keep their records. The information couldn't seamlessly transfer from one agency to the other, or to Joint Communications.

So, the county investested in a Windows-based system from the software company Superion that allows information to flow between agencies.

The software has different capabilities and modules for various purposes, but the whole thing works conjunctively with the computer-aided dispatch at Joint Communications.

An excerpt from a 2018 Missourian story:

"The new records system will work in tandem with Boone County Joint Communications' computer-aided dispatch software, which was installed Jan. 30 as part of a county-wide effort to update technology.

"Joint Communications is in charge of taking 911 calls and dispatching emergency services to citizens. **The new system allows information taken during 911 calls to be accessed from any public safety user agency in the county, Director Chad Martin said. The**

computer-aided dispatch system also has a new automatic vehicle locator feature that displays the location of emergency vehicles on a map to dispatchers and field units.

‘When emergency vehicles are transmitting their location and displaying on a shared map to users, it allows all emergency service disciplines to be more situationally aware of where units are to better allocate resources and optimize response times,’ Martin said.”

...

“Boone County voters in 2013 voted for a dedicated three-eighths-cent sales tax to support 911 and emergency operations, such as a new emergency communications center, Martin said. Part of that tax later went toward purchasing the new computer-aided dispatch software. The system cost $803,220, according to the contract signed between Boone County and Superion.”

In 2011, the county implemented a service called **Smart911** through a Massachusetts-based company, Rave Mobile Safety. This is supposed to help people calling 911 better communicate with EMS responders directly. The service is free to residents, but they have to sign up prior to their emergency to maximize the service.

The 2011 press release from the city quoted then director of Joint Communications, Zim Schwartze, saying "Simply put, Smart911 can shorten response time in a critical situation."

It’s unclear how much the county spent to make this service available, but in cities that have it, it can cost more than $10,000.

Here’s somewhat useful information from a 2018 report Joint Communications compiled in 2018 (this one most recent, acc to website):

- Activity recorded in the CAD system is an indicator of the workload in the 9-1-1 Operations Center.
    - In 2018, there were 291,594 calls for service and user agency-initiated activities (aka CAD events) *[*I don’t know what these are]* recorded in the CAD system.
    - Columbia Police Department calls for service and field activity generated 69% of the CAD system workload.

https://www.komu.com/news/columbia-s-joint-communications-to-upgrade-9-1-1-system

https://www.columbiatribune.com/91023e79-1c87-5a77-abe7-c271d5b0d288.html

https://www.columbiamissourian.com/news/local/years-of-planning-training-culminate-in-new-record-keeping-system/article_0222ea12-261a-11e8-b804-2f3ac6995d4e.html

https://www.govtech.com/em/next-gen-911/Emergency-System-Boone-County.html

https://www.showmeboone.com/gis/

EMS authorities

The national authority on EMS is the Department of Transportation. The Department maintains the National Highway Traffic Safety Administration, through which the Office of EMS (ems.gov) is active.

In Missouri, the Department of Health and Senior Services oversees EMS
State Advisory Council on EMS

"Prehospital Emergency Care" and "Annals of Emergency Medicine" are peer-reviewed journals on the subject
https://www.researchgate.net/publication/51744872_Emergency_Medical_Services_Response_Time_and_Mortality_in_an_Urban_Setting (8:59 min or less)

Dr. Howard Mell specifically researches response times in rural areas of the country
https://jamanetwork.com/journals/jamasurgery/fullarticle/2643992

Interview with Joe Piper, assistant director of Boone County Joint Communications
April 7, 2020

- The CAD is conducted through JC, but JC has no authority over response times or recommending time goals for the responders (Boone Hospital Center, University Hospital, Columbia Fire Dept., Boone County Fire Protection District and Boone County Southern Fire Protection District
- JC handles (1) CAD and (2) mobile data computer in ambulances and police cars (not the actual hardware, but rather the backend stuff)
    - In EMS response, JC does everything from taking the call to dispatching an appropriate unit, but that's where they hand off the baton in the process
    - What they scrutinize is how quickly they answer a call and how quickly they dispatch a unit
- JC keeps the data, but other agencies who respond to calls have access to it
- Old CAD system pre-2018 was static; the county was divided into equal sections, and whenever a call came in a unit in the corresponding section to the scene would be

dispatched. Sometimes units in the section would be busy, or no one would be at the firehouse (county fire protection district is volunteer), so responding would take longer

- New CAD system calculates which unit, anywhere in the county, is closest to a location where someone needs responders and send the next-closest one if that first one isn't available (AVL - Automatic Vehicle Locator); also distinguishes types of units among all of them
    - Went live in January; process of shifting took 1.5 to 2 yrs
- CAD updates, small and large, are routine now; data kept for short amount of time because it's so big
- Old CAD data saved in notes field in each line of data in new system — means this old data would take forever to extract and share, but it wasn't lost in the software change
- A challenge for JC is finding the exact location of a caller who needs EMS. Landlines are fixed, so they're more reliable, but everyone uses wireless nowadays. The person in the 9-1-1 center who takes the call has to work with the caller needing help to get the most accurate location info before dispatch. Wireless gives call-taker basically a circle of various sizes in an area, and the person could be a dot anywhere in that circle.
- JC 9-1-1 call-takers are trained to provide medically approved instructions to patients over the phone for CPR, controlled bleeding, childbirth, etc., and that counts (acc to Joe) as part of the response time
    - Emergency Medical Dispatches through National Academy of Emergency Dispatch
- 2 minutes or under the JC dispatch goal, but Joe said he's hesitant to give his team markers because he doesn't want people to cut corners as they take information in a call. If call isn't thorough enough, location could be wrong, wrong unit could be dispatched (EMTs when person needs an ambulance with particular apparatus), etc.
- 2 min goal "probably" selected back at beginning of CFD accreditation process as something to aspire to
- JC accredited, so calls are randomly selected and reviewed every week by an external source
    - Report and feedback generated for person who took one of those reviewed calls
- Minimum JC staffing is five people (Supervisor, fire dispatcher, police dispatcher, secondary police dispatcher, fire EMS, rest call takers when 5+)
- JC sitd down monthly with CFD to discuss JC's response time in taking call and dispatching unit

Brian Frazier CFD PIO
(573) 823-6942

2018 CFD report:
https://www.como.gov/fire/wp-content/uploads/sites/26/2019/04/2018-Columbia-Fire-Department-Community-Risk-Assessment-Standards-of-Cover.pdf
Response performance part starts on page 76 "components of call times"
*I think the baseline table we're most interested in is on page 81

Benchmarks based on National Fire Protection Association recommendations

CFD only serves Columbia jurisdiction
Has had same # stations since 2009 (9 stations, which are fully staffed 24/7)

Working on opening three more: one in southwest, one in east and one in north

Columbia City Council has approved purchase of land for the stations in the east and southwest

Additional stations will help bring response time down

A challenge is the city road network; major construction slows down response times, which is to be expected

Part of response time is turnout time, which starts when agency is notified of a call and ends when the unit starts to move (en route); turnout time can be improved by designing stations so beds are close to exit (slowest response period acc to Frazier is overnight)

Also, another component of design that leads to better response time is a "drive-through station" where firefighters don't have to back units into garage; they just pull through a back garage door and position units in front of the front garage door so they're ready to pull out of the station and go

Medical calls take less time in turnout because responders don't have to put on all of their fire gear

Don't want a station on a hill (bad visibility) or at a busy intersection (would have to wait)

Most frequent types of calls

- The top 10 most frequent types ("natures") of calls were:
    - ROUTINE TRANSPORT, 15,439
    - EMS RESPONSE, 8,654
    - LONG DISTANCE TRANSPORT, 5,385
    - MEDICAL EMERGENCY, 4,406
    - 17A4 FALL, 2,915
    - 6D BREATHING PROB, 2,849
    - 17B FALL, 2,328
    - 33C EMER PT TRANSFER, 2,307
    - 10D CHEST PAIN, 2,027
    - 6D2 BREATHING PROB, 1,885

Average time differences by *Agency*

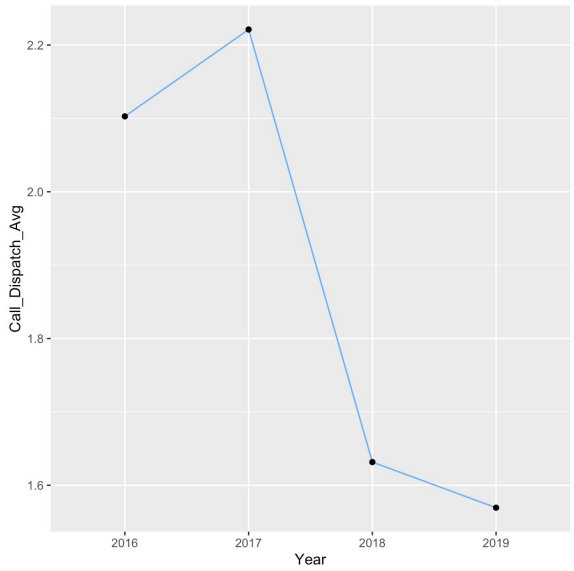
- ***Call_Dispatch***
  - BCJC, 3.9 minutes
  - BHC, 2.2 minutes
  - UHC, 2.1 minutes
  - SBFD 1.6 minutes
  - BCFD, 1.6 minutes
  - CFD, 1.5 minutes
  - APFD, 1.3 minutes
  - CEFD, 0.7 minutes
- ***Dispatch_Enroute***
  - SPFD, 3.2 minutes
  - CEFD, 3.1 minutes
  - BCFD, 3.1 minutes
  - CFD, 2.0 minutes
  - APFD, 1.9 minutes
  - UHC, 1.5 minutes
  - BHC, 1.3 minutes
  - BCJC, 0.4 minutes
- ***Enroute_Arrive***
  - BHC, 6.6 minutes
  - UHC, 6.0 minutes
  - BCFD, 5.3 minutes
  - SBFD, 5.0 minutes
  - CFD, 3.6 minutes
  - APFD, 3.5 minutes
  - CEFD, 3.5 minutes
  - BCJC, 2.6 minutes
- ***Call_Arrive***
  - BHC, 10.1 minutes
  - BCFD, 9.9 minutes
  - SBFD, 9.8 minutes
  - UHC, 9.7 minutes
  - CEFD, 7.4 minutes
  - CFD, 7.1 minutes
  - BCJC, 6.9 minutes
  - APFD, 6.7 minutes

- ***Dispatch_Enroute***

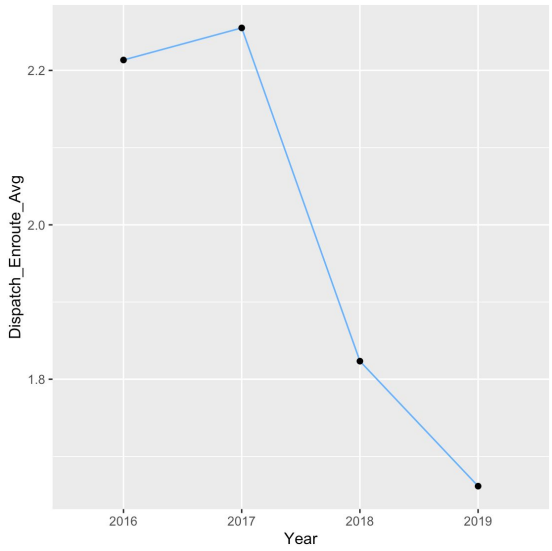
- E, 2.1 minutes (longer time between dispatch and enroute for echo calls)

Plotting the time differences over time

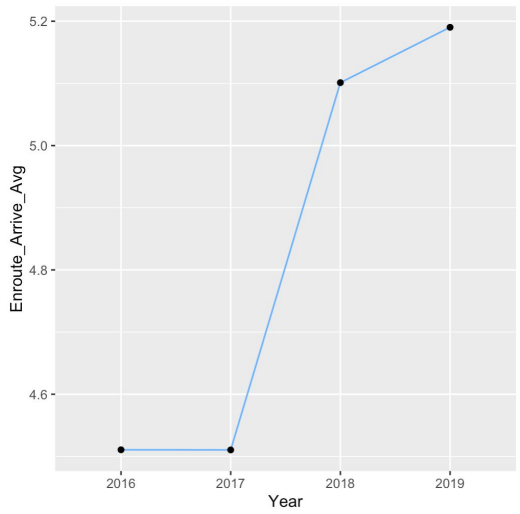
- ***Call_Dispatch***



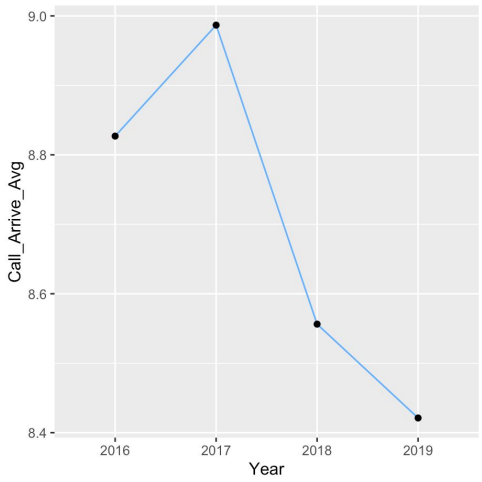
- ***Dispatch_Enroute***



- ***Enroute_Arrive***



- ***Call_Arrive***



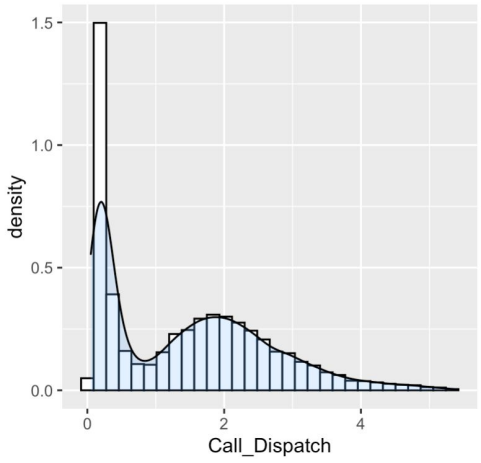
<u>Boone County Fire Protection District</u>

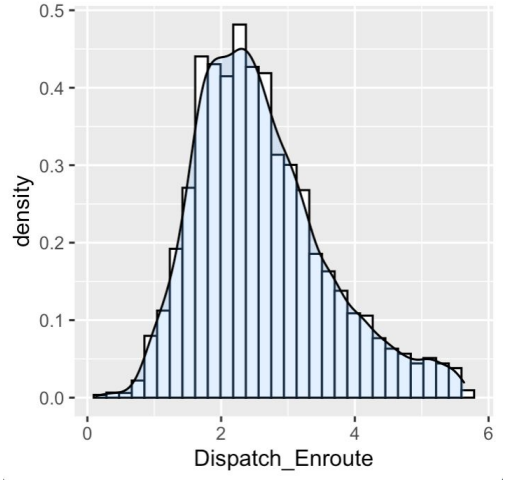
- **Most common types of calls (filtered for calls with time differences greater than zero)**
    - EMS RESPONSE, 502
    - MEDICAL EMERGENCY, 350
    - 6D BREATHING PROB, 320
    - 6D2 BREATHING PROB, 320
    - 17A4 FALL, 296
    - 10D CHEST PAIN, 195

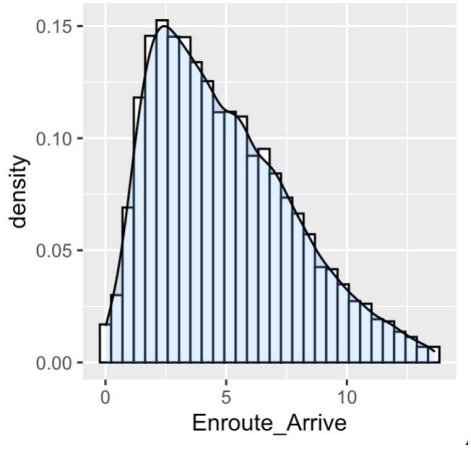
    - 17B FALL, 185
    - 17A2 FALL, 178
    - 17A FALL, 166
    - 26C SICK PRSN, 153
- **Average time differences**
    - *Call_Dispatch*: 1.6 minutes (fourth fastest out of five departments)
    - *Dispatch_Enroute*: 3.1 minutes (third fastest)
    - ***Enroute_Arrive*: 5.3 minutes (slowest)**
    - ***Call_Arrive*: 9.9 minutes (slowest)**
- **Average time differences by *Nature***
    - *Call_Dispatch*
        - 67O1 CNTRL BURN INVEST, 9.5 minutes
        - 67D3 LRG OUTSIDE FIRE, 7.4 minutes
        - NAT COV FIRE, 6.2 minutes
        - 28C1K STROKE, 3.7 minutes
        - 67B OUTSIDE FIRE INVEST, 3.4 minutes
        - 77D8 VEH COL UNSTEADY VEH, 3.4 minutes
        - 67D2O NAT COV FIRE THRT OTHER, 3.3 minutes
        - 55B5 ELCTRL HZRD INVEST, 3.2 minutes
        - 68A1 SMK INVEST OUTSIDE, 3.2 minutes
        - 77C1 VEH COL INJ, 3.2 minutes
    - *Dispatch_Enroute*
        - 52B1G FIRE ALRM, 4.8 minutes
        - 77D8 VEH COL UNSTEADY VEH, 4.8 minutes
        - 52C1S SMK ALRM, 4.7 minutes
        - SEARCH AND RSQ, 4.6 minutes
        - 67D2O NAT COV FIRE THRT OTHER, 4.6 minutes
        - 28C1K STROKE, 4.6 minutes
        - 77D4M VEH COL EXT, 4.6 minutes
        - 67D2U NAT COV FIRE THRT UNK, 4.5 minutes
        - LINES DOWN, 4.5 minutes
        - 77B1M VEH COL INJ, 4.5 minutes
    - *Enroute_Arrive*
        - 68A1 SMK INVEST OUTSIDE, 8.3 minutes
        - 53A3 ANML RSQ, 8.3 minutes
        - ASST OFFICER, 7.9 minutes
        - RES STR FIRE, 7.8 minutes
        - 69D6 RES STR FIRE, 7.8 minutes
        - 127D1 SUICIDE ATMPT, 7.7 minutes

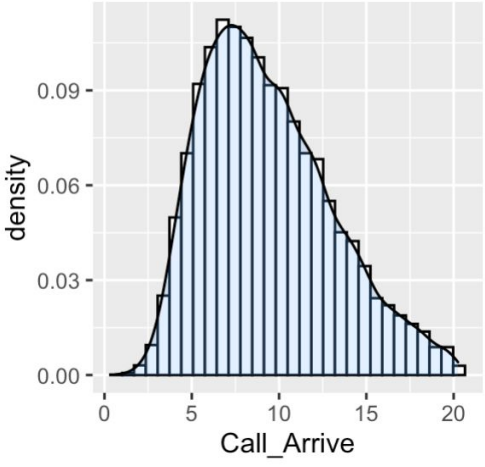
        - INVESTIGATION, 7.7 minutes
        - 66A1 UNK ODOR INSIDE, 7.6 minutes
        - SEARCH AND RSQ, 7.5 minutes
        - 67D3 LRG OUTSIDE FIRE, 7.5 minutes
    - *Call_Arrive*
        - 67O1 CNTRL BURN INVEST, 19.2 minutes
        - 67D3 LRG OUTSIDE FIRE, 19.0 minutes
        - NAT COV FIRE, 17.9 minutes
        - 53A3 ANML RSQ, 15.4 minutes
        - 68A1 SMK INVEST OUTSIDE, 14.3 minutes
        - SEARCH AND RSQ, 14.1 minutes
        - 67D2U NAT COV FIRE THRT UNK, 14.0 minutes
        - 66A1 UNK ODOR INSIDE, 14.0 minutes
        - 66A2 UNK ODOR OUTSIDE, 13.7 minutes
        - 53A2 ASST CITIZEN, 13.6 minutes

- **Histograms/density plots for time differences**

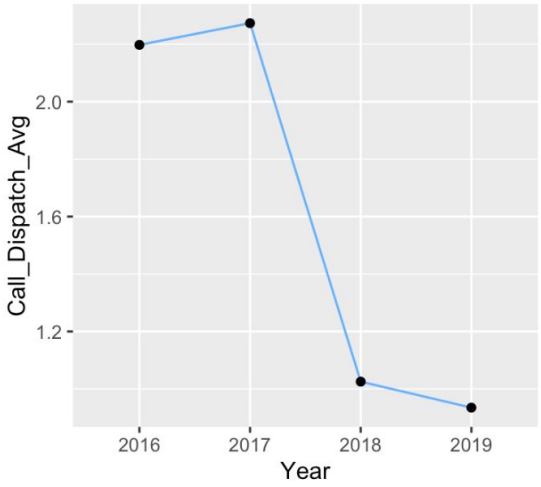


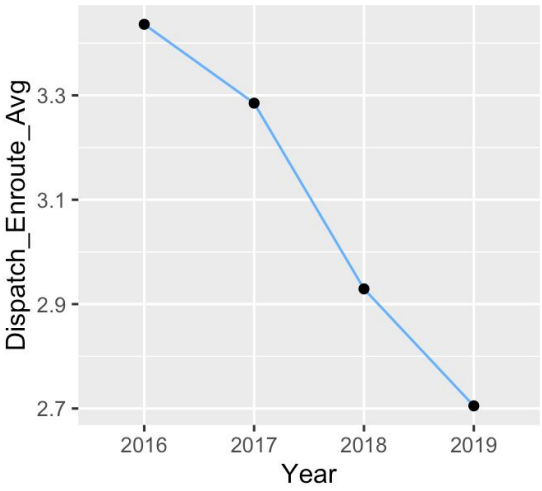


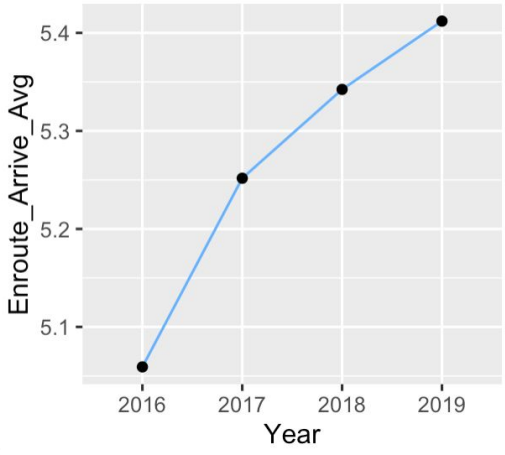


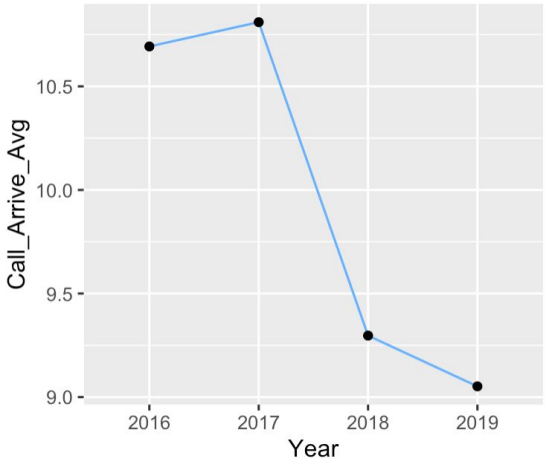


- **Plotting the time differences over time**



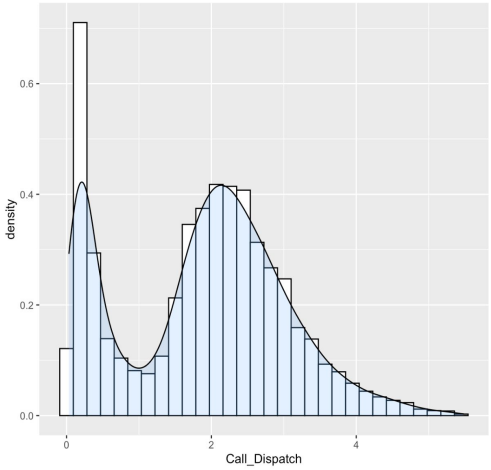




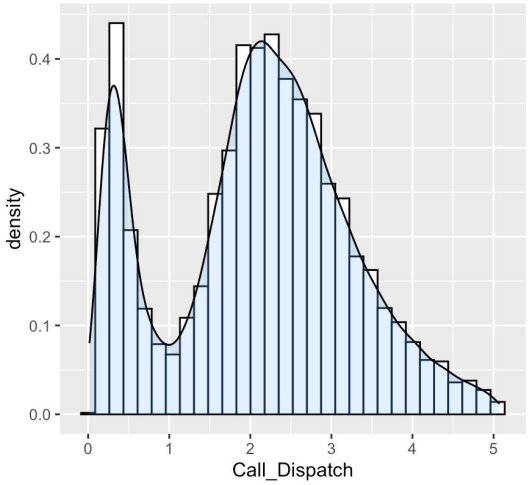


Histograms/density plots for time differences before and after the new CAD system was put into place (EMS only)

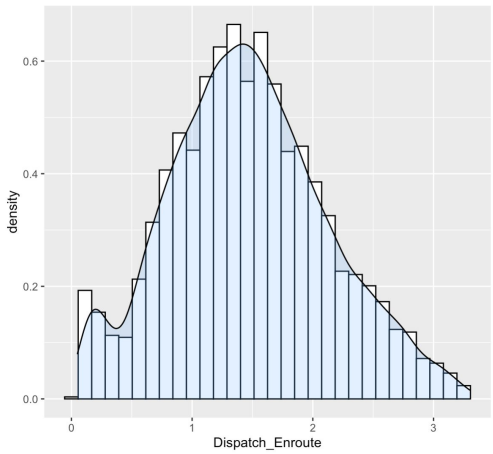
- ***Call_Dispatch***
  - *Before*



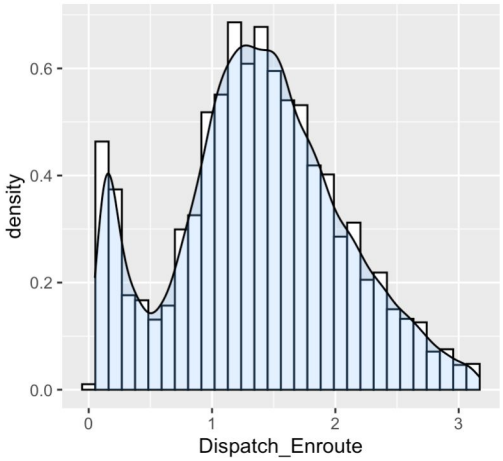
  - *After*



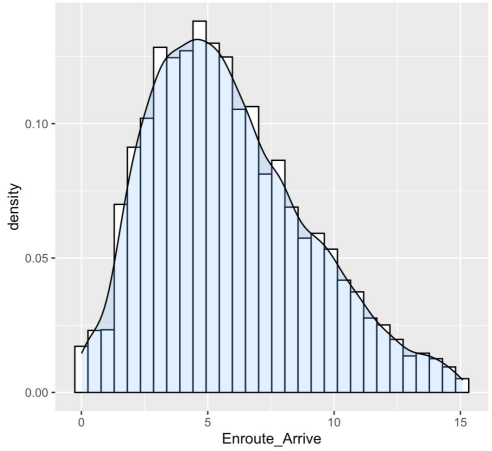
- ***Dispatch_Enroute***
  - *Before*



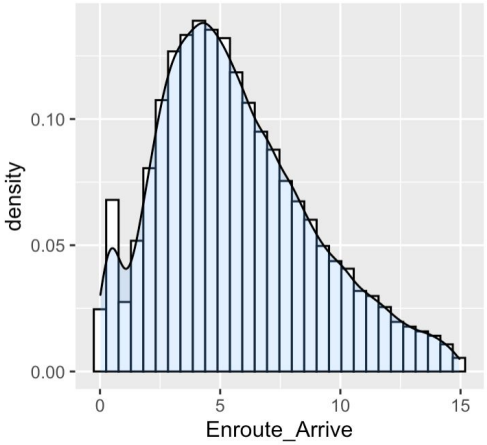
  - *After*



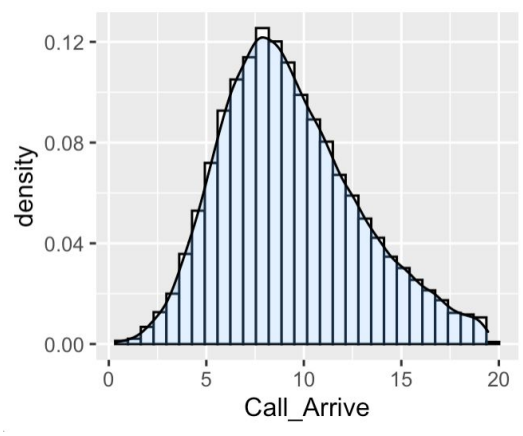
- ***Enroute_Arrive***
  - *Before*

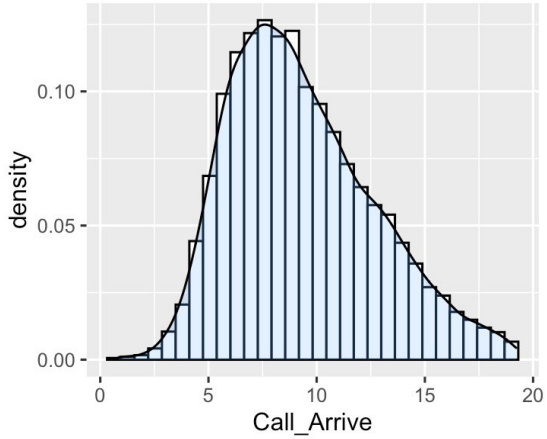


  - *After*



- ***Call_Arrive***
    - *Before* *After*



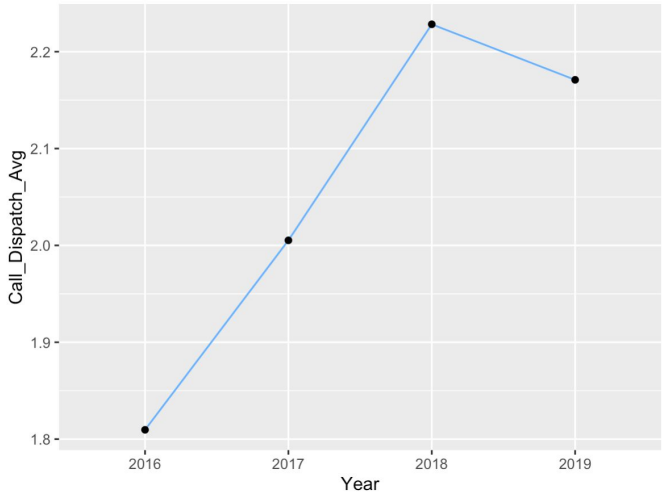


Comparing average time differences before and after the new CAD system was put into place (EMS only)

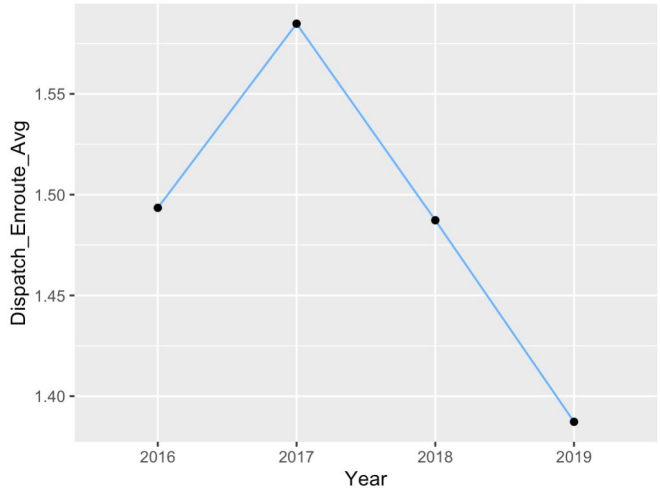
- ***Call_Dispatch***
    - **Before: 1.9 minutes**
    - **After: 2.2 minutes**
    - **This difference is statistically significant.**
- ***Dispatch_Enroute***
    - Before: 1.5 minutes
    - After: 1.4 minutes
    - This difference is statistically significant.
- ***Enroute_Arrive***
    - Before: 6.4 minutes
    - After: 6.3 minutes
    - This difference is statistically significant.
- ***Call_Arrive***
    - Before: 9.8 minutes
    - After: 9.9 minutes
    - This difference is not statistically significant.

Plotting the time differences over time (EMS only)

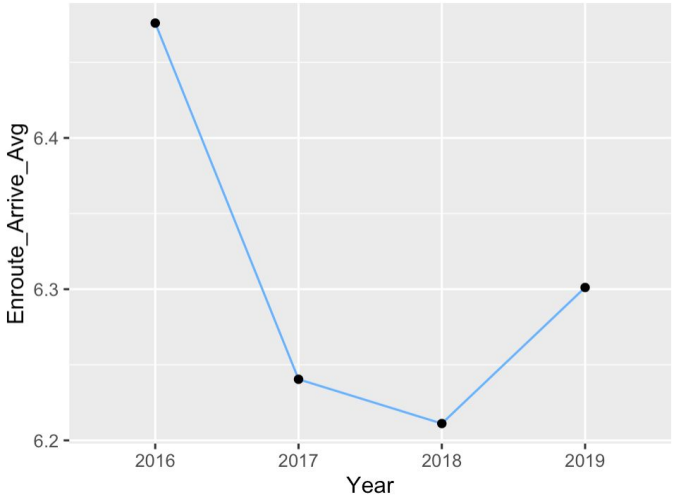
- ***Call_Dispatch***



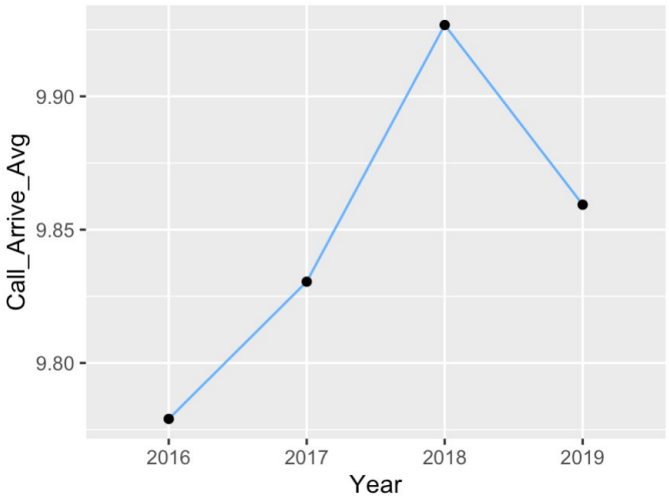
- ***Dispatch_Enroute***



- ***Enroute_Arrive***



- ***Call_Arrive***



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