Performance Assessment: Representation and Reporting

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D210: Representation and Reporting

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Part 1: Interactive Data Dashboard

A1: Interactive Data Dashboard

The dashboard is available on Tableau Public via this link. The .twb file is also available in this submission.

A2: Data Sets

The dashboard uses the following datasets.

1. The *Medical* data set provided by WGU
2. Kaiser Family Foundation's *Hospital Adjusted Expenses per Inpatient Day* data set, located online here.

Both data sets are included in the submission as .csv files.

A3: Installation Instructions

No sort of installation is required to access this dashboard. The dashboard is made available to users on Tableau public and may be accessed via this link. Public availability ensures the dashboard is easily accessible to users and avoids potential complications with local installations.

A4: Navigation Instructions

This dashboard is a single-tab dashboard intended to give users insight into Hospital admission data in one consolidated view. It can be broken into six sections and navigated as follows:

1. Key Performance Indicators (KPIs)
Located in the top left

- Card visualizations showing:
    - Average Initial Days - displays typical length of stay
    - Readmission Rate - shows percentage of returning patients
    - Two comparison cards showing average daily hospital admission cost per state for the patient and the hospital admission expense for the hospital (WGU vs. KFF data sets)

2. Admission Types
Located in left middle

- Bar chart
- Compares three categories of patient admissions

3. Primary Services
Located in bottom left

- Tree map

- Tracks frequency of primary medical services during hospital admission

4. Medical Conditions
Located in top right
- Horizontal bar chart
- Displays percentage of hospitalized patients with specific medical conditions

5. Readmission Rates by US State
Located in bottom right
- Interactive US Map visualization
- Hover functionality shows:
    - Specific readmission percentages
    - Count of readmissions
- Color intensity indicates relative rates
- Legend below shows intensity scale

6. Filtering Options
- State selection dropdown
- Readmission status filter (Yes/No)

Part 2: Storytelling with Data

B: Panopto Storytelling with Data
A Panopto recording is included with the submission.

Part 3: Reflection Paper

C1: Dashboard Alignment
Explain how the purpose and function of your dashboard align with the needs outlined in the data dictionary associated with your chosen data set.

The medical dataset focuses on hospital readmissions, a critical concern for the associated hospital chain. The analysis aims to quantify the extent of readmission issues and identify actionable insights to address them.

The dashboard is designed to tackle the challenge of CMS penalties by monitoring readmission rates and their contributing factors. By highlighting key correlations and providing detailed analysis via filters, it allows the hospital chain to adopt a data-driven approach to reducing readmissions. The map visualization is particularly useful for a nationwide chain, helping identify high-risk facilities.

The primary purpose of the dashboard is to showcase readmission rates alongside key performance indicators (KPIs) and metrics correlated with readmissions. Notable KPIs include

% Readmitted and Average Initial Days, which are prominently highlighted to track readmission rates and average initial hospital stays. Statistical analysis revealed a strong correlation between initial length of stay and readmission, making this metric essential to monitor. Similarly, the Initial Admission Type visualization is critical due to the strong statistically significant relationship between emergency admissions and hospital readmissions. The visualization itself allows users to analyze trends across admission types.

Other visualizations explore primary services during admission, patient medical conditions, and readmissions by U.S. state. These enable users to dissect the data and identify patterns. Filters for Readmission Status and State enhance the dashboard's utility, allowing users to compare characteristics of readmitted versus non-readmitted patients and pinpoint trends by US State.

C2: Additional Data Set Insights

Explain how the variables in the additional data set enhance the insights that can be drawn from the data set you chose from the provided options.

The additional data set, Kaiser Family Foundation's *Hospital Adjusted Expenses per Inpatient Day,* enhances insights by enabling a comparison between the hospital system's average daily costs and the expenses calculated by KFF. This comparison enables a deeper understanding of how readmissions impact hospital financials, patient affordability, and overall system efficiency. Readmissions can lead to increased operational costs, resource strain, and financial burdens on patients and payers. By comparing patient charges and adjusted expenses, we can assess whether hospitals are passing these costs to patients or if they signal potential inefficiencies in managing care transitions that result in avoidable readmissions.

This insight is particularly valuable when investigating the relationship between readmissions and financial sustainability. Hospitals with a higher prevalence of readmissions may display inflated costs due to repeated admissions, whereas lower costs in systems with better readmission prevention efforts could highlight best practices. The dataset also helps pinpoint differences in how hospitals manage and charge for readmissions, which can guide interventions to reduce both costs and readmission rates.

C3: Decision-Making Support

Explain two different data representations from your dashboard and how executive leaders can use them to support decision-making.

Initial Admission Type (Bar Chart)

- **What It Shows:** This bar chat categorizes admissions into Emergency, Elective, and Observation types with their counts.
- **How Leaders Can Use It**:
    - Resource Allocation: Leaders can use admission type counts to determine where they should allocate their resources. For example, since emergency admissions are greater than 50% of admissions, leaders should prioritize resources like staffing and beds for unplanned patient care.

    - Policy Adjustments: Leaders can react to high or low amounts of observation and elective admissions by adjusting hospital policies that define what criteria must be met for admission.
    - Readmission Analysis: By using the “Is Readmitted” filter, leaders can analyze the admission types that lead to readmissions. For example, a leader could observe high readmittance rates for emergency admissions and determine that there might be gaps in discharge planning or insufficient follow-up care.

% of Patients with Specified Medical Conditions (Horizontal Bar Chart)

- **What It Shows:** The chart ranks medical conditions based on their prevalence among patients. The medical conditions included in the chart are those that were binary in nature from the medical data set.
- **How Leaders Can Use It**:
    - Preventive Programs: Leaders can identify medical conditions that would benefit from prevention programs. For example, the high percentage of overweight patients may suggest implementing weight management initiatives.
    - Specialized Care: Certain conditions may indicate specialized care is needed which can inspire planning and resource allocation.
    - Readmission Analysis: Applying the filter can reveal which medical conditions are most associated with readmitted patients.
        - Actionable decision examples:
            - Develop condition-specific care programs, such as nutritional support for overweight patients or pain management programs for those with chronic back pain.
            - Allocate more resources to manage high-risk conditions and improve post-discharge support.

C4: Interactive Controls

Explain two interactive controls in your dashboard and how each enables the user to modify the presentation of the data.

State Dropdown Filter

- Functionality: This dropdown allows users to filter the data based on a specific US state. By selecting a state, the dashboard dynamically updates all visualizations to show data for that specific state or states if multiple are selected.
- Impact: Users can focus on trends and metrics relevant to a particular state or geographic area.

Readmission Checkbox Filter

- Functionality: The checkboxes for "Is Readmitted" (Yes/No) let users toggle between including or excluding data for patients who were readmitted. Checking or unchecking an option changes the visualizations to reflect only the chosen subset of data.

- Impact: Users can compare readmission-related patterns against those for patients who were not readmitted, offering insights into differences in costs, services, or conditions.

C5: Color Blindness

Describe how you built your dashboard to be accessible for individuals with colorblindness.

This dashboard is designed to ensure accessibility for individuals with colorblindness by primarily distinguishing metrics and visualizations through means other than color, as suggested by Shaffer (2016). For example, the two bar charts use length of the bar and color to show values. Similarly, the tree map uses box size and color to convey its values. Clear labels are also employed as a means of sharing data in addition to color. The labels and visualizations use strong contrast ratios that ensure readability regardless of color perception. The standard Tableau Blue-Teal color palette is used with a monochromatic approach because blue-based colors remain distinguishable for many forms of colorblindness. This allows users to differentiate elements through lightness and darkness rather than hue.

C6: Data Representations

Explain how two data representations in your presentation support the story you wanted to tell.

Ultimately, the goal of this dashboard was to stay true to the issue presented in the data dictionary which is centered around hospital readmissions. The first data representation created was the card for % Readmitted. It is critical that this measurement be apparent and at the forefront of the dashboard to convey the message to the user of how the hospital system is performing against readmittance. The size of the card draws the user's eye to this metric and its location in the top left of the dashboard matches a common left to right viewing approach.

Another important data representation for the story is the horizontal bar chart that shows the % of patients with the specified medical condition. In reality, this visualization packs 11 different metrics into a single visualization and allows the user to compare similar metrics against one another. The story to be told with this visualization is which medical conditions require the most attention to react to for hospitalizations, but also to create preventive plans. Having the chart at the top next to the important % Readmitted metric ensures it is reviewed by the user. The size of the chart as well as the flow of the bars help show an obvious trend that draws the user right in.

C7: Audience Analysis

Explain how you used audience analysis to adapt the message in your presentation.

The primary audience for this dashboard consists of executive leadership, including several vice presidents within the organization, which guided my decision to maintain high-level KPIs and visualizations. Executive stakeholders typically seek quick, actionable insights rather than detailed analysis, as they often delegate deeper, root-cause investigations to their teams. This understanding of user needs drove my decision to create a single-tab dashboard rather than spanning multiple pages. While designing for executives, I also needed to present this dashboard to my Data Analytics peers. Given their similar technical background to my own, I

was able to communicate more technically rather than simplifying explanations, as I did in demonstrating the dashboard's visual representations. This peer audience enabled me to focus on presenting the metrics directly rather than explaining fundamental concepts for the dashboard and for how the metrics are calculated.

C8: Universal Access

Describe how you designed your presentation for universal access by all audiences.

Since the dashboard itself is available on Tableau Public and the presentation is available via Panopto, either resource is accessible by a simple click of a link.

The dashboard incorporates several key design principles to ensure universal accessibility. As discussed in section C5, the color scheme is selected with color blindness in mind and there are high contrast ratios to ensure readability. Visual elements use clear fonts and include text to accommodate screen readers. The dashboard is organized with critical metrics at the top and groups related information together, while providing multiple ways to access the same data through both textual and visual representations. The single-page design allows users of all technical backgrounds to easily locate information.

C9: Effective Storytelling

Explain two elements of effective storytelling that you implemented in your presentation and how each element was intended to engage the audience.

1. Clear Structure

In presenting the dashboard to my peers, I aimed to maintain a clear structure in my storytelling. A compelling story follows a clear plot: a beginning, middle, and end (Huez, 2024). After my introduction, the beginning focused on outlining the problem of hospital readmissions and the motivation behind the dashboard and analysis. The middle highlighted the findings and provided an explanation of the dashboard. Finally, the ending emphasized key takeaways and actionable steps based on the results. This structured approach is designed to give the audience a logical flow, making the information easier to follow and understand

2. Emotional Connection

An effective storytelling element is creating an emotional connection with the audience. In this presentation, I shared a personal experience from my time as a certified nursing assistant, which directly related to the issue of hospital readmissions. This story emphasized the significance of the topic and underscored the potential impact we can achieve by implementing the findings. By sharing this experience, I aimed to engage the audience on a deeper level and inspire action.

D: Sources

Hospital adjusted expenses per inpatient day. KFF. (2024, February 1). https://www.kff.org/health-costs/state-indicator/expenses-per-inpatient-day/

Huez, A. (2024, May 13). 7 data storytelling techniques to build dashboards that engage your customers. Toucan. https://www.toucantoco.com/en/blog/7-data-storytelling-techniques-to-engage-your-customers

Shaffer, J. (2016, April 20). 5 tips on designing colorblind-friendly visualizations. Tableau. https://www.tableau.com/blog/examining-data-viz-rules-dont-use-red-green-together