Reflection Paper

Medical Data Dashboard

Javier Lopez

D210, Representation and Reporting

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1. Dashboard Purpose and Function

Our dashboard informs stakeholders of hospital metrics, patient demographics, and health trends. The data dictionary states that the Senior Vice President (SVP) of Hospital Operations is “responsible for developing new initiatives to improve patient outcomes based on observed trends.” Our dashboard allows them to see a quick overview of the most prevalent medical conditions among patients, their complication risks, and the services rendered to patients upon their initial hospitalization. The data dictionary also states that the SVP “is interested in broad categorization of patient treatments and outcomes as a function of demographics, and how these trends play out across regions.” We addressed this need by including filters in our dashboard, allowing stakeholders to filter the data from a broad overview nationally and by region (Midwest, Northeast, South, and West) while allowing for a more in-depth investigation into specific states and counties. To ensure that we met all the needs of the SVP, we made our dashboard filterable by geographic location, patient demographics, and patient health data, including medical conditions and treatments.

Regarding the Vice President (VP) of Research, we saw that “a key focus of this VP is to oversee research initiatives to identify patterns in patient care and drive improvements in patient outcomes through strategic initiatives.” To meet the needs of the VP of Research, we ensure that patient demographics and health data, along with readmission status and hospital metrics, work in tandem to give the best possible overview of how each variable interacts with the others. We achieved this by including a patient status filter comparing not-readmitted and readmitted patients. When filtered by patient status, the VP will be able to see what treatments were performed most on

readmitted patients and the demographics of those patients. They will also be able to see how each treatment affected the readmission rates and hospital KPIs, along with the demographics of patients that received each treatment or have specific medical conditions. Additionally, they can compare the variables mentioned above and their effects in each region.

The last set of stakeholders, the Panel of Regional Vice Presidents (Regional VPs), are “responsible for executing policies and managing operations in conjunction with the SVP.” We gathered that each Regional VP would be interested in seeing their region’s performance and how it compares to the others and that of the nation. To best assist the Regional VPs, we ensured that the entire dashboard was filterable by region, state, and county. The two most powerful tools we included for Regional VPs were the Metrics Overview and the Geographic Analysis. The metrics overview allows all stakeholders to see the network’s performance compared to the comparative metrics. It goes one step further by breaking down these key performance indicators (KPIs) by region and offering access to a network map where Regional VPs can dive deeper into their metrics to identify opportunities. A Regional VP can visualize their region using the map to determine the top and bottom performing states. The Counties visualization beside the network map can be filtered by clicking on any State on the map, where they can identify specific counties affecting the state’s metrics.

2. Additional Data Sets

We pulled data from the Center for Medicare and Medicaid Services (CMS) Hospital Readmission Reduction Program (HRRP)[1] to better understand the network's

performance compared to other healthcare facilities. The HRRP data contains readmission rates and predictions for healthcare facilities nationwide. The facility's name, state, total discharges, readmissions, and expected readmission rate are included. Using this data, we gathered the readmission rates by state. After collecting achieved and expected readmission rates, we could compare performance.

3. Decision-Making Aides

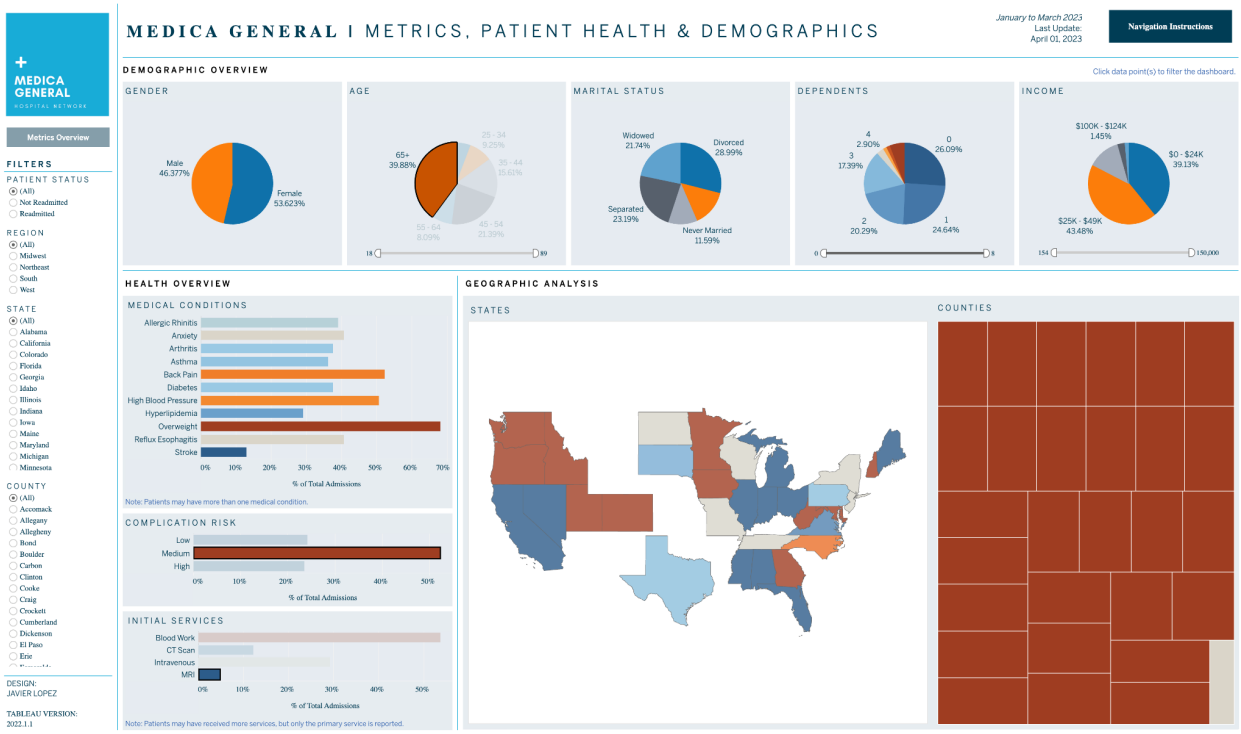

Image 3.1 - Geographic Analysis Tool

One of our dashboard's most valuable data representations is Geographic Analysis, combining the network map and counties. This representation allows leadership to identify areas of opportunity throughout the network clearly and empowers regional leaders to hone in on the counties most impacting the readmission rates. By

having the ability to identify performance contributors at all depths, leaders can identify best practices from top-performing contributors and share them with opportunity areas. Additionally, by filtering the map using various filters, including health and demographic variables, leaders can identify the most vulnerable regions and strategize how to support them best.

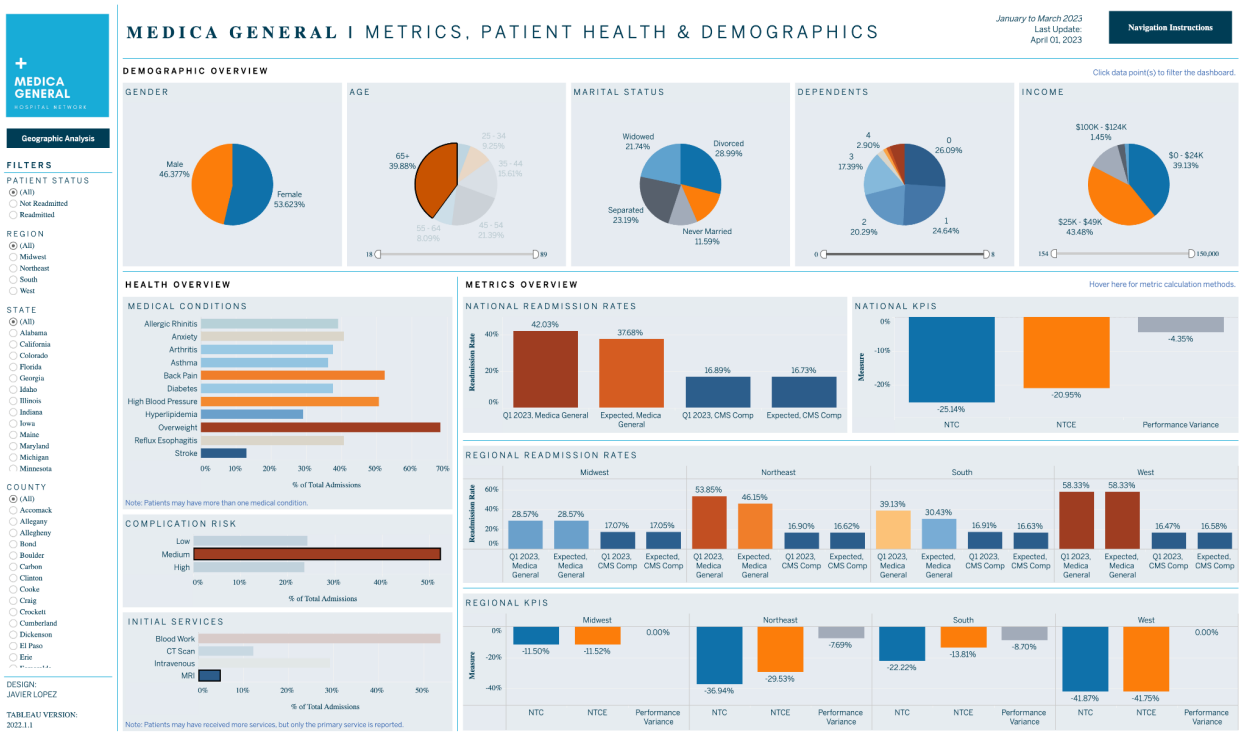

Image 3.2 - Metrics Overview Tool

Another valuable asset on our dashboard is the Metrics Overview. This data representation gives leaders a broad overview of network performance compared to their expected and comparative performance. Using the Metrics Overview, leaders can analyze readmission rates and other KPIs for the nation and identify what variables impact them most. The image below shows how this tool can be used to identify these variables and their impact across the network. In this example, leaders will see that even though Blood Work is the most-performed service, patients 65 and older with MRIs

done and a medium risk of complication were one of the highest percentages of readmission.

4. Interactive Controls

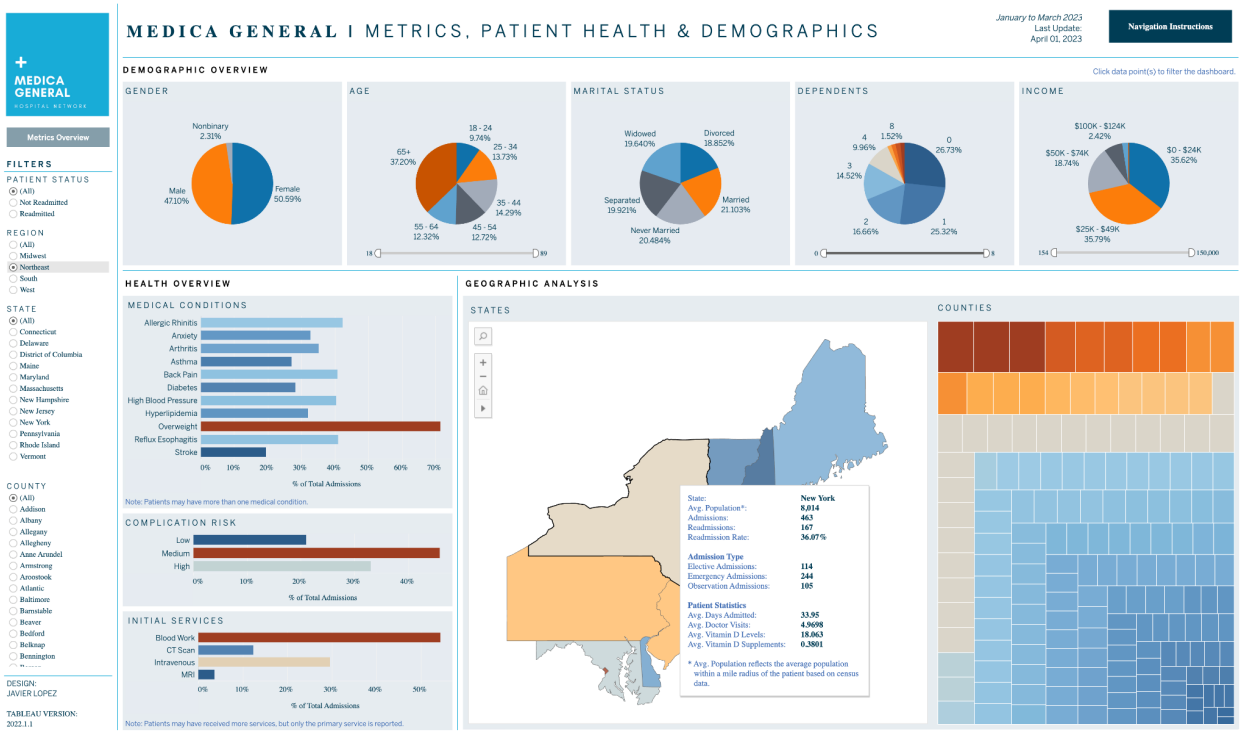

Image 4.1 - Northeast Geographic Analysis

Out of the multiple interactive controls in the dashboard, one of the most useful is the filter sidebar on the left. These filters allow you to focus on the data by patient status, region, state, and county. The image above shows how a Regional VP can leverage the filters to visualize each state's regional performance. The executive can then select a state and focus on the individual county's performance. When hovering over the state or county, a user can see specific data for the area, including the average population, totals for each type of admission, and other patient health statistics. The Demographic, Health, and Metrics overviews will also update to reflect the filtered data.

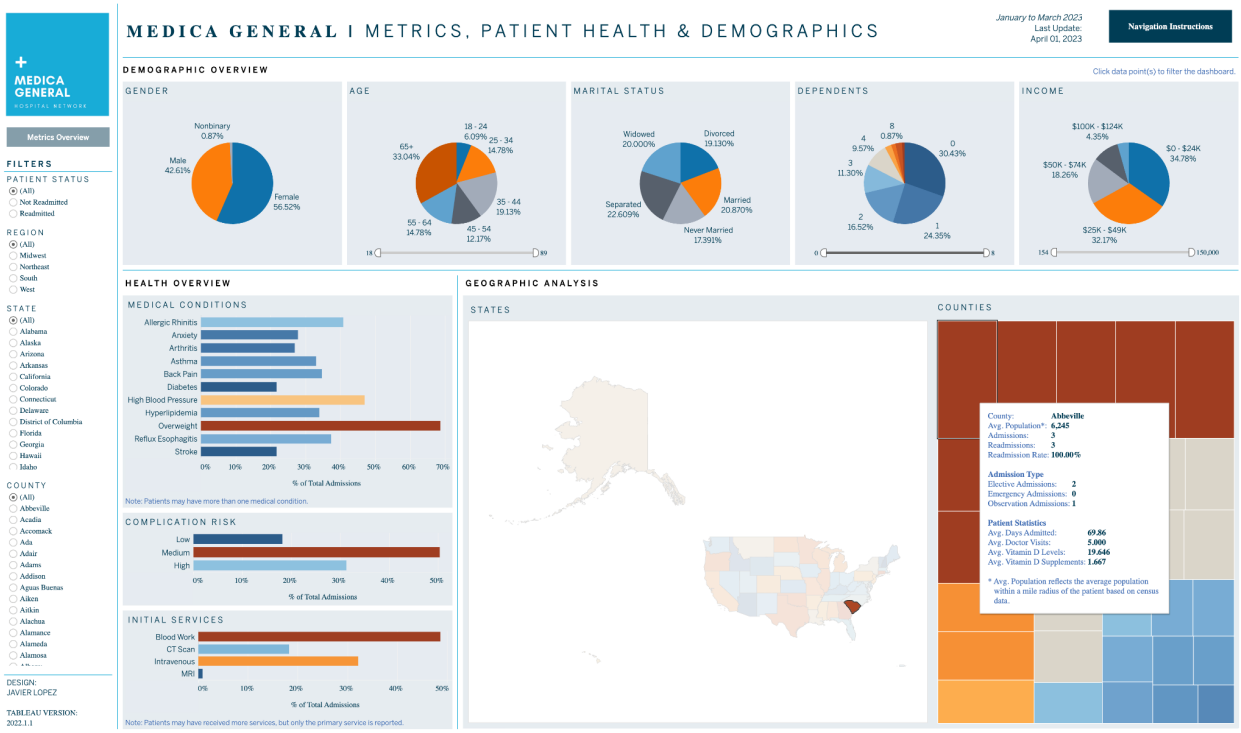

Image 4.2 - South Carolina Readmission Data and Statistics

Another useful interactive feature in our dashboard is using actions to select data points on specific visualizations. When a user selects a data point on any visualization within the Demographic Overview, Health Overview, or Demographic Analysis, the rest of the dashboard will update to reflect the filtered data on the dashboard. The image above shows how a user can use the button at the top left of the dashboard to toggle between the Metrics Overview and Geographic Analysis. Once users select a state, county, or both, they can toggle back to the Metrics Overview and see the Readmission Rate and relevant KPIs for the chosen areas.

5. Accessibility

There have been many studies on colorblind individuals and methods to ensure we create helpful tools and products for all users. We took advantage of the Tableau colorblind color palette for categorical visualizations and used the orange-blue diverging palette for continuous visualizations to ensure we made our dashboard colorblind-friendly. Additionally, we went one step further and included alternate text for any images uploaded onto the dashboard. By implementing color palettes that focused on tones of blues, oranges, and greys, along with alternate text on images, we ensured that our dashboard was as accessible as possible for users with multiple types of color blindness.

6. Data Representations and Storytelling

Our presentation focused on two aspects of the data, patient health and demographics and performance metrics. The Metrics Overview section of our dashboard was critical in conveying to our audience the performance metrics at a national and regional level. We compare the hospital network's readmission rate and the comparative in these visualizations along with three KPIs, allowing us to better understand the relationship between the two metrics. The first KPI, NTC, measures the network's performance to the comparative. The second KPI, NTCE, measures the network's predicted performance, or performance goal, to the comparative's performance goal. The last KPI, the performance variance, compares the network's

performance to its predicted performance. To concisely convey these metrics, we included the visualizations from the metrics overview in our presentation.

The second aspect covered in the presentation is patient health and demographics, focused on our dashboard's Demographic and Health overviews. The demographics visualizations for this part of our presentation were the most important. We extracted the most common aspects of our patient population from the gender, age, marital status, dependents, and income pie graphs to create the network's average patient profile. The image below depicts how the Demographics overview played a significant role in creating the patient profile.

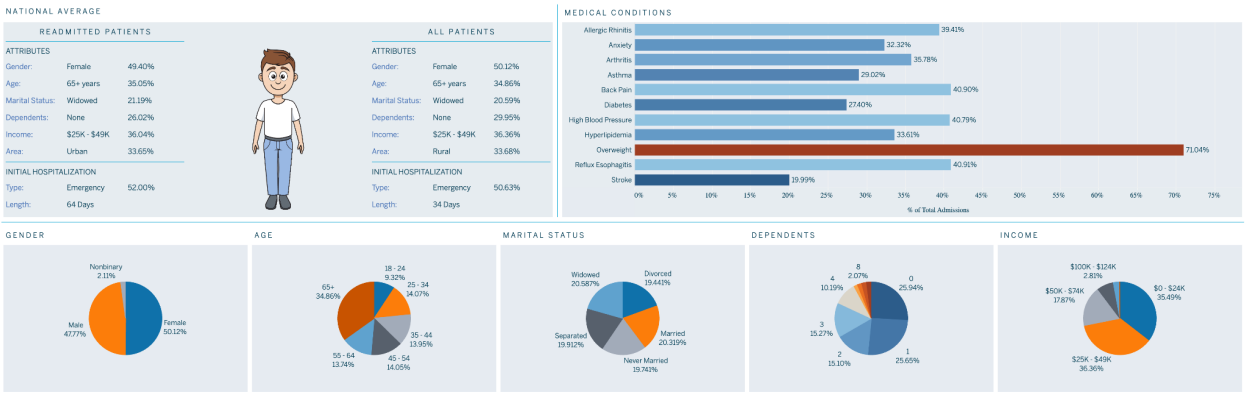

Image 6.1 - Average Patient Profile and Demographic Data

7. Audience Analysis

The audience for our presentation is our data analyst peers. This implied that our audience had higher expertise and were comfortable with technical jargon and specific data analysis techniques. Keeping that in mind, we felt comfortable providing additional details in our data visualizations that were not present in our dashboard. We included actual figures in our visualizations so that audience members could follow along with

precisely what we discussed rather than focusing on a high-level overview. Additionally, we discussed the methods we used to arrive at specific figures in our data, such as critical metrics and KPIs.

8. Universal Access

To ensure our presentation can be shared with executive leaders and other stakeholders, we included more business-specific jargon in our recommendations and summarized key points from the data. As mentioned earlier, our presentation consists of two themes, metrics and KPIs and patient health and demographics. In the metrics overview, we took steps to break down how each KPI was calculated so that a broader audience could understand any abbreviations and what parts of the data played a role in arriving at their specific values. We also carried on the same colorblind palettes from our dashboard. We included alternate text for images in the presentation to ensure our presentation was also accessible to blind audience members that may be using text-to-speech.

9. Effective Storytelling

Effective storytelling includes multiple elements, including clear and concise messaging and relevance. When curating the slides for our presentation, we condensed critical points into short facts that could be elaborated upon if needed. We broke down our presentation into two themes, metrics, and patient information, to make it easy for the audience to follow along and to ensure that we kept the audience engaged at all

times. Additionally, we kept relevance in mind when creating our presentation. It is likely that once the presentation is shared with a broader audience, such as executive leaders, each person would be looking for information that could help them understand the data as it relates to their role. Therefore, we included recommendations and insights directly related to each member described within the data dictionary and the audience of data analyst peers. For example, the regional breakdown in the metrics overview will likely be the most interesting part of the presentation to the panel of regional managers. At the same time, the patient health and demographics portion is likely to engage the VP of Research and the SVP the most.

D. Sources

1. *Hospital Readmissions Reduction Program*. Center for Medicare & Medicaid Services. (2023, January 17). Retrieved April 20, 2023, from https://data.cms.gov/provider-data/dataset/9n3s-kdb3