

DATA MANAGEMENT

SHOWING OUTCOMES WITH DATA

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The presenter has no conflicts of interest to declare.



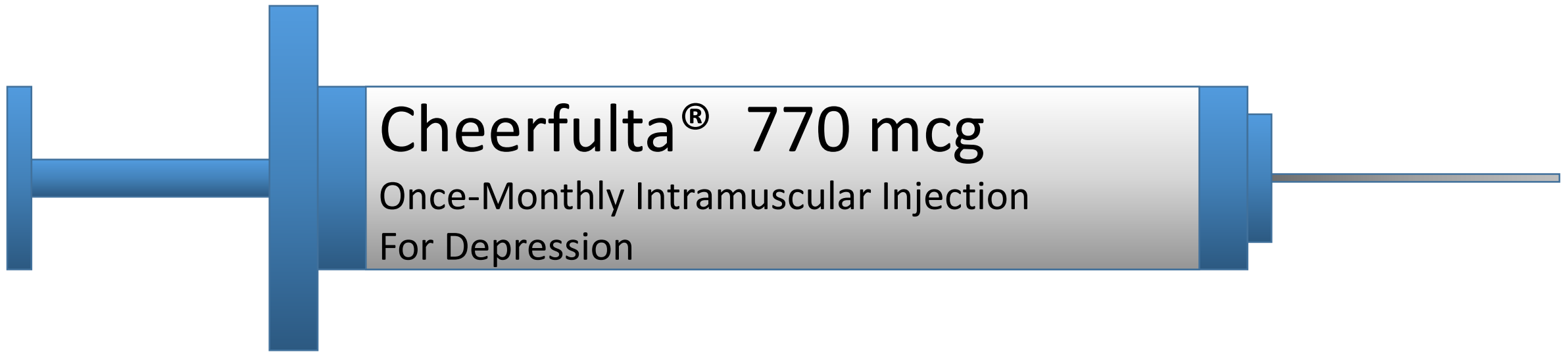
Objectives

- Explain the importance of standardized data collection
- Identify available data sources and reporting resources
- Describe examples of using charts and graphs to show outcomes with data



Standardized Data Collection

Consider a scenario:

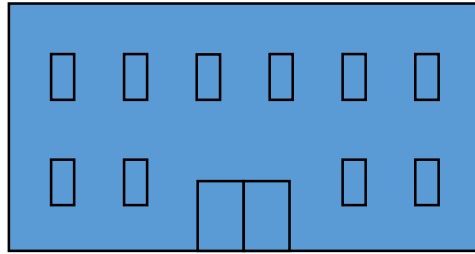


A new weight-based dosing antidepressant,
approved for Major Depressive Disorder.

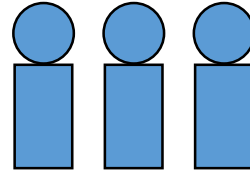


Standardized Data Collection

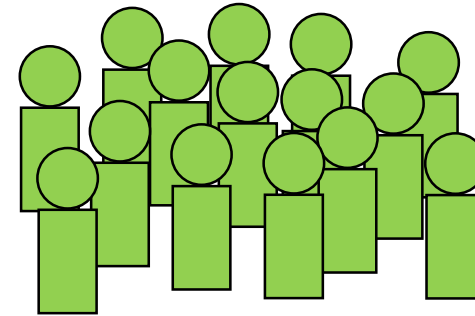
Consider a scenario:



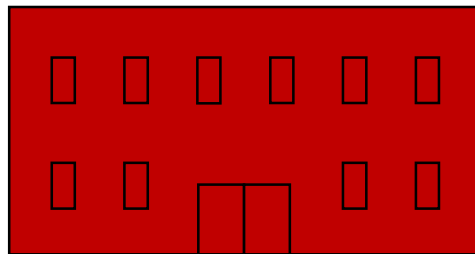
Clinic



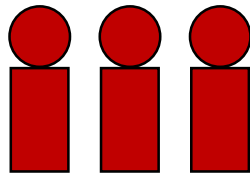
Providers



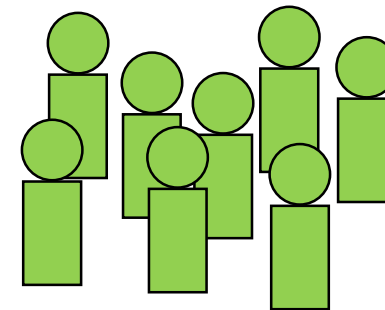
Patients



Clinic



Providers

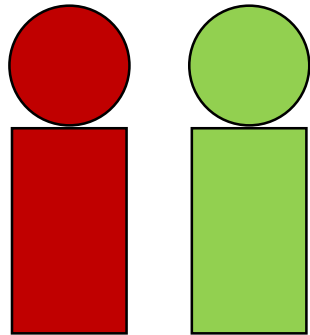


Patients

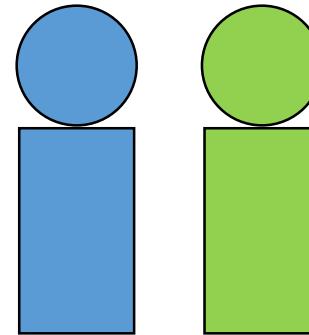


Standardized Data Collection

Consider a scenario:



How do you feel
this month?



How are you
doing this month?



Standardized Data Collection

In what ways did the **form** impact how standard the data collection was?



Standardized Data Collection

In what ways did the **environment** impact how standard the data collection was?



Standardized Data Collection

How might the results of this study be skewed based on these factors?



Standardized Data Collection

Definitions

Primary Data

Information that is commissioned and gathered for the purpose of the study.

Secondary Data

Information that was not gathered expressly for the study.



Standardized Data Collection

Four Characteristics of standardized data:

- Complete
- Generalizable
- Reliable
- Valid



Standardized Data Collection

Complete

How does incomplete data collection alter the results of a study?

What pieces of data are required to accurately study the question proposed?

Is the data recorded frequently enough to eliminate bias?

Examine a sample of the data set before attempting the study if possible.



Standardized Data Collection

Generalizable

In what context is the data recorded?

Location?

Demographics?

Time Period?

Methods of measurement?

Does the context support the degree of generalization intended?



Standardized Data Collection

Reliable

Are the results repeatable?

What factors may have influenced the repeatability of the data?

Do the methods of recording data encourage consistency?



Standardized Data Collection

Valid

What is the accuracy of the method of measure?

Is there researcher bias?

Does the data mean what you think it means?



Data Sources and Reporting Resources

Standard Data Sources:

- Medical Records
- Internal Electronic Databases
- External/commercial billing databases
- Patient registries
- Government databases

Kauffman YS, Witt DM. The Essential Guide to Pharmacy Residency Research. American Society of Health-System Pharmacists; 2020. p. 62



Data Sources and Reporting Resources

Public Databases:

- <https://healthdata.gov/>
 - State Drug Utilization Data
 - COVID-19 Impact and Community Vulnerability
 - De-Identified Inpatient Discharges
- World Health Organization
- openFDA

10 Best Healthcare Data Sets (Examples). Archer-soft.com. Published February 19, 2020. Accessed August 9, 2021. <https://archer-soft.com/blog/10-best-healthcare-data-sets-examples>



Data Sources and Reporting Resources

Public Databases:

- Data and Tools of the National Center for Health Statistics
- data.gov
- Medicare.gov
- HCUP – inpatient stays and ambulatory surgery in US Hospitals <https://hcup-us.ahrq.gov/databases.jsp>

10 Best Healthcare Data Sets (Examples). Archer-soft.com. Published February 19, 2020. Accessed August 9, 2021. <https://archer-soft.com/blog/10-best-healthcare-data-sets-examples>



Data Sources and Reporting Resources

Accessibility of Data Sources

Factors indicating good availability of data:

- Existing report
- Existing data fields / measures
- Already-standardized and defined measures
- Open platform (Excel/Access)



Data Sources and Reporting Resources

Accessibility of Data Sources

Factors indicating more time needed to gather data:

- Custom report to gather data
- Custom data fields / measures
- Measures not previously standardized / well-defined
- Closed / limited platform (EMR / Administrative Data)



Data Sources and Reporting Resources

What programs do you use for data or creating reports?



Data Sources and Reporting Resources

- Most accessible reporting resources
 - Microsoft Excel
 - Microsoft Access
 - Power BI



Data Sources and Reporting Resources

- Most accessible reporting resources
 - Microsoft Excel
 - Microsoft Access
 - Power BI



Data Sources and Reporting Resources

- Larger Scale
 - SPSS / SAS / Tableau
- Programming-focused (high control, automation)
 - SQL query
 - Python in a Jupyter Notebook
(with Pandas / Plotly libraries)



Which chart/graph type do you wish you knew how to use better?

- A. Bar graph
- B. Pie Chart
- C. Line Graph
- D. Box and Whisker plot
- E. Scatter Chart
- F. Heat Map



Chart Vs. Graph

- Use a graph if...
 - Data shows pronounced trends
 - Paints an interesting picture
 - Reveals relations between variables

Ng KH, Peh WC. Preparing effective illustrations. Part 1: graphs. Singapore Med J. 2009;50(3):245-249.



Chart Vs. Graph

- Use a graph if...
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The Thesis of a Graph

A graph must communicate a clear thesis within several seconds.

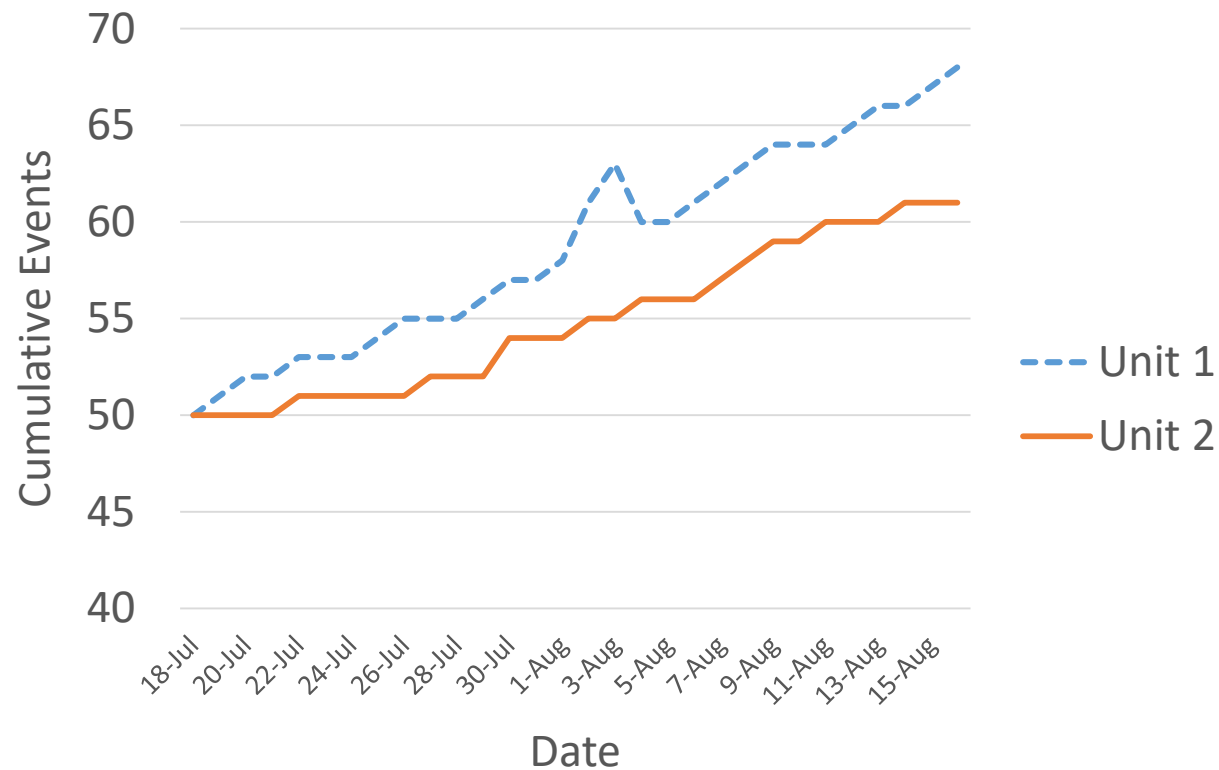
Examples:

- **A** rises faster over time than **B**.
- Most patients are in groups **A** and **B**.
- Treatment **A** performs significantly better than **B**.

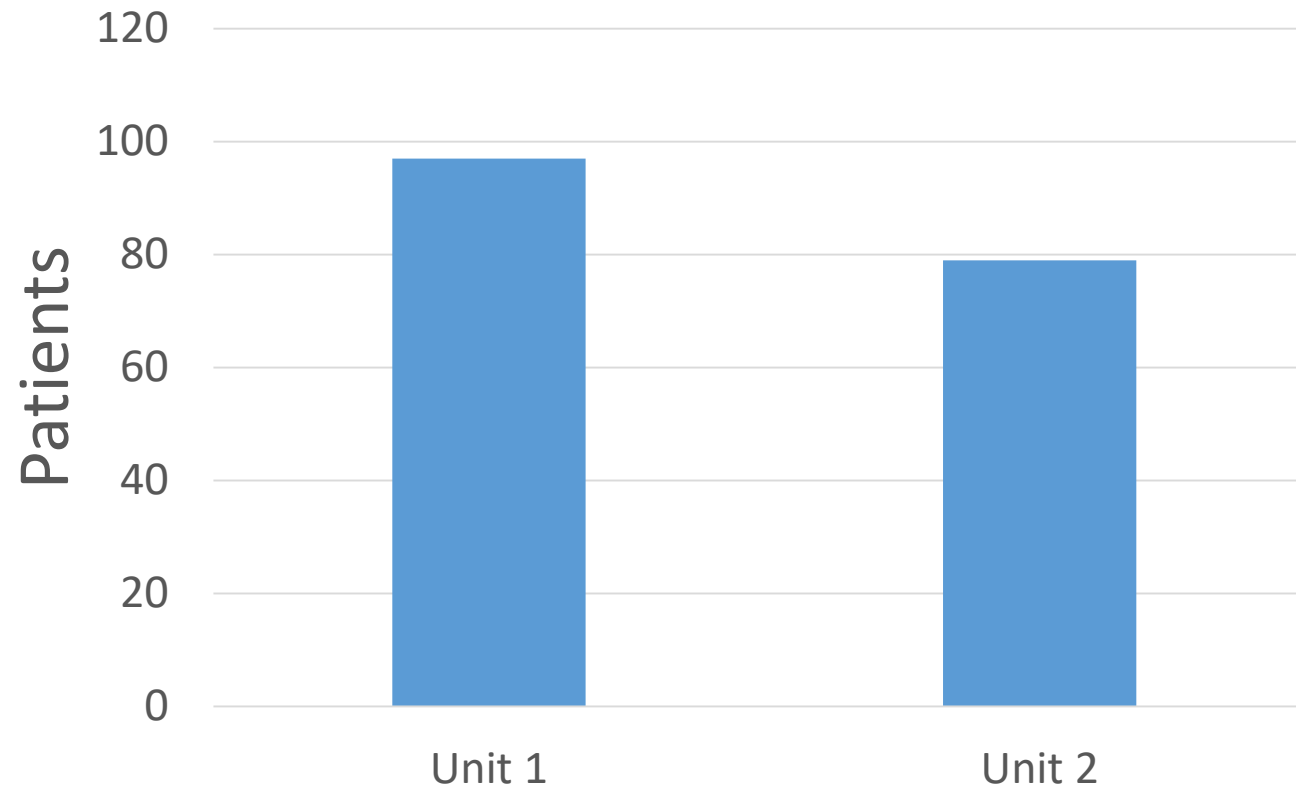


Line Graph

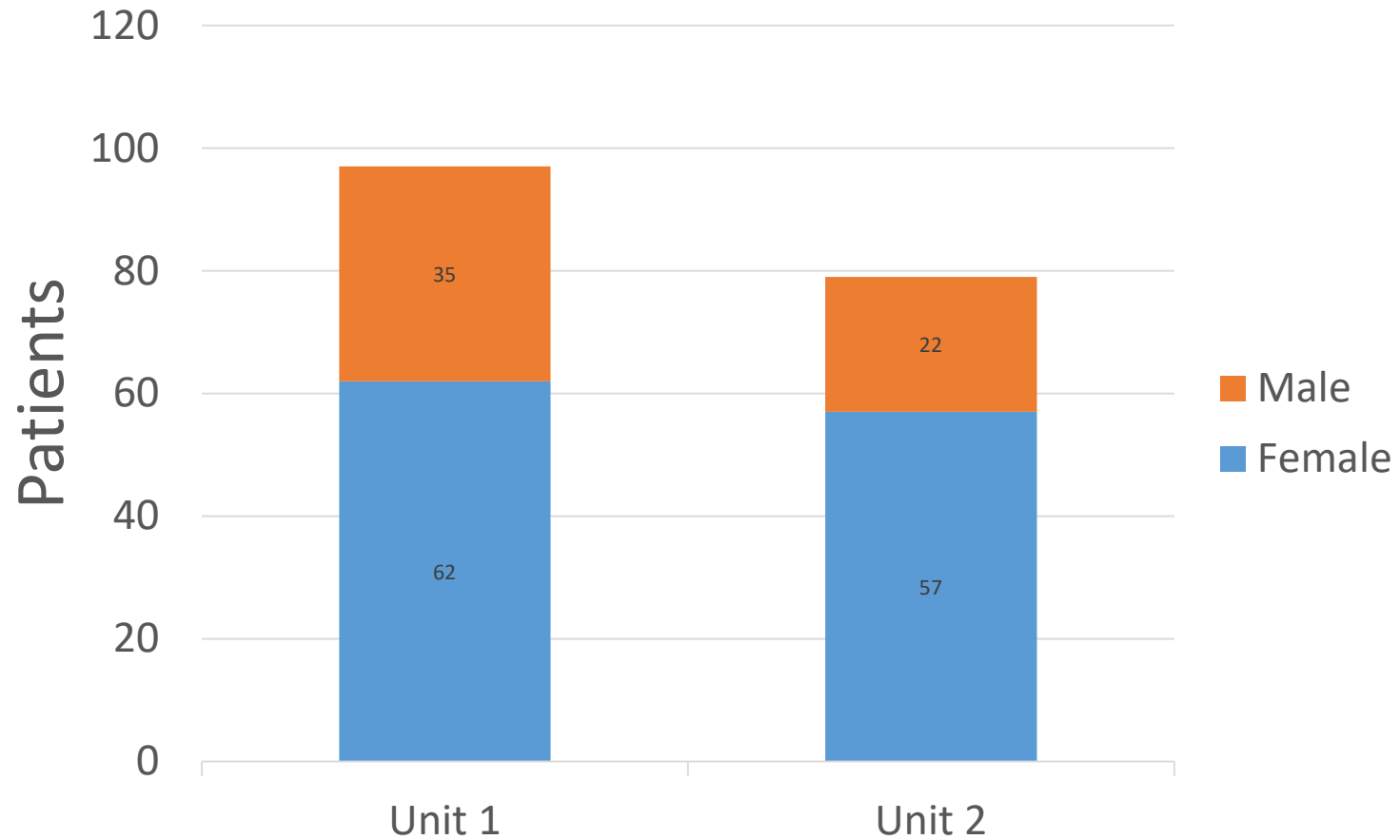
Related groups changing over time, compared to one another.



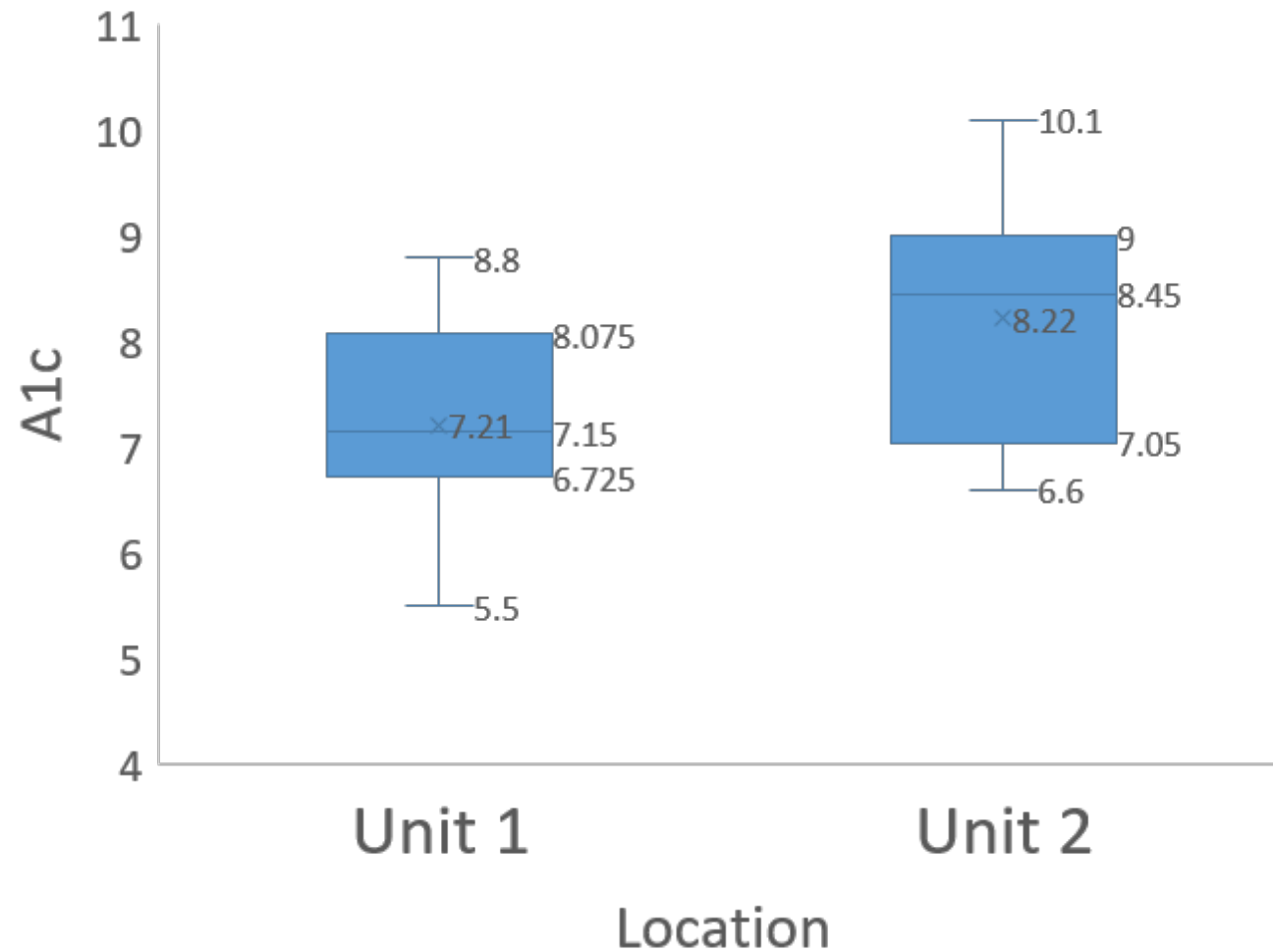
Bar Graph



Stacked Bar Graph

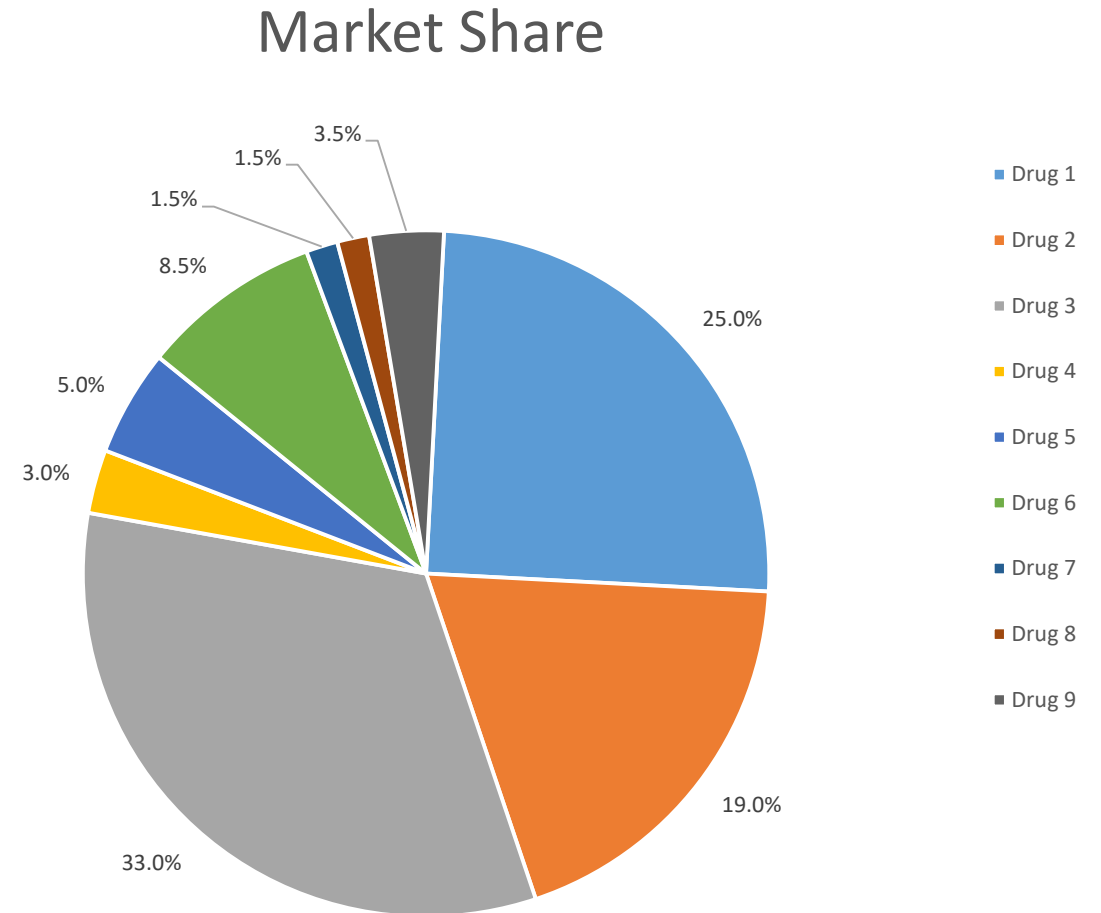


Box and Whisker Plot



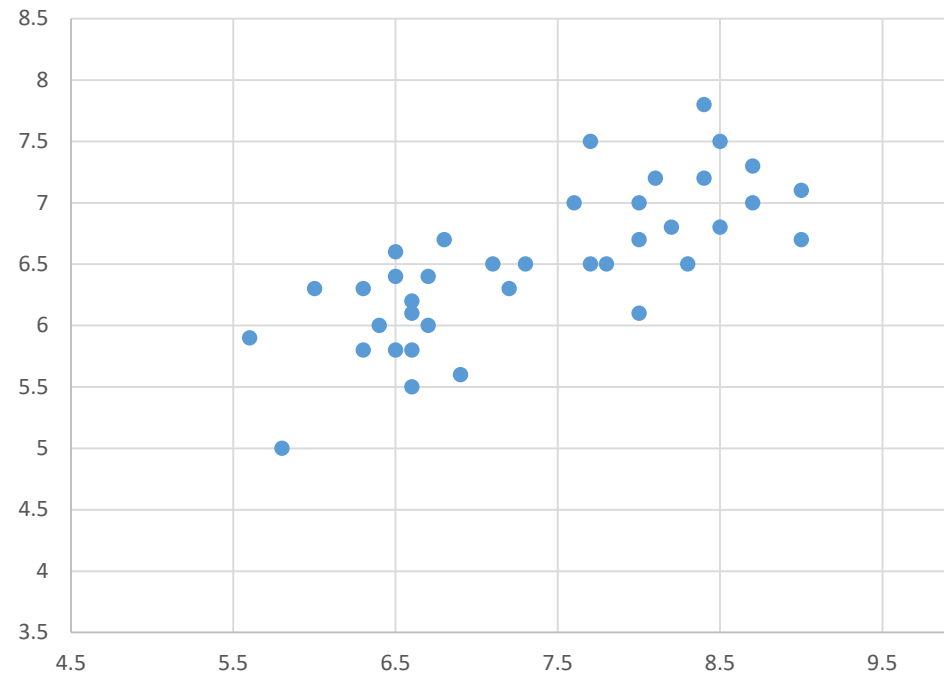
Pie Chart

- Consider whether this form is best
- Avoid 3D Effects
- Group large segments together
- Ensure labels are clear



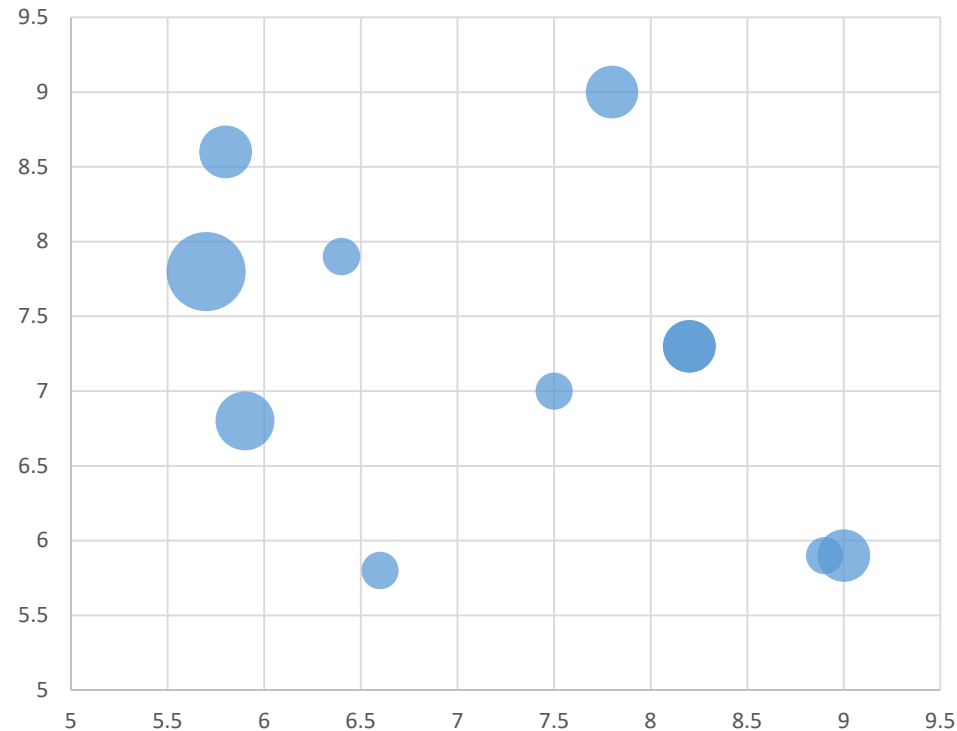
Scatter Chart

When many observations create a shape and it may be important to depict clustering patterns.



Bubble Chart

Depicting three dimensions of data.



Heat Map

Depicting patterns in large amounts of data.

Clinical Interventions	Hospital	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2
PICU	1	150	165	170	162	168	175
MICU	1	208	150	180	212	220	225
Floor 2	1	130	132	117	145	180	141
Floor 3	1	104	105	121	145	140	128
Floor 4	1	129	109	150	115	113	115
Floor 5	1	101	123	148	120	119	120
Floor 1	2	91	87	118	112	97	96
Floor 2	2	116	70	86	89	110	119
Floor 3	2	82	92	96	135	120	80
Floor 4	2	86	114	100	85	90	106
Floor 5	2	112	94	104	116	105	84
Floor 1	3	55	66	62	64	59	70
Floor 2	3	66	50	60	75	71	51
Floor 3	3	40	45	44	40	54	50
Floor 4	3	63	58	75	75	77	66

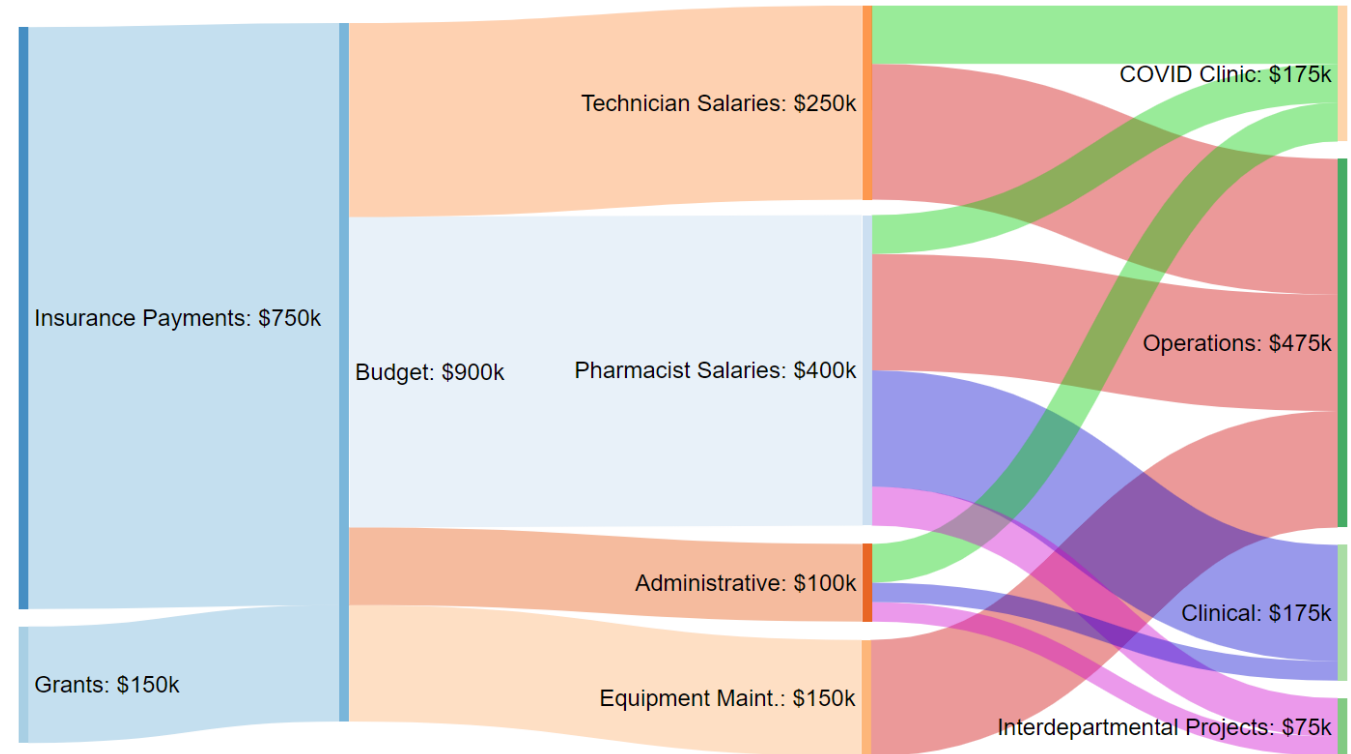


Sankey Diagram

Complex progressions:

- Characteristics of patient groups
- Clinical cohorts
- Budgets

FY2020 Budget



Generated with fictional data by Danny Limoges, PharmD using
www.sankeymatic.com



References

- Kauffman YS, Witt DM. The Essential Guide to Pharmacy Residency Research. American Society of Health-System Pharmacists; 2020.
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- Randle T. What do you mean I'm not supposed to use Pie Charts?! Geckoboard.com. Published August 17, 2015. Accessed August 2, 2021. <https://www.geckoboard.com/blog/pie-charts/>
- Bogart S. Sankey Diagram Generator. Accessed August 2, 2021. <https://sankeymatic.com/>



Questions?



Learning Assessment Questions

Data Management – Showing Outcomes Using Data

1. Which of the following represents the most standardized method of data collection?
 - a. Providers write a free text description about the side effects of a medication every time patients voice a complaint about medication.
 - b. Blood pressures are taken by nurses, using different brands of blood pressure cuff, and are recorded in the EHR.
 - c. Unvalidated claims data from hospitals in two different countries are examined to understand which medications physicians prefer.
 - d. Patients are asked to state two adjectives that describe their pain level, which are entered in a free-text field in a form.
2. Which of the following best describes a well-made graph?
 - a. Surprising and persuasive
 - b. Large and detailed
 - c. Clear and accurate
 - d. Elegant and colorful
3. Which of the following would be best depicted as a graph rather than a data table?
 - a. Yearly data on the budget allocated to a certain department, which has been the same for 5 years.
 - b. A series of hundreds of data points, scattered in a seemingly random pattern.
 - c. Several dozen demographics about a patient population.
 - d. Hundreds of data points of individual patients, describing patient age and a1c that form a pattern.
4. Which of the following programs would work best to summarize a large, unfiltered file of lab results (1 gigabyte).
 - a. Excel
 - b. Word
 - c. SPSS
 - d. Power BI

Answer key:
1. B 2. C 3. D 4. C