Quality and Safety Series

Data Visualization 101
OBJECTIVES

• Describe the basics of data visualization for your quality improvement and patient safety projects.
• Identify the best tool to effectively track and communicate quality and safety data.
• Achieve the appropriate balance between form and function.
What Is Data Visualization?

• Graphical representation of information and data.

• Tools that provide an accessible way to see and understand trends, outliers, and patterns in data.

Why Is Data Visualization an Important Step?

• Aids in tracking patient safety measures to:
  - Understand baseline performance.
  - Assess the effects/analyze the results of patient safety interventions.
  - Evaluate whether changes in performance are sustained over time.

• Helps users analyze and reason regarding data and evidence.
Baseline Data/Baselining

**The measurement of outcome or performance prior to an intervention.**

- Confirm that the data reflect the current state.
- Use the measure definition.
- Ensure there are enough data points.
- Watch for seasonal impacts.
Analyzing the Results

• Display the data.
  – Start with run charts.
  – Use control charts or SPC* charts for more specific insight.

• Analyze the data.
  – Are these the predicted results?
  – Look for impact of the intervention.

• Examine change or variation.
  – Watch for 5–8 points above or below the mean.

SPC = statistical process control
The Makes and Breaks

The makes
• Make data more accessible, understandable, and usable.
• Communicate information clearly and efficiently.
• Stimulate viewer engagement and attention.

The breaks
• Create elaborate data visualizations that fail to serve their main purpose—to communicate information.
• Might create misleading or erroneous conclusions.
Best Practices for Graphical Displays

• Know your audience.

• Design graphics that can:
  – Stand alone outside the context of the report.
  – Communicate the key messages.

https://www.cbo.gov/sites/default/files/presentation/45224-datavisualization0.pdf
General Types of Data Visualization

• **Charts**
  
  *(Most prevalent type in acute care settings)*

• Tables
• Graphs
• Maps
• Infographics
• Dashboards
Run Chart

- A standard quality tool used to display trends over time.

Useful to:
- Display variation.
- Discover patterns.
- Observe the effects of process improvement.
Pie Chart

- A snapshot in time.
- Represents one variable, which is divided into slices to illustrate numerical proportion.

*Food preferences: % of people eating fast food vs no fast food in a specific population*

Useful to know and compare the importance of factors as a whole.
Bar Chart

- Used to show patterns or relationships in the data for one or more variables.

Useful to show:
- Comparisons among categories.
- Different units or sub-populations.
Histogram

- An approximate representation of the distribution of numerical data.
- A specialized type of bar chart used to summarize groups of data.

Useful to show:
- Data distribution or spread.
- Symmetric or skewed data.
- Extreme data values.
Pareto Chart

• Displays a series of bars with which the priority for problem solving can easily be seen by the varying height of the bars.

• 80% of the problems or effects come from 20% of the causes.

• Theoretically, by tackling 20% of the most frequent causes, an 80% improvement can be achieved.

The tallest bars are the most frequently occurring issues.
Scatter Diagram

• Displays values for typically two variables for a set of data.

Useful to highlight the correlation between variables.
Radar or Spider Chart

- A two-dimensional chart designed to plot one or more series of values over multiple quantitative variables.
- Each variable has its own axis. All axes are joined in the center of the figure.

Useful to display and easily compare multiple categories.
Key Take-Aways

• Choose the most appropriate type of data visualization to engage your audience.

• Keep it simple!

• Limit the number of visual tools used for your staff.

• Limit the number of visual effects to facilitate understanding.
References

  


Thank you!

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