



Data from 1 to 1000

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WHAT QUESTIONS DO YOU WANT TO ANSWER?

- Notice outbreaks
- Track improvements/growing problems OR identify if there is a problem
 - 'Have our hand hygiene rates improved over time?'
 - 'Is our prescribing of carbapenems similar to other hospitals?'
- Describe a population or problem
 - 'Where are CAUTI happening in our facility?'
 - 'Are our SSI cases older than our average surgery case?'



SYSTEMATIC DATA COLLECTION

- Consider what data elements you will want at the end of the project → collect them from the beginning
 - Denominator data?
 - Risk factors? Demographics? Other attributes?
- Collect at regular intervals- close to real-time
- Have written procedures and data collection tools



PICK A GOOD MEASURE

- Count data (numbers) are a starting place
 - Can be difficult if the population or denominator changes a lot
- Rates can address changing denominator
 - Not risk-adjusted
 - Must collect denominator data
- For comparisons between groups of different risk, may need an adjusted measure
 - Need to collect data about the risk factors



KEY POINT

- You have to do surveillance when nothing is happening, or you won't know when something is happening



HOW DO I KNOW SOMETHING IS HAPPENING?

- An inpatient at your facility has new hospital onset diarrhea
 - Do you care?
 - Do you even find out?
- Two days later, four more patients have new hospital onset diarrhea
 - Do you care?
 - Did you make a note about that first patient?



HOW DO I KNOW SOMETHING IS HAPPENING?

- There are 5 influenza cases inpatient at your hospital. Is that a lot?
- Would your answer be different in July vs January?
- Would your answer be different if you worked at PAMC or Petersburg Medical Center?



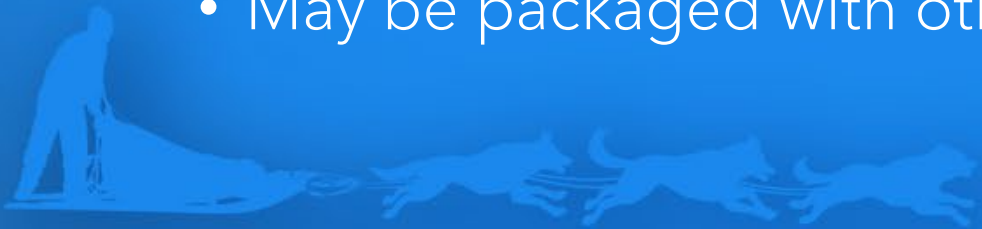
BASELINES

- Describes “normal”
- Depends on specific condition, season, and population
- Requires longitudinal data collection
 - You can't know a baseline from one unit of time
- Baseline can tell us where we're starting from if it's inadequate, or can be a control group if we think something unusual is happening



MORE ABOUT BASELINES

- Often done as a rate
 - Time: catheter days per month, cases per week
 - Events: rates per number of ED visits, number of surgeries, etc.
- Some variation is expected
 - Can be helpful to calculate boundaries for what's in the normal range
- Sometimes "normal" comes from modelling
 - E.g. SIR
 - May be packaged with other analysis



Analysis





WHAT QUESTION DO WE WANT TO ANSWER?

DO WE HAVE THE RIGHT DATA TO ANSWER IT?



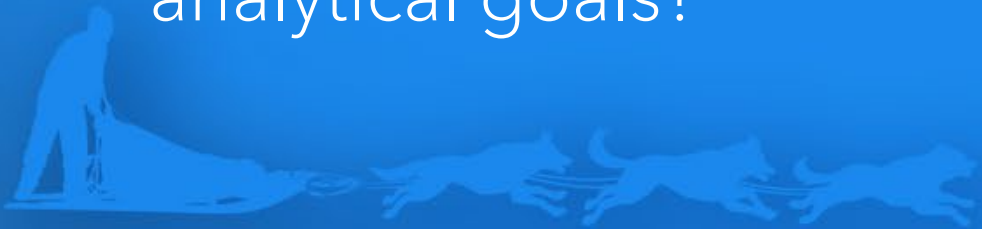
ANALYSIS SHOULD BE ANSWERING A SPECIFIC QUESTION

- Fishing around without a plan can get you false results
- Data collection should consider the kinds of questions you want to answer
- Example: "Are our rates of CAUTI stable over time?"
 - "Do we have an outbreak of influenza?"
 - "Is hand hygiene compliance similar between our units?"
 - "Did our training improve cleaning of high-touch surfaces?"



IF YOU DON'T HAVE A LOT OF DATA...

- Consider increasing your time unit (e.g. from month to quarter)
- Consider doing a qualitative vs. quantitative analysis
- Is there a higher-volume process measure?
- Can you include several low-volume metrics?
- Did I design my data collection process to align with my analytical goals?



QUALITATIVE ANALYSIS

- Situations with only one or two cases
 - Root cause analysis, after-action report/hot wash
- Where you're interested in peoples' thought process (why?)
 - Thematic analysis, highlighting of instructive quotes
- Can be a first step at understanding a problem
- Figures might include diagrams, timelines, or pictures; may have extended quotes



WHERE TO LEARN STATS

- Many courses on Coursera and similar services
- Carnegie Mellon has a free class
- If you need help with doing the math:
 - There are Excel templates
 - Use something like GraphPad
 - Ask a friendly neighborhood epidemiologist or statistician





Visualization





WHAT IS THE POINT?



CHARTS/FIGURES SHOULD HAVE A POINT

- Why are you including this SPECIFIC chart?

Strong Storm Moves into Bering Sea Thursday and Friday



Impacts will be highly dependent on the low's track. Stay tuned for updates.



Potential impacts

- High confidence of storm force winds (55-73 mph), with hurricane force gusts (73+ mph) possible
- High surf, coastal erosion, coastal flooding are possible but are looking less likely along the Southwest coastline

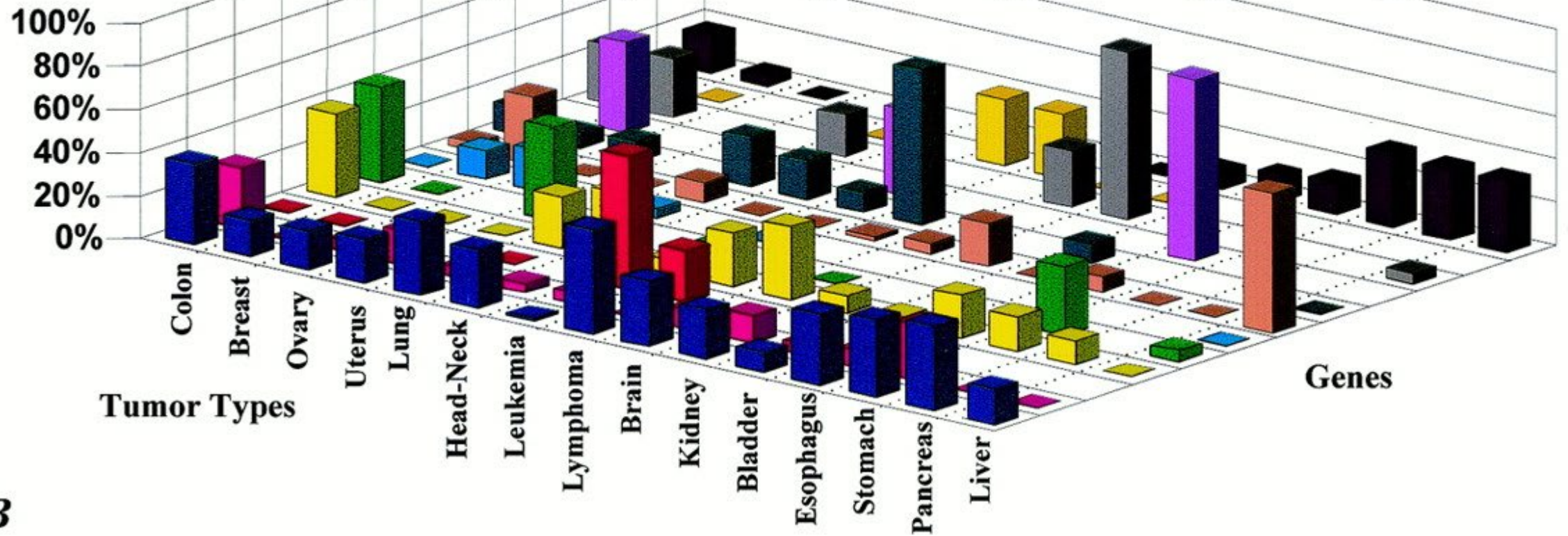


Issued: Monday, 9/30/2024

LET'S SET THE TONE

A

**Frequency of
Hypermethylation**



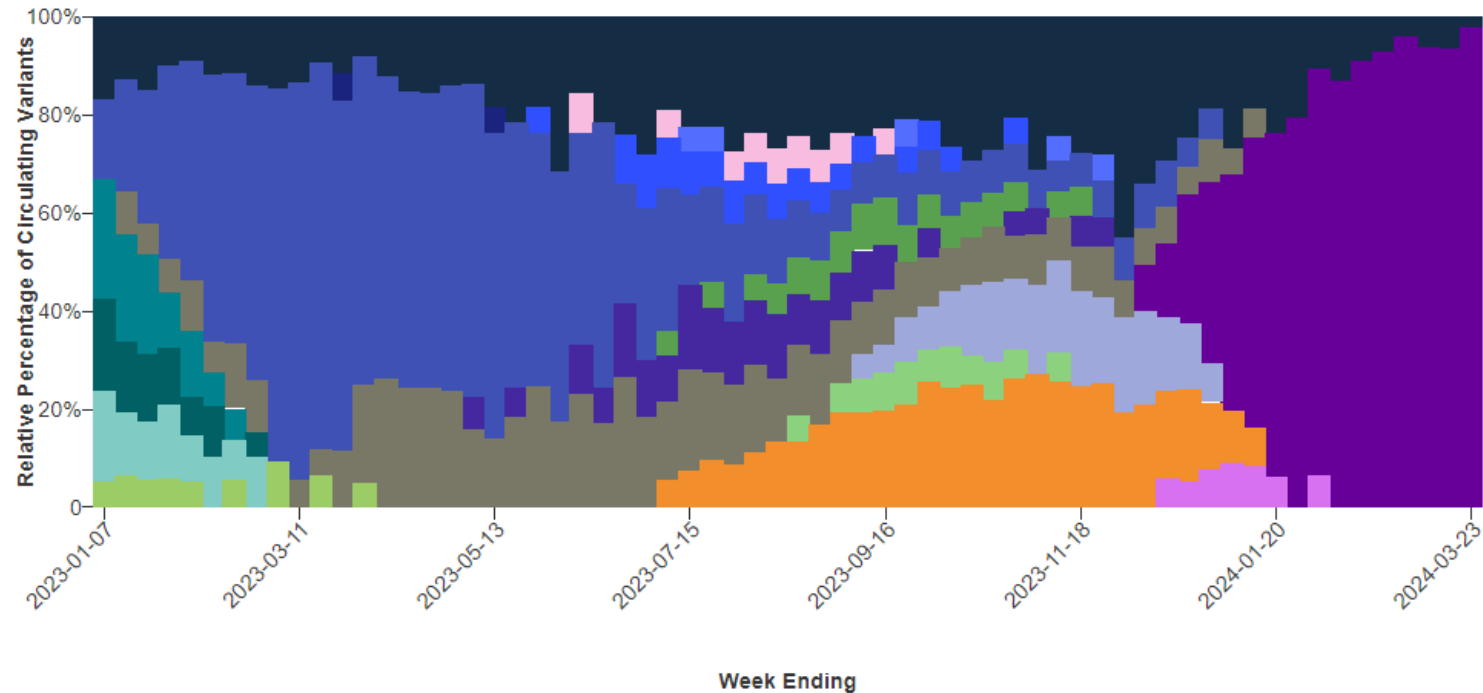
B

WHAT DOES THIS FIGURE MEAN?

Predominant Variant

JN.1

The BA.2.86 variant category includes all JN.* sublineages except JN.1 which is separated out into its own callout group.



Select a variant to add or remove it from the visualization.

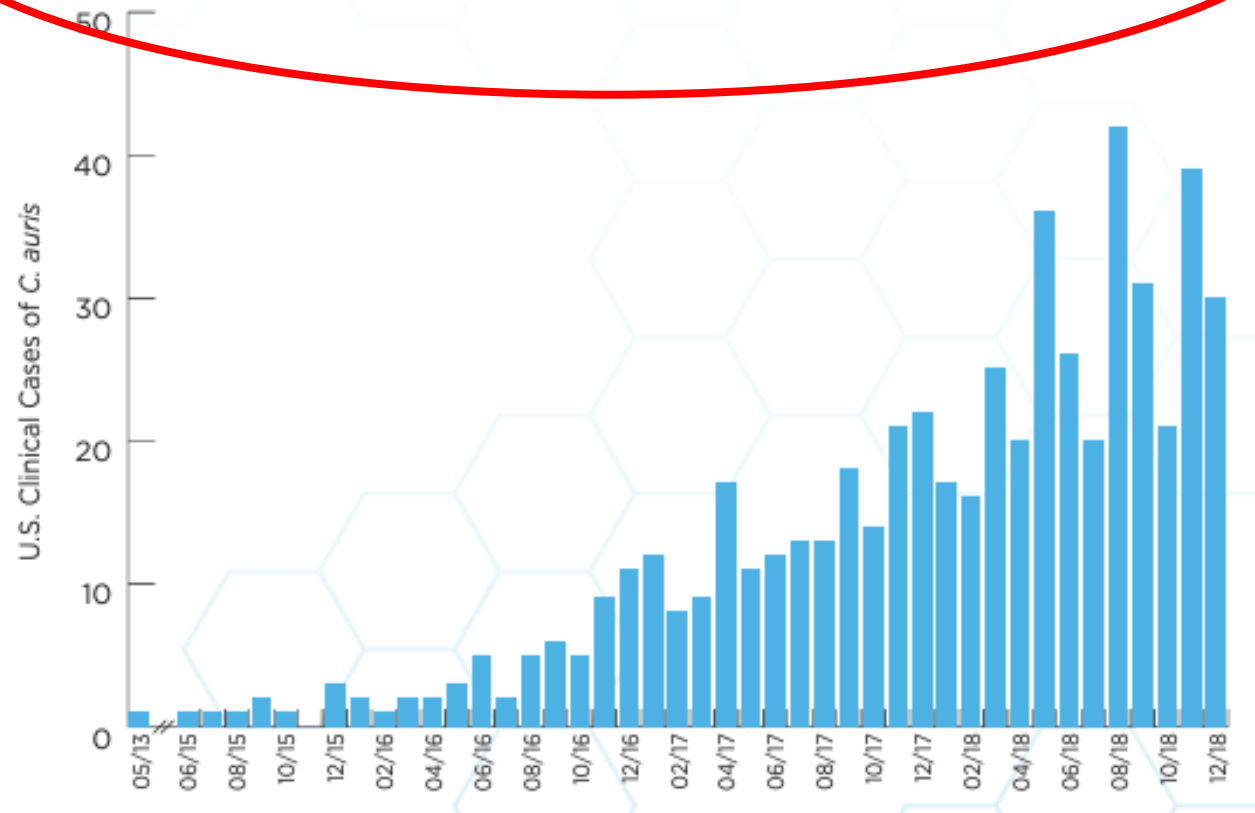
- BA.2
- BA.2.86
- BA.5
- BQ.1
- BQ.1.1
- EG.5
- FL.1.5.1
- HK.3
- HV.1
- JN.1
- XBB
- XBB.1.16
- XBB.1.16.1
- XBB.1.16.6
- XBB.1.5
- XBB.1.5.1
- XBB.1.5.59
- XBB.1.9.1
- XBB.1.9.2
- XBB.2.3
- Other



REQUIRED ASPECTS OF FIGURES

CASES OVER TIME

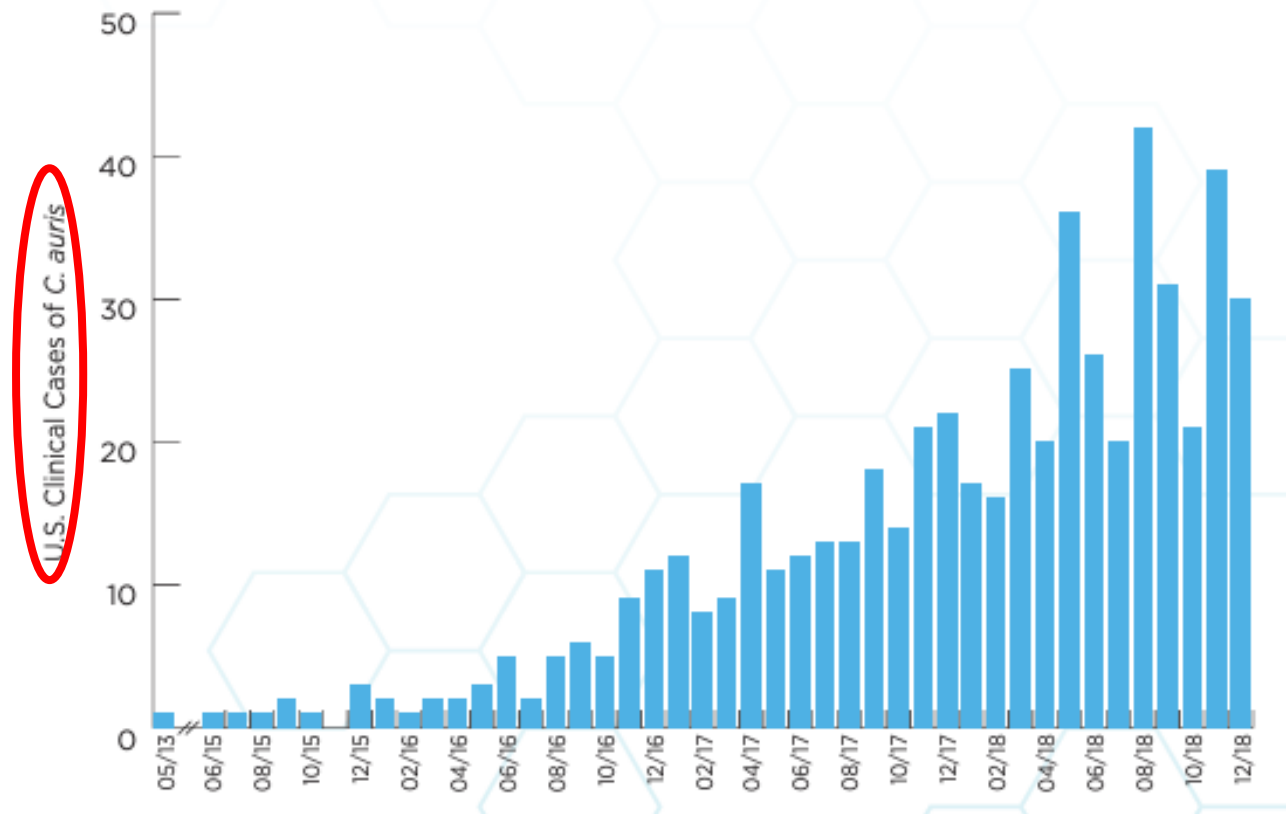
C. auris began spreading in the United States in 2015. Reported cases increased 318% in 2018 when compared to the average number of cases reported in 2015 to 2017.



REQUIRED ASPECTS OF FIGURES

CASES OVER TIME

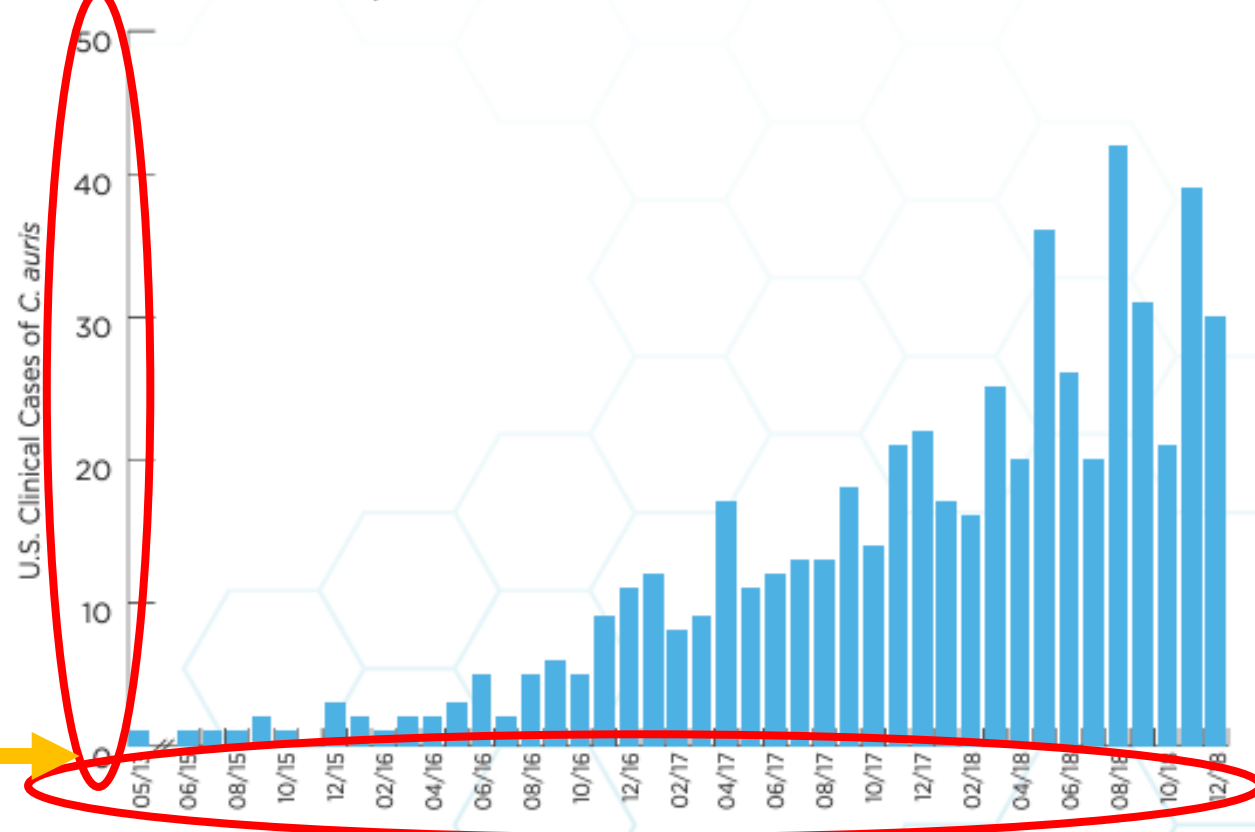
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REQUIRED ASPECTS OF FIGURES

CASES OVER TIME

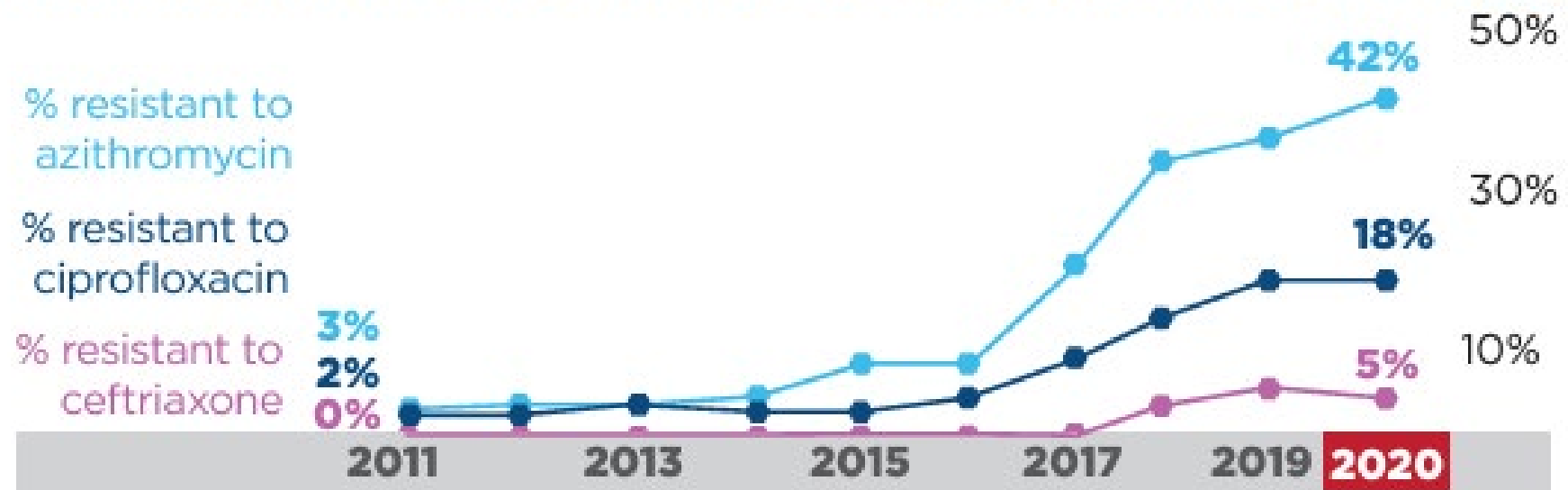
C. auris began spreading in the United States in 2015. Reported cases increased 318% in 2018 when compared to the average number of cases reported in 2015 to 2017.



Axis should start at 0!

IT'S OK TO BE FLEXIBLE SOMETIMES

Drug-resistant *Shigella* infections have been rising since 2016. Resistance to ceftriaxone was rare before 2018, but was 5% in 2020.



WHICH CHART SHOULD I USE?

- There are tools for this!
 - What kind of data do you have?
 - What do you want the reader to learn?
 - This one is more long-form
 - There is literature to help
 - What's the format?
 - Who is the audience?
- How much explanation will you be able to give?
- This checklist is pretty good



HOW IS AMOUNT REPRESENTED?

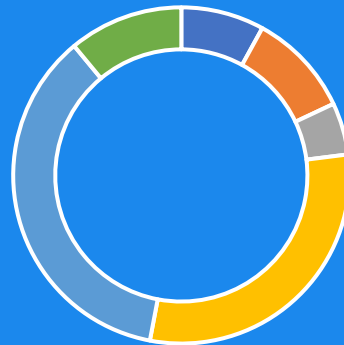
- Graphs turn numbers into scales of area, length, or other 2D measures

Proportion



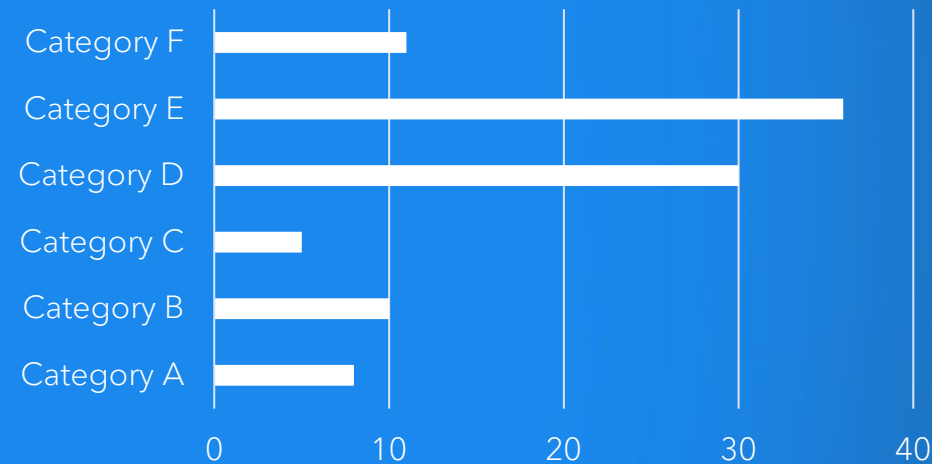
■ Category A ■ Category B ■ Category C
■ Category D ■ Category E ■ Category F

Proportion



■ Category A ■ Category B ■ Category C
■ Category D ■ Category E ■ Category F

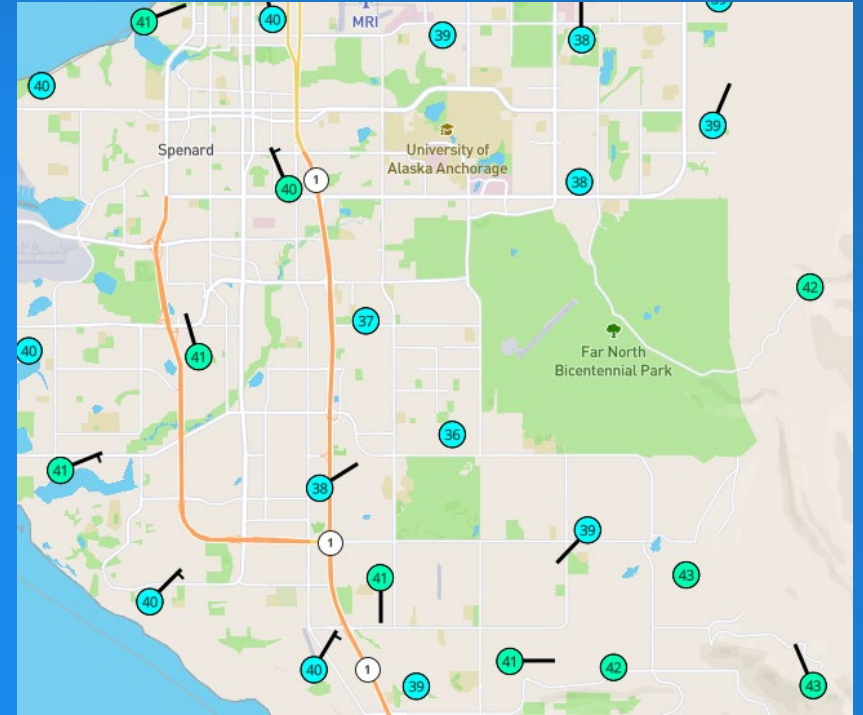
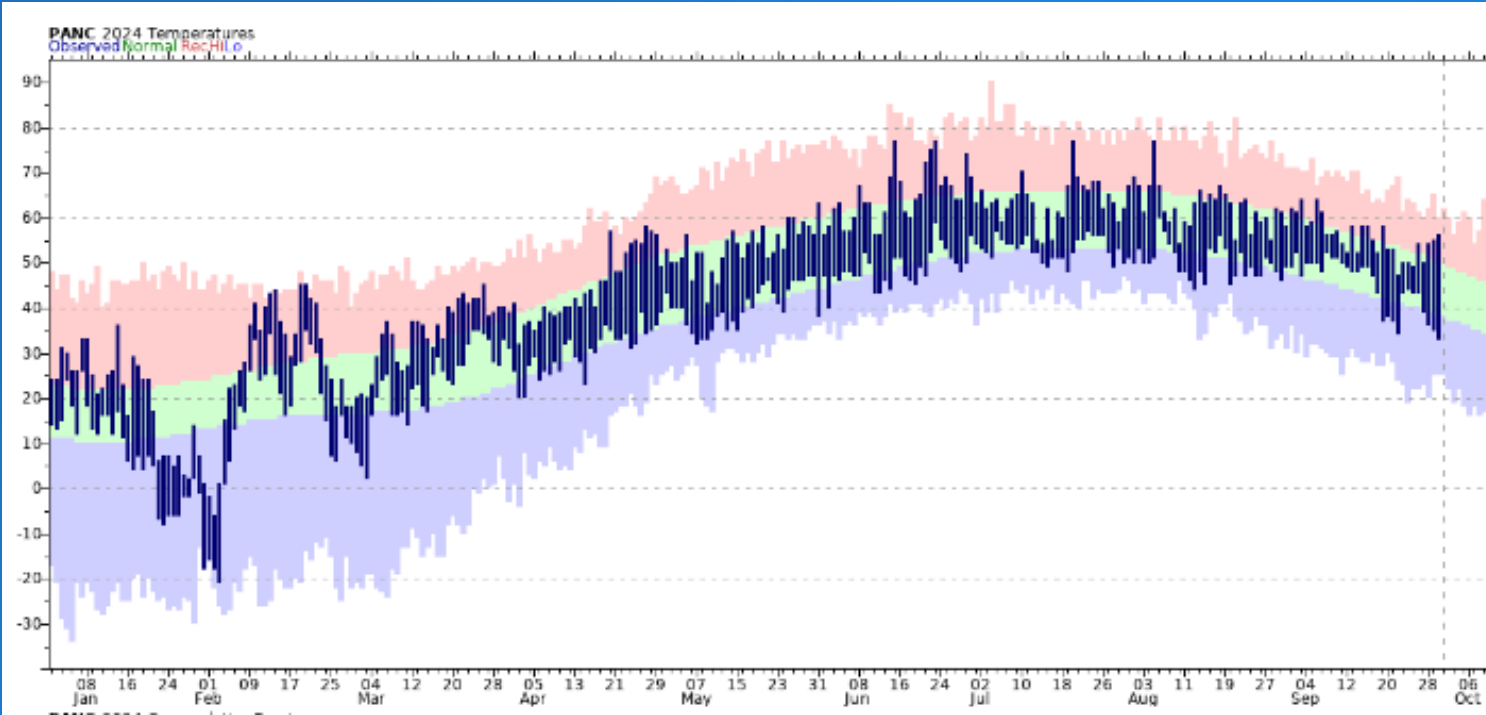
Proportion



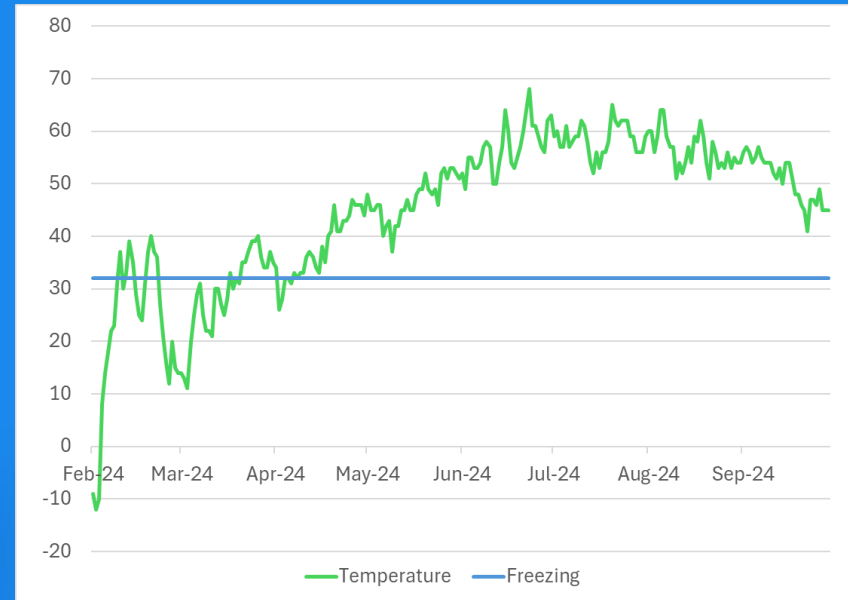
LIGHTNING ROUND- I WANT SOMEONE TO:

- Know whether it's hotter or colder today than yesterday
- Know if it's below freezing
- See the trend in temperature over the long term
- Compare the temperature at several places in town
- Compare the temperature today to the average temperature on this day in history
- See both the high and low temperatures over the past week





↓ 45° 8° colder than yesterday



TABLES ARE GREAT

- If you need someone to know or compare specific numbers, tables are best
 - Also helpful if there are different units you're co-displaying
- Tables also require good formatting
 - Title
 - Units labeled or indicated
 - Row and column labels
 - Being mindful of how much ink is on the table



COMPARE

Species	Ampicillin	Ceftriaxone	Ciprofloxacin	Levofloxacin	Trimethoprim-sulfamethoxazole	Nitrofurantoin
<i>Escherichia coli</i>	65% (1509)	96% (1509)	89% (1509)	89% (1509)	84% (1509)	98% (1509)
<i>Klebsiella pneumoniae</i>			98% (160)	98% (160)	96% (160)	39% (160)

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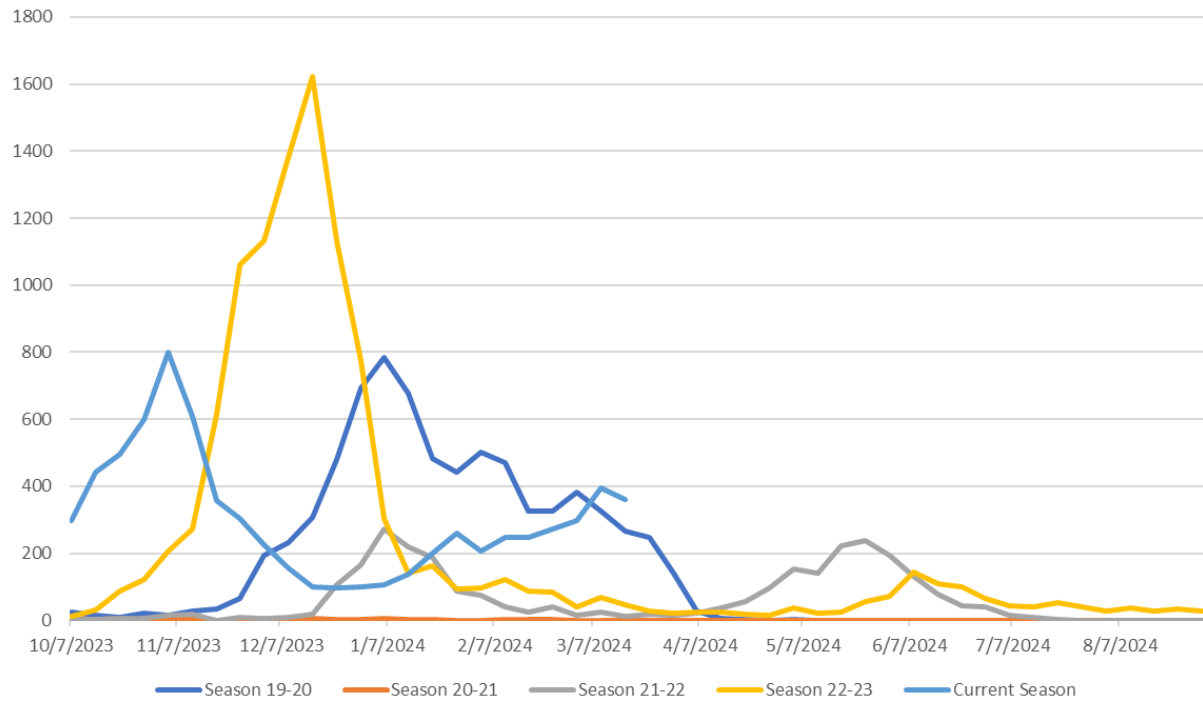
WAYS TO EMPHASIZE SPECIFIC THINGS

- Color scheme
- Line weight/boldness
- Annotate or label
- Mark important thresholds

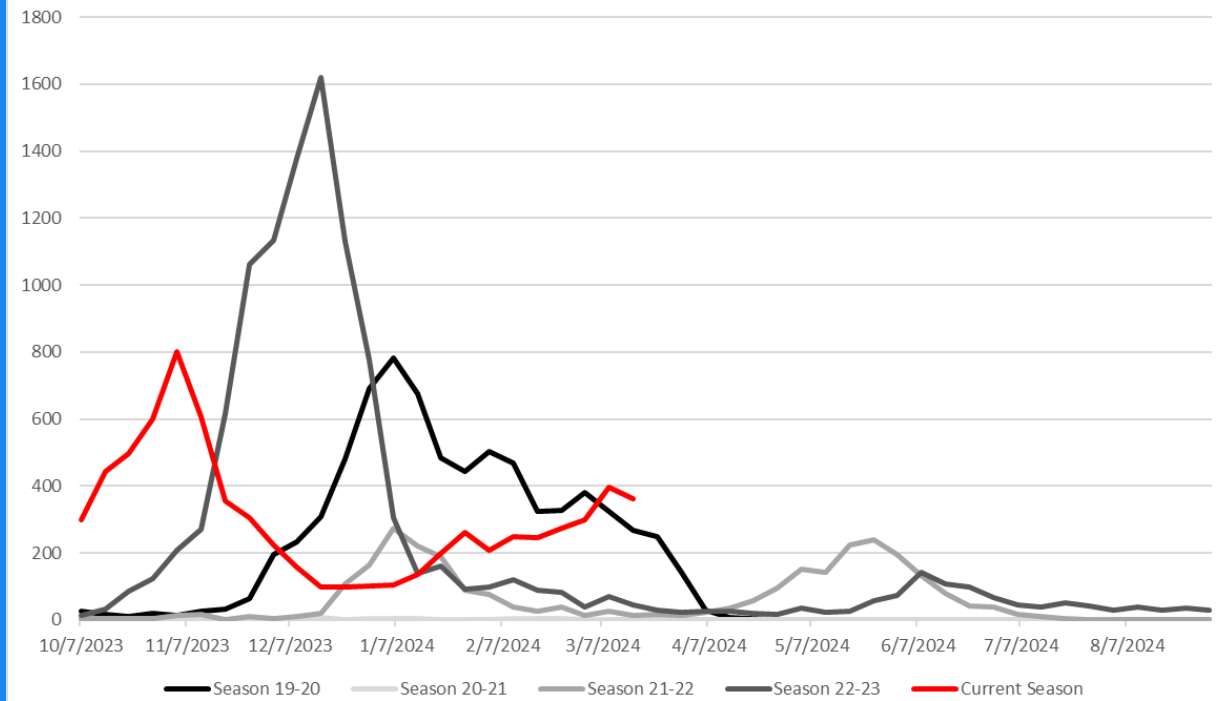


COMPARE

Influenza Cases by Season and Week

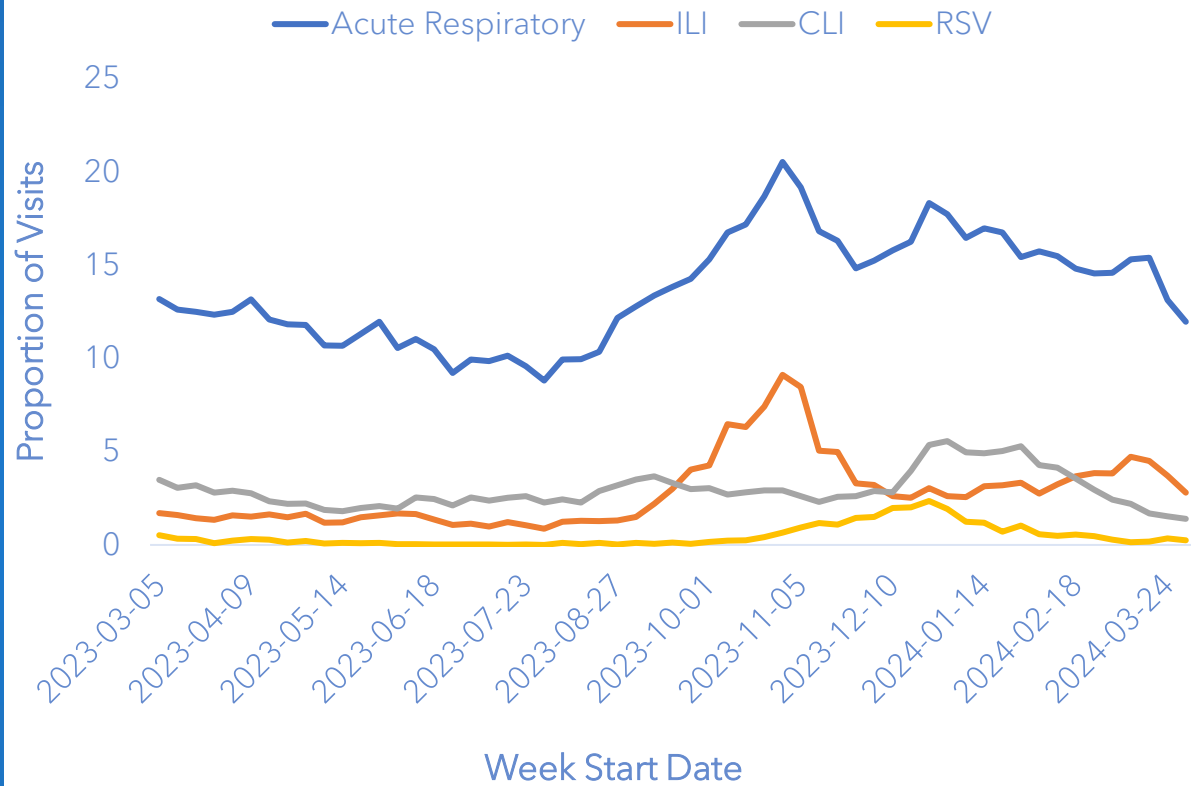


Influenza Cases by Season and Week

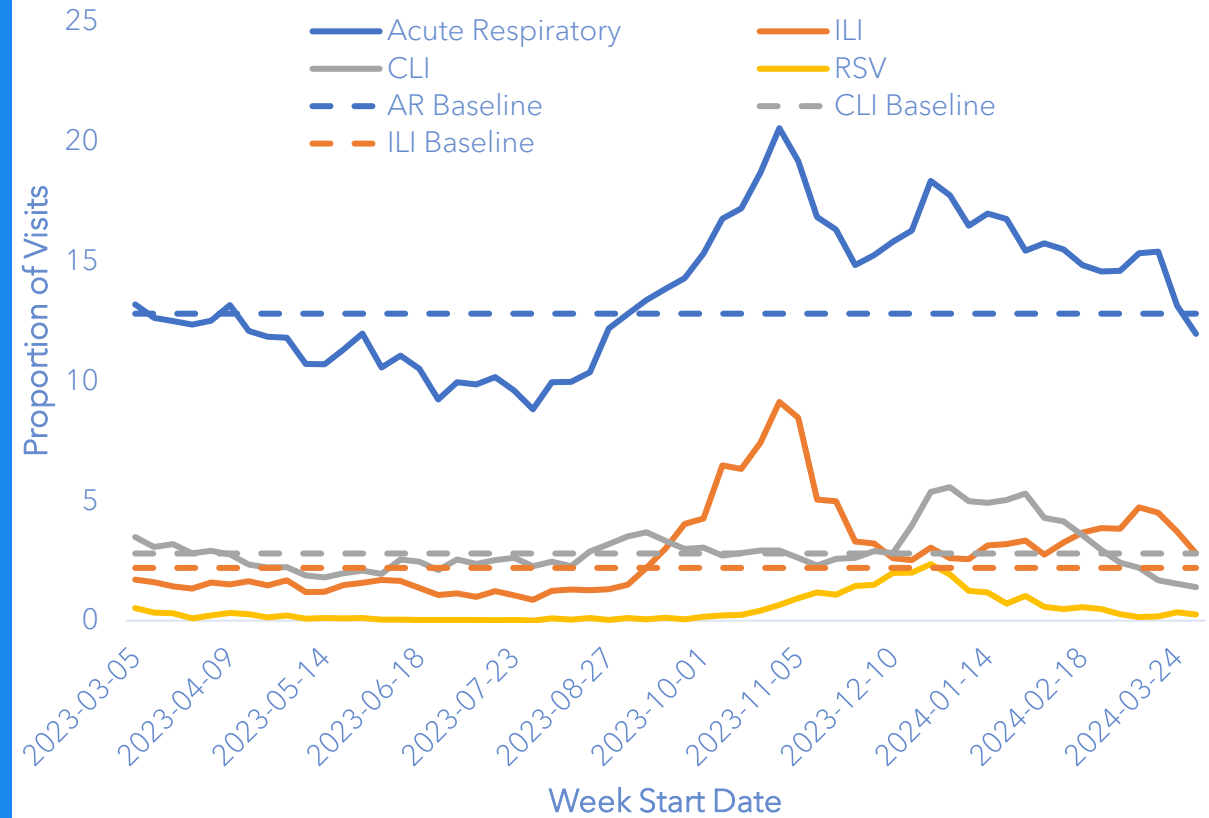


COMPARE

Proportion of ED visits with respiratory viruses



Proportion of ED Visits with respiratory viruses



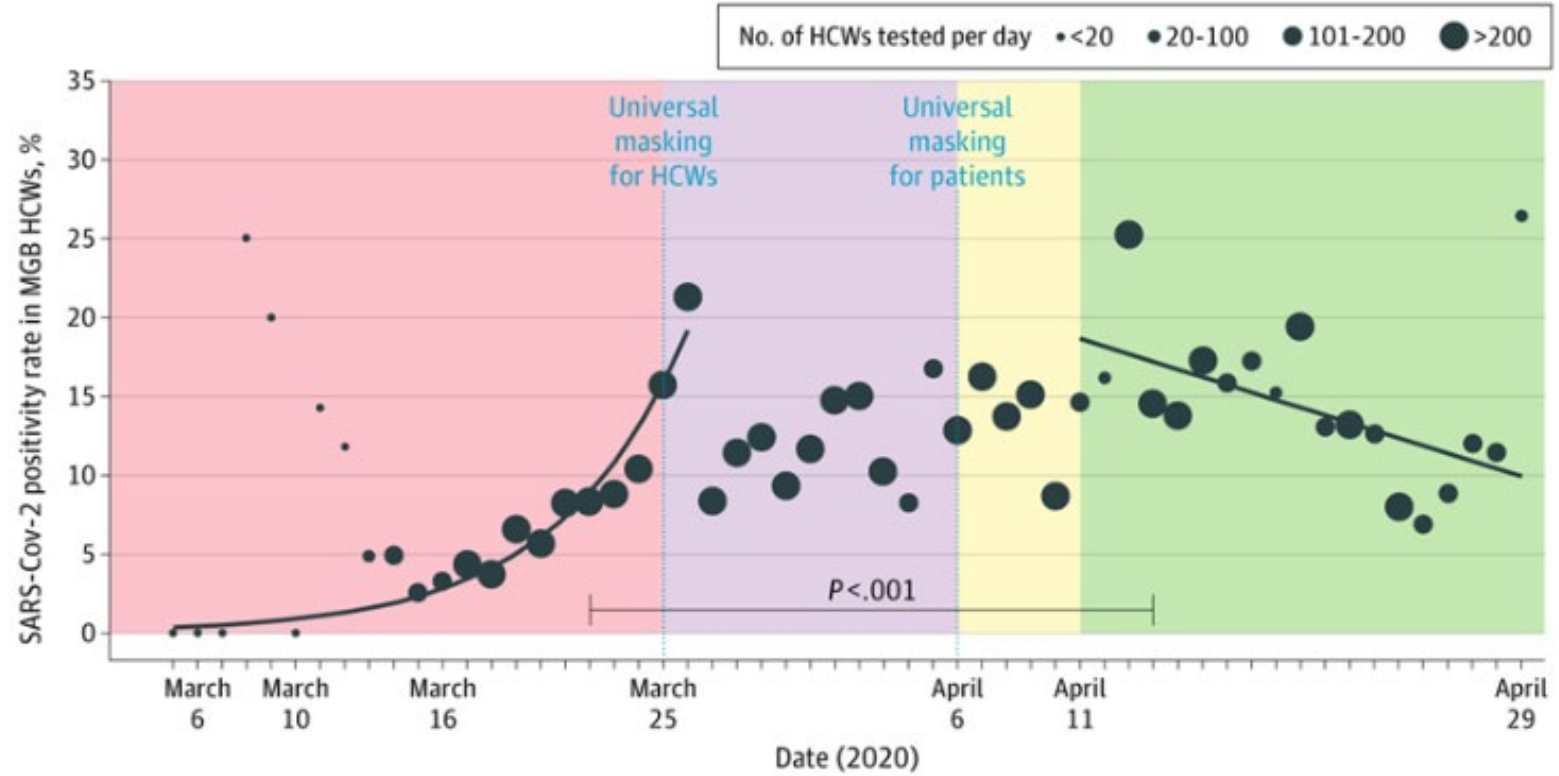
A TABLE EXAMPLE

Alaska Native / American Indian TBI frequency by activity for each age group (Alaska Trauma Registry 2010-2013)

Activity	Age_Group									Total
	<1 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	>=80	
Falls - Other	44	20	29	37	27	61	26	19	30	293
Assault / Homicide / Purp. Inflict	12	<5	46	34	30	30	<5	<5	<5	163
ATV	7	34	32	15	5	10	<5	<5	<5	106
Motor Vehicle Traffic	<5	11	41	6	7	5	<5	<5	<5	78
Snow Machine	<5	7	27	12	7	6	<5	<5	<5	65
Pedestrian	9	<5	12	5	12	7	<5	<5	<5	52
Pedal Cycles	5	8	7	5	<5	7	<5	<5	<5	35
Struck by Person or Object	6	11	5	<5	<5	<5	<5	<5	<5	32
All Other	<5	20	21	10	11	6	<5	<5	<5	78
Total	90	118	220	128	102	135	46	30	33	902



Figure. Temporal Trend in Percentage Positivity of SARS-CoV-2 Testing Among HCWs



ANNOTATE

Interventions
in
Massachusetts

March 10: Massachusetts declares state of emergency

March 16: Massachusetts closes schools

March 17: Massachusetts reduces public transportation

March 24: Massachusetts issues stay-at-home orders for nonessential workers

Interventions
at MGB

March 12: MGB restricts visitors

March 14: MGB restricts elective procedures

March 16: MGB restricts all business travel and limits on-site working

March 25: MGB universal masking of HCWs

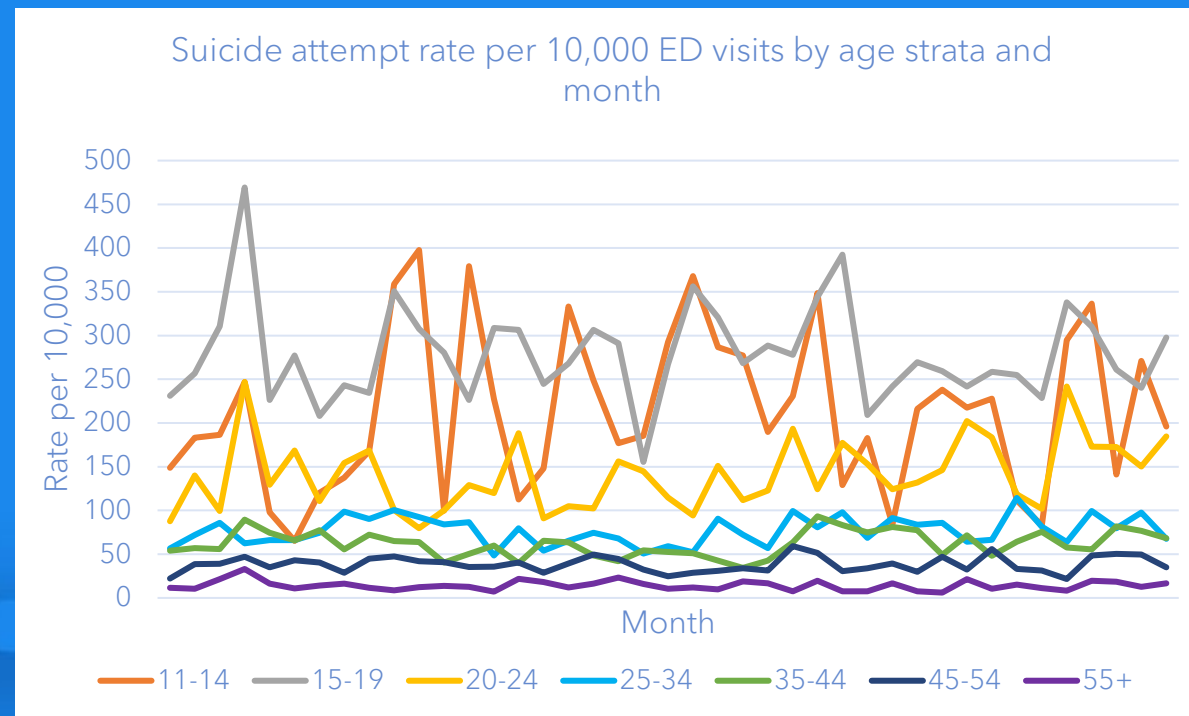
April 6: MGB universal masking of patients



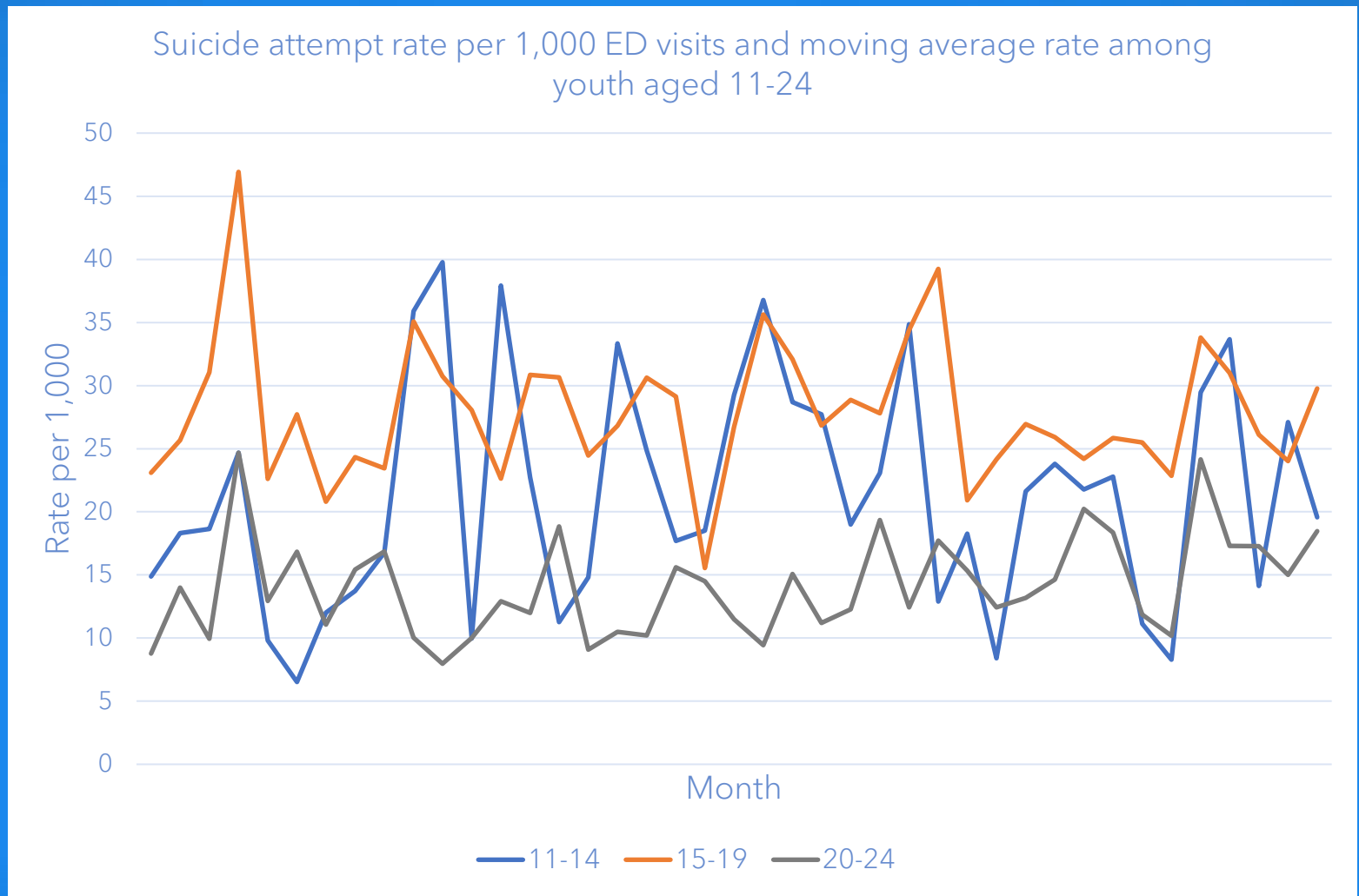
HOW SHOULD I GRAPH THIS?

- I am writing a report describing the epidemiology of suicide attempts
 - Especially interested in trends among youth over time
 - For internal use; want partners to be able to adapt for their own purposes

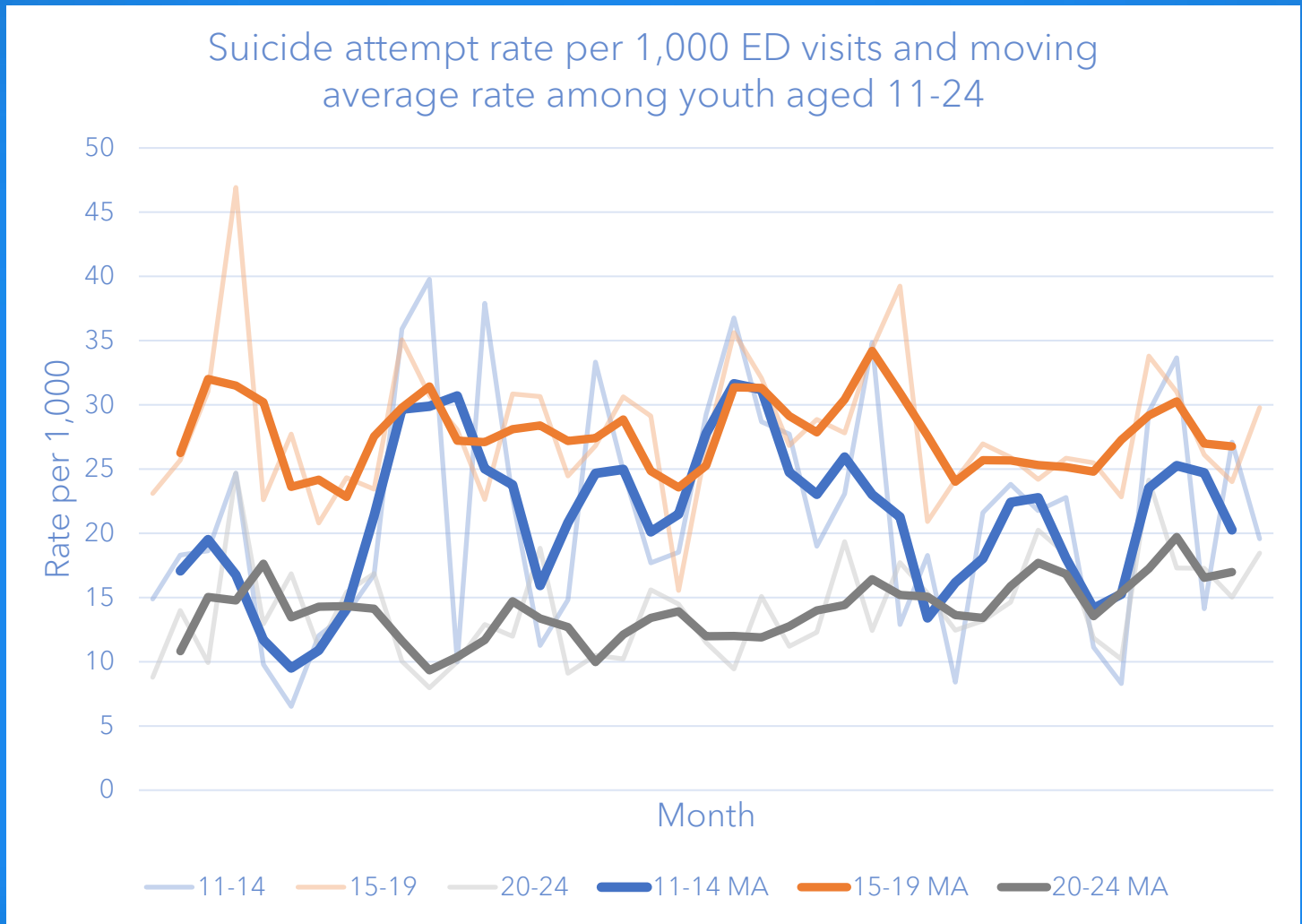
- All age strata:



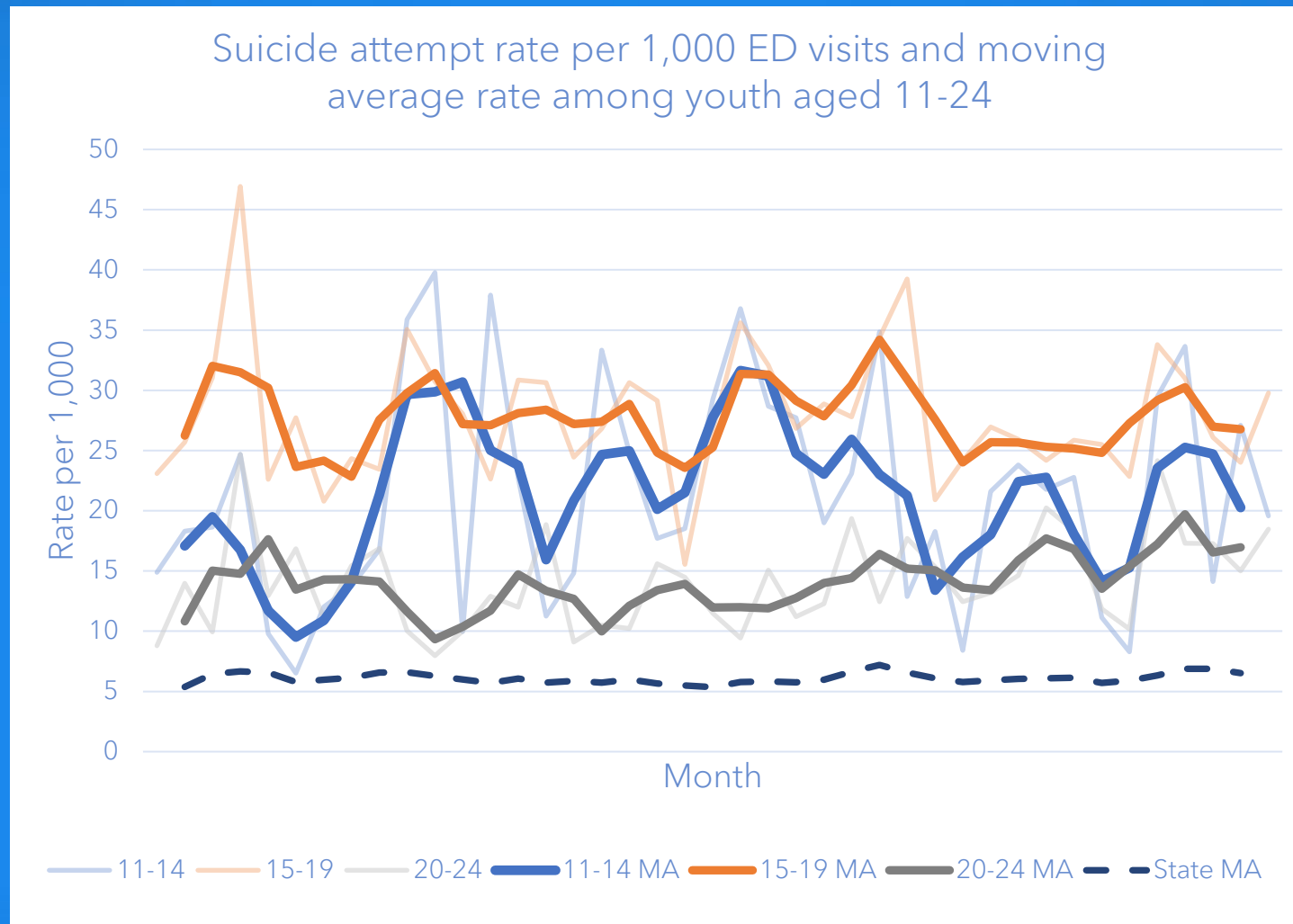
V1: JUST THE YOUTH



V2: IT'S TOO NOISY!

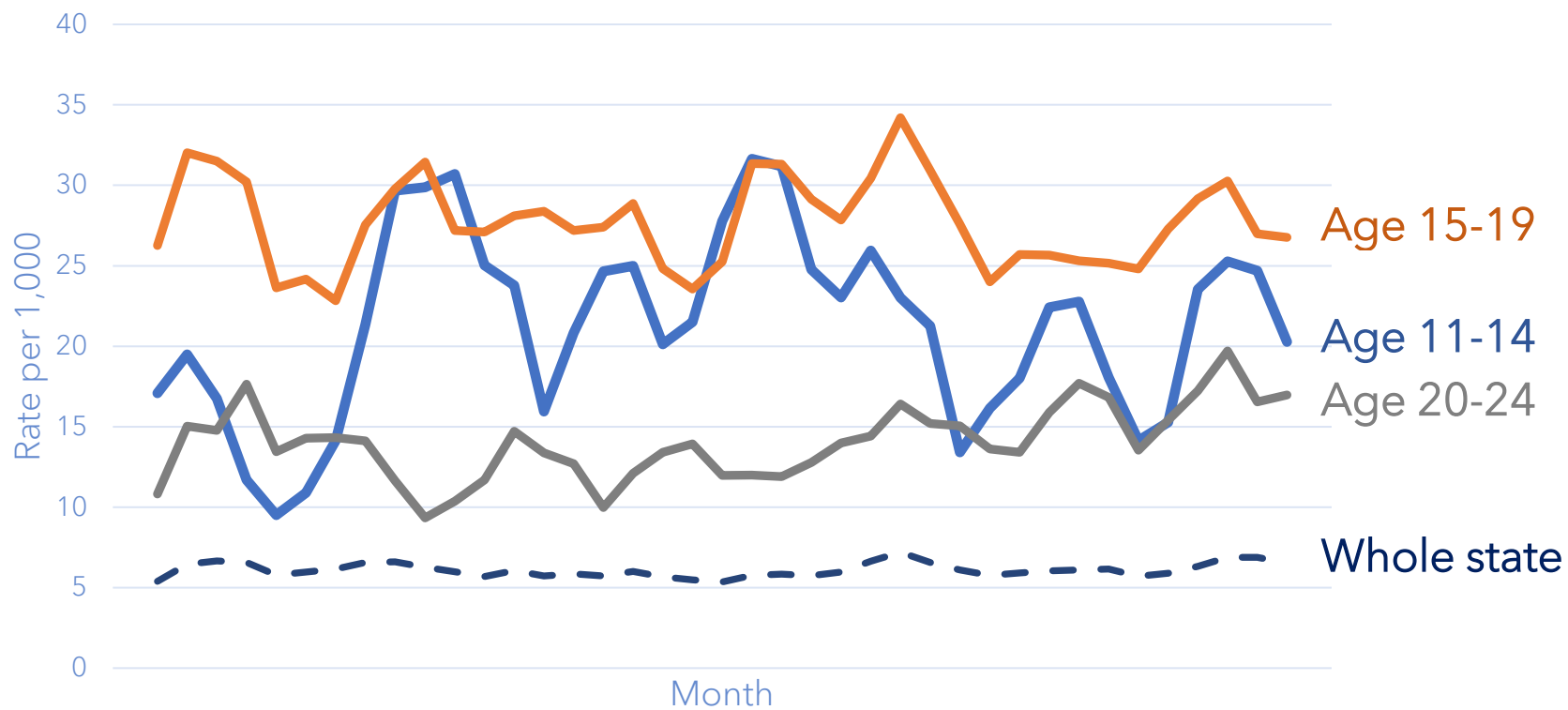


V3: NEEDS CONTEXT



V4: FOR THE PUBLIC

Youth suicide attempt rates are much higher than other age strata, especially among youth aged 15-19.



AN ALTERNATIVE: MICRO ARRAY

Lab-Confirmed Cases

Summary

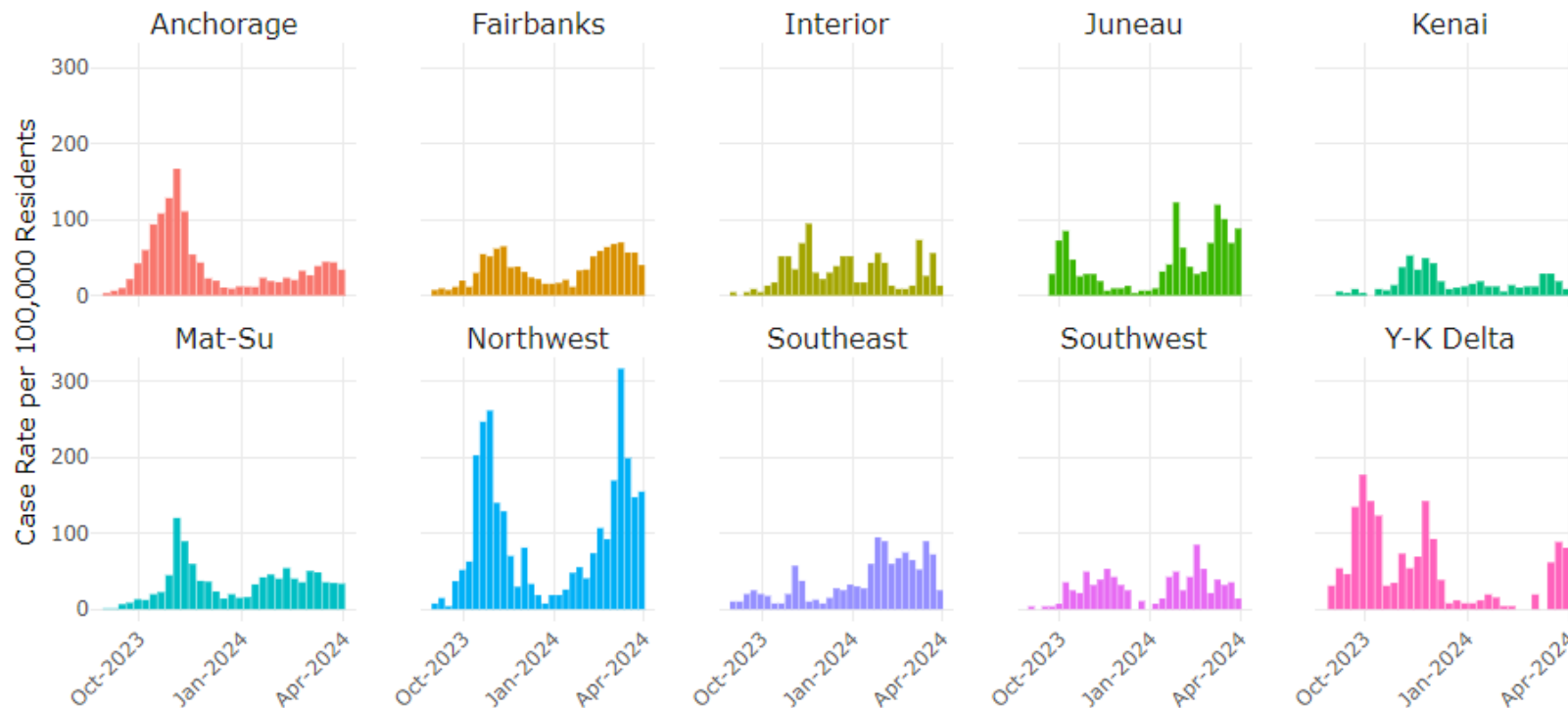
- In the ongoing respiratory virus season, there was an early increase in influenza virus activity. There was an increase in COVID-19 activity at the start of 2024, but this has recently begun to decline.
- Rates of RSV remain low, therefore regional rates should be interpreted with caution.

Alaska

By Region - COVID-19

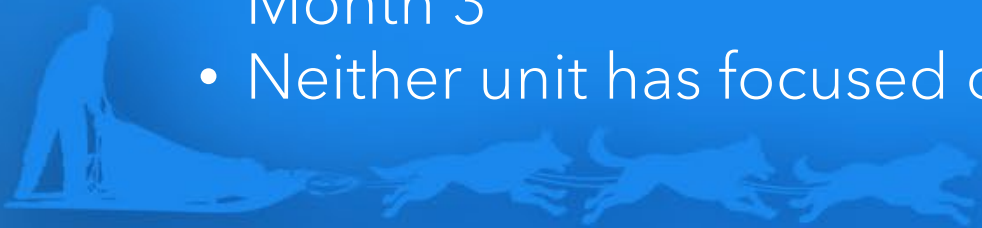
By Region - Influenza

By Region - RSV



YOUR TURN!

- You want to make a figure describing catheter use rates over time
 - Make sure to include the important parts of a figure
- Your choice of what the specific communication goal and audience is
- If you would want to do additional analysis or transformation, feel free to estimate the results
- Some metadata:
 - Both units are of a similar size and patient makeup
 - Unit B had a month-long trial of a new catheter insertion kit product in Month 3
 - Neither unit has focused on catheter-related issues lately



TEST DATA (DON'T NEED TO INCLUDE ALL)

	Device Days				Patient Days		
	Facility-wide	Unit A	Unit B		Facility-wide	Unit A	Unit B
Month 1	55	30	25	Month 1	577	300	277
Month 2	53	35	18	Month 2	557	270	287
Month 3	85	40	45	Month 3	590	290	300
Month 4	60	20	40	Month 4	587	295	292
Month 5	92	51	41	Month 5	581	286	295
Month 6	62	30	32	Month 6	578	298	280



FIGURE PARADE

- Who is your figure for?
- What is the main takeaway?
- Describe your figure, and any decision you made to support your audience and your argument



CONCLUSION

- Plan ahead for what you need to know and what questions you'll want to answer
- Take time to adjust figures and tables to be easy to understand
 - This is work you do one time that gets used by each person who reads your report
- All of this is easier than you'd think



WHAT ABOUT THIS?

COVID-19 Update for the United States

Early Indicators

Test Positivity >

% Test Positivity

4.0%

(March 17 to March 23, 2024)

Trend in % Test Positivity

-0.6% in most recent week



Feb 3, 2024 Mar 23, 2024

Emergency Department Visits >

% Diagnosed as COVID-19

0.6%

(March 17 to March 23, 2024)

Trend in % Emergency Department Visits

-21.1% in most recent week



Feb 3, 2024 Mar 23, 2024

These early indicators represent a portion of national COVID-19 tests and emergency department visits. [Wastewater](#) information also provides early indicators of spread.

Overall respiratory virus activity in **the United States**

Low

Based on healthcare visits for fever and cough or sore throat. [Read more »](#)

Wastewater viral activity level in **the United States**

COVID-19

Flu†

RSV

High

Minimal

Minimal

Wastewater (sewage) monitoring may provide an early warning that levels of infections are increasing or decreasing in your community, even when people don't have symptoms.

[Read more »](#)

† Flu levels are for Influenza A only.

Emergency department visits in **the United States**

COVID-19

Flu

RSV

Decreasing ↘

Increasing ↗

Increasing ↗

Emergency department data is used to monitor changes in people seeking medical care.

[Read more »](#)