**D211 Advanced Data Acquisition**

**Task 1: Data Analysis**

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D211 Advanced Data Acquisition

May 12, 2024

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**D211 Representation and Reporting**

**Task 1: Data Analysis**

**Part I: Dashboard**

A :

Creating a Tableau dashboard started with searching for relevant data to enhance the WGU medical data set. There are various publicly available data sources, and the external data set was downloaded from the UC Irvine Machine Learning Repository [(Strack et al., 2020)](https://archive.ics.uci.edu/dataset/296/diabetes+130-us+hospitals+for+years+1999-2008). The data from both sources was uploaded into a Jupyter Notebook and cleaned using Python. The UCI data set was pared down to relevant data for the executives' question, which concerned examining patient readmission rates and possible causes.

The most pertinent variable in both data sets was whether a patient had been readmitted within 30 days of their last hospital admission. Three visualizations from the WGU medical data and two from the UCI data set were created. As the dashboard was compiled, the filters from each visualization could be used on multiple visualizations. The full explanation of the filters and interactivity of the dashboard will be addressed in section A3.

This first data representation is a map that breaks out the following data by average values for each state: number of Patients, Days in Hospital, Average Daily Charge, and Total Charge for visits. This visualization could be filtered by whether the patient has been readmitted or not, whether the patient has diabetes or not, and by each state.

A map of the united states with a blue state

Description automatically generated A screenshot of a map

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The second visualization shows the relationship between the average number of hospital days and MD visits, broken down by readmission status. The density of the plot lines references the average daily cost to each group of patients. This visualization can also be directly filtered by whether a patient has diabetes. This visualization can be used as a key performance indicator (KPI) to track patients' number of MD visits.

A graph with a line and a line

Description automatically generated

The third visualization from the WGU data set was the association between the admission category and the number of patents admitted under each. It also shows the number of admissions, the percentage of admissions in that category, the average daily cost to the patient, and the number of admissions in the admit category. Like the other two visualizations, this data could be filtered by the readmission status and the presence of diabetes. This visualization can be used as a KPI, tracking the number of patients admitted under each category.

A screenshot of a graph

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The UCI data set had several significant differences that must be considered. All the patients in the UCI data have diabetes, as the original data set involved a study on diabetic patients. Within the UCI data, the maximum number of days a patient stayed in the hospital is 14, compared to 72 in the WGU data. Finally, the UCI data set was considerably larger, coming in at over 91,100 rows, compared to 10,000 in the WGU data set.

The first representation of the data from the external data set was a look at the number of hospital days grouped by age. These plot lines were broken down by readmission status, and data could be filtered based on this criterion. It also lets us see the average number of lab procedures performed on each subgroup. This visualization can be used as a KPI to track the number of hospital days for each age group.

A graph with numbers and a line

Description automatically generated

The second visualization of the UCI data was a heat map of the number of patients readmitted status, broken down by age. This part of the dashboard can also be filtered based on the patients' readmission status and responds to all the readmission filters on the dashboard. This visualization can be used as a KPI, tracking the number of readmitted patients for each age group.

A screenshot of a computer

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A1: Data

The external data set used for this PA was taken from a previous PA, which was cleaned and ready for use in building the dashboard. (Bier, 2024)

Both final cleaned data sets have been attached. The external data set from the UC Irvine Machine Learning Repository was available for public use [(Strack et al., 2020)](https://archive.ics.uci.edu/dataset/296/diabetes+130-us+hospitals+for+years+1999-2008).

* wgu\_data\_211.csv
* uci\_data\_211.csv

A2: Installation/ Access to Dashboard

The entire dashboard for this project was created using Tableau Desktop in the Labs on Demand (LoD) virtual environment. The dashboard can be installed using the following steps:

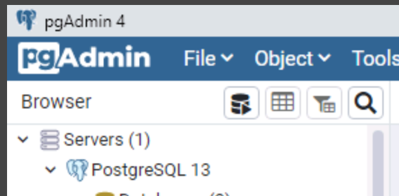
* Download the attached files to the “Downloads” folder on the LoD desktop, or use the link (to download from the folder on the CoCalc website)
  + D211\_SQL. txt or [SQL txt link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/D211_SQL.txt)
  + uci\_data\_211.csv or [UCI csv link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/uci_data_211.csv)
  + PBier\_211\_Tableau.twbx or [Tableau.twbx link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/PBier_211_Tableau.twbx)
* Change the folder permission so pgAdmin4 can read and upload the external files 🡪
  + Open the “Downloads “folder 🡪 on the right-side menu, choose "Downloads' 🡪 right click 🡪 Choose “Give access to…” 🡪 choose “Specific People” 🡪 in the new dialogue box choose "Everyone" from the drop-down menu 🡪 click “Add” 🡪 click “Share” 🡪 Click “No” in the new pop-up window 🡪 Exit.
* Open pgAdmin4 by double-clicking on the icon on the LoD desktop
* In the upper left corner, click the down carrot, choose medical\_data

A screenshot of a computer

Description automatically generated



* Scroll down to “Schemas” --> open up --> Scroll down to “Tables”
* A new query window by clicking on the query button in the upper left side menu new line





* Open the SQL text file by clicking on the folder in the upper left corner of the query window.

A screenshot of a computer

Description automatically generated



* Choose the file D211\_SQL.txt 🡪 The file should import into the query window 🡪 Click the run button in the toolbar.

A screenshot of a computer

Description automatically generated



* Right-click on the tables in the left-hand menu and choose “Refresh” → The imported data table and the newly created WGU table for use in Tableau can now be seen.

A blue and white logo

Description automatically generated

* In the upper right corner, choose "File" 🡪 choose “Open” 🡪 Choose Pbier\_211\_Tableau.twbx file from downloads
* A pop-up Should appear asking for a password 🡪 **Passw0rd!**
* If the data connection is not automatically created, the full pop-up may appear 🡪 server is local host 🡪 port is 5432 🡪 Database is medical\_data 🡪 Username is postgres 🡪 password is **Passw0rd!** 🡪 Sign In.

A screenshot of a computer

Description automatically generated

* The dashboard should fully load.
* To view in presentation mode, Click the “screen” icon in the upper toolbar on the far-right side.

A screenshot of a computer

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A3: Dashboard Navigation

The dashboard can be navigated in several ways, allowing for personalized views of information that a person may be trying to discover. The first step will be discussing the filtering within each visualization. The second is the filter bar, which will be explained following each KPI explanation.

Data set from WGU:

State Data:

* Hovering over any state will give information on the number of patients, days in the hospital, average daily charge, and the total charge for the visit. A map of the united states with a number of patients in the center

  Description automatically generated
* Directly clicking on a state will filter the other KPIs, giving information solely for that state.

**A map with a blue outline

Description automatically generated**

* A filter bar in the top right corner of the state box allows the user to filter by state name rather than using the state. Multiple states can be chosen to show corresponding filtered data in the other KPIs. After selecting the desired state(s), click Apply at the bottom of the drop-down box.

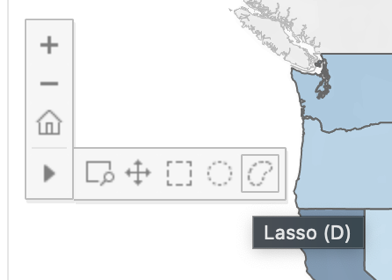
**A screenshot of a computer survey

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Description automatically generated**



* Multiple states can also be chosen using the Lasso tool, which can be found on the left side of the state box in the toolbox.

** A map of the state of washington

Description automatically generated**



* The toolbox can also be used to move the view of the United States around and for zooming in or out.

**A screenshot of a computer

Description automatically generated A map of the state of alaska

Description automatically generated**



* The filters can be reset anytime by clicking the un-filter icon above the filter itself, hitting the “Esc” key on the upper L-hand corner of the keyboard, or using the reset view button in the bottom right corner of the dashboard.

A grey square with red x in it

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Admission Level:

* Hovering over each admission level shows the number of admissions, the percentage of admissions in that category overall, and the average daily cost to the patient.

A screenshot of a graph

Description automatically generated

* Clicking on an individual category acts as a filter for the other KPIs, and the changes can be visualized directly or by hovering over a point of interest to see the new results.

A screenshot of a computer screen

Description automatically generated

Number of MD Visits:

* Data can be seen by hovering the mouse over the plot line. The information displayed at each point on the lines includes the average number of MD visits, if the patient was readmitted, the average number of days in the hospital, and the average daily cost to the patient.

A graph showing a number of visits

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* Clicking directly on a plot line will make the readmission status a filter for the rest of the dashboard, allowing the user to filter by the number of MD visits and the readmission status.
* The bottom of the KPI has a filter based on the number of days spent in the hospital. The slider can be moved to increase or decrease the range of days a person would like to focus. As with the other filters, it will filter across the entire dashboard and can be reset with the un-filter button.

A graph of a number of days

Description automatically generated`



Data set from UCI

Lab Procedures :

* Like the MD visits line graph, information can be found by hovering over the line. The information shown includes the patients’ age group, readmission status, the average number of labs per day for the age group, and the average number of days of admission.

A graph with numbers and a line

Description automatically generated

* Clicking on a plot line will filter the readmission status for the rest of the dashboard.

Readmissions by age:

* This heat map shows the number of readmissions based on age groups. Hovering over a cell reveals information on the age group, readmission status, the number of readmissions for that grouping, and the percentage of the readmission group.

A screenshot of a computer

Description automatically generated

* Clicking on any cell will act as a filter for readmission status for the rest of the dashboard.

Filter bar:

* Two quick filters on the far-right side of the dashboard allow the user to view only the selected data. Instructions are available above the filters.
* Click the desired information and then click "Apply."

A screenshot of a white screen

Description automatically generated A screenshot of a medical survey

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* Remove filters by clicking the un-filter button above each filter or the reset view button in the bottom right corner of the dashboard.

A4: SQL code

The coding environment used for this project was pgAdmin4, the graphic user interface for using PostgreSQL, a version of SQL. The code to create a table and import an external data set is below. Also included is the code to create a table using the existing medical\_data data set, which was then used with the external data to create a dashboard using Tableau. The code is also attached to this PA submission as a .txt file and can be imported into pgAdmin and run directly.

-- Create an empty table for the UCI data set

CREATE TABLE uci\_data (

patient\_nbr BIGINT,

gender VARCHAR(20),

time\_in\_hospital INT,

num\_lab\_procedures INT,

num\_procedures INT,

diabetesMed VARCHAR(10),

readmitted VARCHAR(10),

admission\_type VARCHAR(20),

age\_bins VARCHAR(10)

);

-- Import the external data set

COPY uci\_data

FROM 'C:\Users\LabUser\Downloads\uci\_data\_211.csv'

DELIMITER ','

CSV HEADER;

-- For WGU data

-- Change the location table name since this is a reserved word

ALTER TABLE "location"

RENAME TO places;

-- Add columns to have initial admission descriptor rather than a numeric indicator

ALTER TABLE patient

ADD COLUMN initial\_admit varchar(50);

UPDATE patient

SET initial\_admit = admission.initial\_admission

FROM admission

WHERE patient.admis\_id = admission.admins\_id;

ALTER TABLE servicesaddon

DROP CONSTRAINT servicesaddon\_pkey;

ALTER TABLE servicesaddon

ADD CONSTRAINT fk\_patient\_id\_servicesaddon

FOREIGN KEY (patient\_id)

REFERENCES patient(patient\_id);

-- Create a smaller table for use in Tableau

CREATE TABLE wgu\_data AS

SELECT

patient.patient\_id,

patient.lat,

patient.lng,

patient.age,

patient.readmis,

patient.gender,

patient.initial\_days,

patient.totalcharge,

patient.additional\_charges,

patient.doc\_visits,

patient.initial\_admit,

places.state,

servicesaddon.diabetes

FROM patient

JOIN places ON patient.location\_id = places.location\_id

JOIN servicesaddon ON patient.patient\_id = servicesaddon.patient\_id;

--Rename the wgu readmission column to prevent confusion in Tableau

ALTER TABLE wgu\_data

RENAME COLUMN readmis to wgu\_readmit;

-- Add foreign key to a new table for referential integrity

ALTER TABLE wgu\_data

ADD CONSTRAINT fk\_patient\_id\_wgu\_data

FOREIGN KEY (patient\_id)

REFERENCES patient(patient\_id);

A full join of the tables uci\_data and wgu\_data was done within Tableau. This type of join was used to retain the data within the UCI table for different visualizations. A left or inner join would have only kept the data where a join was created. This join was created using the following SQL code:

-- Full join

SELECT "wgu\_data"."additional\_charges" AS "additional\_charges",

"uci\_data"."admission\_type" AS "admission\_type",

"wgu\_data"."age" AS "age",

"uci\_data"."age\_bins" AS "age\_bins",

CAST("wgu\_data"."diabetes" AS TEXT) AS "diabetes",

"uci\_data"."diabetesmed" AS "diabetesmed",

"wgu\_data"."doc\_visits" AS "doc\_visits",

"uci\_data"."gender" AS "gender (uci\_data)",

CAST("wgu\_data"."gender" AS TEXT) AS "gender",

"wgu\_data"."initial\_admit" AS "initial\_admit",

"wgu\_data"."initial\_days" AS "initial\_days",

"wgu\_data"."lat" AS "lat",

"wgu\_data"."lng" AS "lng",

"uci\_data"."num\_lab\_procedures" AS "num\_lab\_procedures",

"uci\_data"."num\_procedures" AS "num\_procedures",

CAST("wgu\_data"."patient\_id" AS TEXT) AS "patient\_id",

"uci\_data"."patient\_nbr" AS "patient\_nbr",

"uci\_data"."readmitted" AS "readmitted",

CAST("wgu\_data"."state" AS TEXT) AS "state",

"uci\_data"."time\_in\_hospital" AS "time\_in\_hospital",

"wgu\_data"."totalcharge" AS "totalcharge",

CAST("wgu\_data"."wgu\_readmit" AS TEXT) AS "wgu\_readmit"

FROM "public"."wgu\_data" "wgu\_data"

FULL JOIN "public"."uci\_data" "uci\_data" ON ((CAST("wgu\_data"."wgu\_readmit" AS TEXT) = "uci\_data"."readmitted") AND ("wgu\_data"."initial\_days" = "uci\_data"."time\_in\_hospital"));

**Part II Storytelling**

B: Panopto video link:

<https://wgu.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=e58adb0c-184d-415f-a0b7-b18e00188231>

**Part III Report**

C :

C1: Dashboard

The readmission problem within the WGU hospital data was examined for this PA. The data from WGU was explored, and it was discovered in the initial data exploration that the readmission rate of all hospital stays was approximately 37%, with these admissions having the most extended hospital stays.

The dashboard looks at several possible contributing factors to the high readmission rate, such as admit level, diabetes, the number of MD visits during the stay, age group, and number of labs performed. These views allow a person to investigate further using the filters to determine possible correlations between factors.

This dashboard also allows a view of the cost to patients and the cost burden that a patient may have after leaving the hospital. While unrelated to readmission causes, it aligns with the Institute for Healthcare Improvement's (IHI) Triple Aim, which focuses on improving population health and patient experience and reducing per-capita costs (Stiefel & Nolan, 2012). The concept is to know where the hospital system is and to retain a view of the different factors to align with the overall patient care goals.

The outside data set from UCI also examined hospital stay length, and the readmission rates of known diabetics were used to help identify if there were similar trends within the data sets. This data was a good fit with the WGU data, which has data on many comorbidities, including diabetes, allowing for filtering the WGU data to align more readily with the outside data.

The UCI data set also contained data on length of stay that could be compared to readmissions. The number of labs performed on patients could also be analyzed to see if there were any patterns within the diabetic population.

C2: Tool Choice

Tableau Desktop was the business intelligence tool used for this analysis. Tableau allows users to filter the data visualizations to explore and discover more profound insights. It is flexible in the types of users it reaches since both macOS and Windows platforms can be used (Edmond & Crabtree, 2023).

Tableau also has a public version that can be used to reach a broader audience. The files created in one version can easily re-create a dashboard in the other version, allowing for improved communication of data results inside and outside businesses.

C3: Preparation of Data

The WGU was pre-loaded onto pgAdmin. Data preparation of the internal data set included:

* Changed the name of the Table "location, as "location" is a reserved word within the SQL language. This change was done to prevent confusion.
* Changed the descriptor of the Initial Admit column from a numeric value to the actual descriptors
* A foreign key was added to the table "servicesaddon" to create referential integrity with the Table "patient" which held the primary key.
* A new table was created containing only the needed columns that would be used in the Tableau visualization.
* A foreign key was added to the new table “wgu\_data” to maintain referential integrity.

A screenshot of a computer

Description automatically generated

Figure 1 Data ERD before data preparation

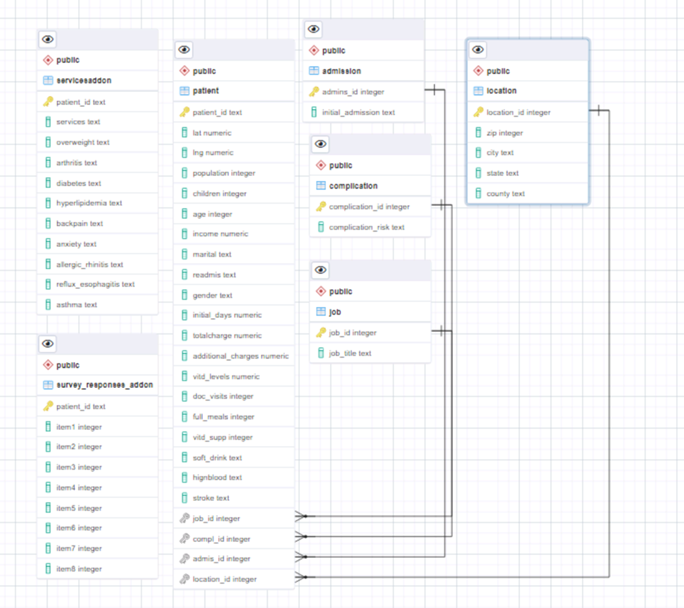


Figure 2 ERD after foreign keys a

* re added.
* An empty table named uci\_data was created to import the external data set.
* UCI external data was imported into the new table within the medical\_data data frame.

Please refer to section A4 or the attached file D211\_SQL for all SQL scripts. txt ( [SQL txt link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/D211_SQL.txt)).

C4: Dashboard Creation

The following installation and creation instructions have also been attached to the PA submission as a guide titled Guide\_211.doc.

* Download the attached files to the "Downloads" folder on the LoD desktop, or use the link (to download from the folder on the CoCalc website)
  + D211\_SQL. txt or [SQL txt link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/D211_SQL.txt)
  + uci\_data\_211.csv or [UCI csv link](https://cocalc.com/484eea22-6e67-4fb5-ab16-4ef66d0dad44/raw/uci_data_211.csv)
* Change the folder permission so pgAdmin4 can read and upload the external files 🡪
  + Open the “Downloads “folder 🡪 on the right-side menu choose “Downloads’ 🡪 right click 🡪 choose "Give access to…" 🡪 choose “Specific People” 🡪 in the new dialogue box choose "Everyone" from the drop-down menu 🡪 click “Add” 🡪 click “Share” 🡪 Click “No” in the new pop-up window 🡪 Exit.
* Open pgAdmin4 by double-clicking on the icon on the LoD desktop
* In the upper left corner, click the down carrot, choose medical\_data

A screenshot of a computer

Description automatically generated



* Scroll down to “Schemas” --> open up --> Scroll down to “Tables”
* A new query window by clicking on the query button in the upper left side menu new line

A screenshot of a computer

Description automatically generated



* Open the SQL text file by clicking on the folder in the upper left corner of the query window.

A screenshot of a computer

Description automatically generated



* Choose the file D211\_SQL.txt 🡪 The file should import into the query window 🡪 Click the run button in the toolbar.

A screenshot of a computer

Description automatically generated



* Right-click on the tables in the left-hand menu and choose “Refresh” → The imported data table and the newly created WGU table for use in Tableau can now be seen.

Tableau Data Streams:

* Open the Tableau app (the white Tableau icon on the desktop).

A blue and white logo

Description automatically generated

* On the Left side menu, under “To a Server” 🡪 More… 🡪 find and choose PostgreSQL.
* A pop-up asking for server data appears 🡪 server is local host 🡪 port is 5432 🡪 Database is medical\_data 🡪 Username is postgres 🡪 password is **Passw0rd!** 🡪 Sign In.

A screenshot of a computer

Description automatically generated

* A new workbook should open, with a screen with instructions to "Drag Tables Here".
* From the left-hand column, where the data tables appear, drag wgu\_data onto the open area.

A screenshot of a computer

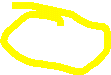
Description automatically generated



* Double-click the small grey wgu\_data box.

A screenshot of a computer

Description automatically generated



* Drag the uci\_data next to the wgu\_data box. Two joined rings should appear.

A screenshot of a computer

Description automatically generated

* Click on the circles, and a new pop-up window appears 🡪 choose Full Outer → under the drop-down for the data source, choose wgu\_readmit, and choose readmitted under the uci\_data.
* Repeat the next choice for initial days under Data source and Time in hospital under uci\_data.

A screenshot of a computer

Description automatically generated

* Close the pop-up window and close the inner window.
* The field data lists the columns in the lower half of the page. Ensure the "lat” and “lng” columns have a glob above them. If not, click the icon above the column to open drop-down 🡪 Geographic role 🡪 choose the corresponding latitude/ longitude.

A screenshot of a computer

Description automatically generated

* Verify that the State Column is defined as the Geographic role of State/ Province.

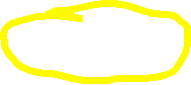
To build Worksheet 1: State Map (wgu\_data)

* Click on the “Sheet 1” tab in the lower left corner.
* Rename the sheet by double-clicking on the sheet title 🡪 “State Map”.
* In the upper toolbar menu, click Format 🡪 Workbook from the drop-down menu 🡪 In the L-hand column, change the "All" fonts to Veranda (more accessible for people with dyslexia to read).
* Under the wgu\_data, click the carrot next to ‘State’ and choose “Add to Sheet”.
* A small box in right lower corner "1 unknown" will also appear – Right click to hide the indicator.
* Drag ‘Wgu Readmit” to the “color” Mark.
* Click the down carrot on the Wgu\_Readmit bar under the Marks 🡪change from Dimension to Measure 🡪Choose “Count” as the measure type.
* Click the “Color” tab under ”Marks." 🡪Choose "Edit Colors." 🡪Using drop-down choices, pick the "Blue" scale (this is color-blind-accessible).
* On the upper toolbar menu, click “Map” 🡪 Choose “Background Layers” 🡪 This opens a new click-box menu on the Left side. Choose “Coastline”. Click X to exit.
* Drag “Initial Days” to the Tooltips box 🡪 click the down carrot and change “Sum” to Average 🡪choose “Average” under Measurements.
* Re-click on “Initial days 🡪 drop-down box 🡪 Format window opens on L side 🡪 choose ‘Pane’ 🡪 under the “Default” choose “Numbers” 🡪 Numbers(custom) 🡪 change decimal places to 0.
* Drag Totalcharge to the tooltip 🡪 click the down carrot and change “Sum” to Average 🡪 choose “Average” under Measurements.
* Re-click on “Totalcharge” 🡪 drop-down box 🡪 Format window opens on L side 🡪 choose 'Pane' 🡪 under the ‘Default’ choose ‘Numbers’ 🡪 Currency(custom) 🡪 change decimal places to 0.
* Create a calculated field 🡪 click on the small carrot next to the search bar above the tables list.

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* In the pop-up box, label the new field “Final Charge to Patient” and add or paste the following code to the calculation field:

[Initial Days] \* [Total Charge] + [Additional Charges]

* Drag “Final Charge to Patient” to Tooltip 🡪 click the down carrot and change “Sum” to Average 🡪 choose “Average” under Measurements.
* Re-click on “Final Charge” 🡪 drop-down box 🡪 Format window opens on L side 🡪 choose ‘Pane’ 🡪 under the ‘Default” choose “Numbers” 🡪 Currency(custom) 🡪 change decimal places to 0.
* Click on the tooltip in the Mark menu🡪 tooltip edit box opens 🡪 change the setting to 🡪 10pt font, centered 🡪 Edit or paste the following into the tooltip box:

Averages for <State>

Patients:     <CNT(Re-admission)>

Days in Hospital:     <AVG(Initial Days)>

Average Daily Charge:     <AVG(Avg Daily Charge)>

Total Charge For Visit:     <AVG(Total Charge For Visit)>

* Drag “Diabetes to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on the “Diabetes” in the filter box and choose “Show Filter.” 🡪 filter should now appear on the R-hand side column.
* Drag “WGU Readmit” to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on “Wgu Readmit” in the filter box and choose “Show Filter” 🡪 filter should now appear in the right-hand column.
* Drag “State” to the “Filters box” 🡪 when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on the “State” in the filter box and choose “Show Filter” 🡪 filter should now appear on the R-hand side column.

State Maps filter column

* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot🡪choose the customize 🡪Choose the “Show Apply Button” (last option).
* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot🡪choose “Customize” 🡪Choose the “Show All Button” to de-select.
* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot 🡪 choose the “Edit Title” 🡪 change the title to “30 Day Readmission”.
* In the right-hand column, in the “Diabetes” filter, hover over the upper right corner to reveal a down carrot 🡪choose “Customize” 🡪Choose the “Show Apply Button” (last option).
* In the right-hand column, in the "Diabetes" filter, hover over the upper right corner to reveal a down carrot. 🡪 choose "Customize" and 🡪Choose the “Show All Button” to de-select.
* In the right-hand column, in the “Diabetes” filter, hover over the upper right corner to reveal a down carrot 🡪 choose the “Edit Title”🡪 change the title to “Patient has Diabetes”.
* In the right-hand column, in the “State” filter, hover over the upper right corner to reveal a down carrot 🡪 choose “Customize” 🡪Choose the “Show Apply Button” (last option).
* In the right-hand column, in the “State” filter, hover over the upper right corner to reveal a down carrot 🡪 choose the customize menu 🡪 Choose the "Multiple Values (drop-down)".
* Drag the Readmit filter to the top 🡪 drag the diabetes filter below the Readmit filter 🡪 State filter should be under the diabetes filter.

To Build Worksheet #2: Admission Level (wgu\_data):

* Using the wgu\_data for this sheet.
* Click on the icon to add another worksheet.

A screenshot of a computer

Description automatically generated

* Rename the worksheet “Admission Level”.
* In the Variable column 🡪 choose “Total Charge” down carrot 🡪 “Rename” 🡪 change name to “Avg Daily Charge”.
* Drag “Initial Admit” from the variables list to the “Rows” area.
* Drag “Avg Daily Charge” from the variables list to the “Column” area.

A screenshot of a computer

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* Click the down carrot in “Avg Daily Charge” 🡪change the “Dimension” 🡪choose “Measure” 🡪 Choose Average.
* Click the down carrot in “Avg Daily Charge” 🡪 choose “Format” 🡪 Change to “Currency” 🡪 Change decimals to zero.
* In the bar chart, right-click on the "Avg. Avg Daily Charge" and choose "Edit Axis" → Change the title to "Average Daily Charge."
* Open the carrot menu for “Initial Admit” 🡪 choose “Sort” 🡪 in the pop-up, choose “Sort Manually” 🡪 order Emergency, Observation, and Elective as the sorting order.
* Right-click on the “Null” value → choose “Exclude.”
* Drag “Wgu Readmit” to Color box 🡪 down carrot 🡪 “Measurements 🡪 change “Sum” to “Count”.
* Click “Colors” box 🡪 “Edit Colors” 🡪 choose “Blue”.
* Drag “Wgu Readmit” to “Label” box 🡪 down carrot 🡪 change measurement to count 🡪 down carrot again 🡪 “Quick Table Calculations” 🡪 choose ‘Percentage of total” 🡪 down carrot 🡪 “Format” 🡪 choose “Percentage” 🡪 change to Zero decimal points.
* Change the sheet view 🡪 in the upper toolbar, click the down carrot next to “Standard” and choose “Entire View”.

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* Right-click on the row title "Initial Admit" 🡪 Choose “Hide Field labels for Rows”.

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* Drag “WGU Readmit” to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on “Wgu Readmit” in the filter box and choose “Show Filter” 🡪 filter should now appear in the right-hand column.
* Drag “Diabetes to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on the “Diabetes” in the filter box and choose “Show Filter.” 🡪 filter should now appear on the R-hand side column.
* Click on “Tooltip” I the Marks box 🡪 edit or paste the following 🡪

Admission Type:     <Initial Admin>

Average Daily Charge:     <AVG(Avg Daily Charge)>

Number of Admissions:     <CNT(Re-admission)>

Percentage of Total Admissions:     <% of Total CNT(Re-admission)>

Admission Level Filter Column

* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot🡪choose the customize 🡪Choose the “Show Apply Button” (last option).
* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot🡪choose “Customize” 🡪Choose the “Show All Button” to de-select.
* In the right-hand column, in the “WGU Readmit” filter, hover over the upper right corner to reveal a down carrot 🡪 choose the “Edit Title” 🡪 change the title to “30 Day Readmission”.
* In the right-hand column, in the “Diabetes” filter, hover over the upper right corner to reveal a down carrot 🡪choose “Customize” 🡪Choose the “Show Apply Button” (last option).
* In the right-hand column, in the “Diabetes” filter, hover over the upper right corner to reveal a down carrot 🡪 choose “Customize” 🡪Choose the “Show All Button” to de-select.
* In the right-hand column, in the “Diabetes” filter, hover over the upper right corner to reveal a down carrot 🡪 choose the “Edit Title”🡪 change the title to “Patient has Diabetes”.
* In the right-hand column, in the “Wgu Readmit” legend 🡪 choose “Edit Title” 🡪 change to “Number of Admissions”.

To Build Worksheet #3: MD visits (wgu\_data):

* Using the wgu\_data for this sheet.
* Click on the icon next to the State Map Data tab to add another worksheet.

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Description automatically generated

* Rename the worksheet “MD Visits”.
* Right-click on the "Doc Visits data 🡪 Rename “MD Visits”.
* Drag “MD Visit” into the “Columns”.
* Click the down carrot to change the "Measure" to "Dimension" and "Discrete".
* Drag “Initial Days” into the “Rows”.
* Click the down carrot 🡪change the “Measure” from “Sum” to “Average”.
* A small box in right lower corner "1 unknown" will also appear – Right click to hide the indicator.
* In the Marks box, Change “Automatic” to “Line”.

A screenshot of a computer

Description automatically generated

* Right-click on the “Null” value in the visualization → choose “Exclude.”
* Drag “Wgu Readmit” to the “Color” mark box.
* Click on the “Colors” mark box 🡪 choose “Edit colors” 🡪 Change “Null” to grey, and “Yes” to blue.
* Drag “Avg Daily Charge” to the “Size” mark box.
* Click the down carrot for “Avg Daily Charge” 🡪change the “Measure” from “Sum” to “Average”.
* Right click the Size box 🡪 Increase the line size using the slider bar.

A screenshot of a computer

Description automatically generated

* Right click on the title for the rows 🡪 choose “Edit Axis” 🡪 Change to “Average Days in Hospital”.
* Click on the tooltip in the Mark menu🡪 tooltip edit box opens 🡪 change the setting to 🡪 Edit or paste the following into the tooltip box:

Average MD Visits:     <Doc Visits>

Readmitted?:     <Re-admission>

Average Days in Hospital:     <AVG(Initial Days)>

Average Daily Charge:     <AVG(Avg Daily Charge)>

* Drag “WGU Readmit” to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on “Wgu Readmit” in the filter box and choose “Show Filter” 🡪 filter should now appear in the right-hand column.
* Drag “Diabetes to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on the “Diabetes” in the filter box and choose “Show Filter.” 🡪 filter should now appear on the R-hand side column.
* Drag “Initial Days” to the “Filters box” 🡪 when the pop-up opens, change the range of values from 1 to 72.
* Right-click on the “Initial Days” in the filter box and choose “Show Filter” 🡪 filter should now appear on the R-hand side column.

Build Worksheet #4: Day Between (wgu\_data)

* Using wgu\_data 🡪
* Click on icon to add another worksheet.

A screenshot of a computer

Description automatically generated.

* Rename the worksheet “Days Between”
* In the variables list, right-click "MD Visits" 🡪 choose "create" 🡪 “Calculated Field”
* In pop-up name new calculation "Days Between MD".
* In calculation field enter or paste:

1/ ([Doc Visits]/[Initial Days])

* Drag “Days Between MD” into “Label” 🡪 down carrot 🡪 “measure”🡪 “average”.
* Click the down carrot in “Days Between MD” 🡪 choose “Format” 🡪 Change to “Number(custom)” 🡪 Change decimals to one.
* Drag “Days Between MD” into “Label” 🡪 down carrot 🡪 “measure”🡪 “Minimum”.
* Click the down carrot in “Days Between MD” 🡪 choose “Format” 🡪 Change to “Number(custom)” 🡪 Change decimals to one.
* Drag “Days Between MD” into “Label” 🡪 down carrot 🡪 “measure”🡪 “Maximum”.
* Click the down carrot in “Days Between MD” 🡪 choose “Format” 🡪 Change to “Number(custom)” 🡪 Change decimals to one.
* Right click on Title 🡪 choose “edit Title” 🡪 change to “MD was last seen”.
* Right click on the “Text” tooltip 🡪 Edit the tooltip to read:

<AVG(Days Between MD)> Days Ago

Average days since an

MD was at bedside.

<MIN(Days Between MD)> Minimum

<MAX(Days Between MD)> Maximum

Build Worksheet #5: Lab Procedures (uci\_data)

* Using uci\_data
* Click on icon to add another worksheet

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Description automatically generated

* Rename the worksheet “Lab Procedures”
* Right Click on “Age Bins” 🡪 Change name to “Age Group”.
* Drag “Age Group” to columns.
* Drag “Time in Hospital” to rows 🡪 down carrot 🡪 measure 🡪 “Average”.
* Right-click on the “Null value” → choose “Exclude.”
* Under the “Marks“ box, change from "Bars" to "Line."
* Drag “Readmitted” to “Colors”.
* Click on the “Colors” mark box 🡪 choose “Edit colors” 🡪 Change “Null” to grey, and “Yes” to blue.
* Drag “Time in hospital" to “Tooltip” 🡪 down carrot 🡪 “measure” 🡪 “Average”.
* Right-click on “Num Lab Procedures” 🡪 “Create” 🡪 “Calculated field” 🡪 in the pop up rename field to “Labs per day” 🡪 in calculation field put:

[Num Lab Procedures]/[Time In Hospital]

* Drag “Labs per day” to “Label “ 🡪 down carrot 🡪 “Measure” 🡪 “Average”.
* Click the down carrot in “Labs per Day 🡪 choose “Format” 🡪 Change to “Number(custom)” 🡪 Change decimals to Zero.
* Right click on the “Text” tooltip 🡪 Edit or paste the tooltip to read:

Age Bins:     <Age Group>

Readmitted:     <Readmitted>

Average Labs Tests per Day:     <AVG(Labs per Day)>

Average Days In Hospital:     <AVG(Time In Hospital)>

Build Worksheet #6: Age of Readmissions (uci\_data):

* Using the UCI data set
* Click on icon to add another worksheet

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* Rename the worksheet “Age of Readmissions”
* Drag “Age Group” to columns
* Drag “Readmitted” to Rows.
* Right-click on the “Null” value → choose “Exclude.”
* Drag “Readmitted” to “Text” mark box 🡪 down carrot 🡪 change “Measure” to “Count”
* Click the "Show me" button in the upper right corner 🡪 choose the heat map (top row, far Right choice)
* A screenshot of a computer

  Description automatically generated
* Click “Color”🡪 “edit colors” 🡪 choose “Blue” 🡪
* Drag Readmitted to “Tooltip” 🡪 down carrot 🡪 change “Measure” to “Count” 🡪 down carrot 🡪 choose “Quick table calculations” 🡪 “Percentage of total”
* Drag “Age Group” to the “Filters box” 🡪when the pop-up opens, click the “All” box and then click “ok”.
* Right-click on the “Age Group” in the filter box and choose “Show Filter.” 🡪 filter should now appear on the right-hand column.
* In the right-hand column, in the “Age Group” filter, hover over the upper right corner to reveal a down carrot🡪choose the customize 🡪Choose the “Show Apply Button” (last option).
* Right click on the “Text” tooltip 🡪 Edit or paste the tooltip to read:

Age Bins:     <Age Group>

Readmitted:     <Readmitted>

Number of <Readmitted> Readmissions:     <CNT(Readmitted)>

Percent of Total <Readmitted> Readmissions:     <% of Total CNT(Readmitted)>

* In the top toolbar, choose "Worksheet" 🡪 choose “Show Caption”.
* On the sheet, right-click on the caption box 🡪 “edit Caption 🡪 Change or paste:

Readmissions

Number of readmitted patients broken down by Age Group. The color shows the count of readmissions.

* In the Columns bar “Age Group” 🡪 Choose down carrot 🡪 Choose “Show Header” to de-select.

Set Filters for Dashboard build:

* Return to State map workbook:
* In the Filters columns choose “Diabetes 🡪 down Carrot 🡪 choose “Apply to worksheets” 🡪 choose “Selected Worksheets” 🡪 choose Admission level, MD visits, and Days Between.
* Repeat this for the “Wgu Readmit” filter.

Building Dashboard –

* Click on the “New Dashboard” icon.



* Rename to “Readmits”.
* In the left-hand column, change "Size" to "Automatic".

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Description automatically generated



* Drag the "State Map Data" to the main area.
* Drag "MD visits" to the right-hand side.
* Drag “Admission Level” and drop under “State Map”.
* Drag “Age of Readmissions” under “Lab Procedures”.
* Adjust sizes to approximately 1/3 of the size of the right-hand side of the page.
* In each box (Worksheet), click the add as filter option.

A screenshot of a computer

Description automatically generated

Formatting Titles:

* Click “State Map” title 🡪 “Edit Title” 🡪 Change or paste to:

State Data (click or lasso to filter)

* Click “ MD Visits” 🡪 “Edit Title” 🡪 Change or paste :

Number of visits from an MD (click to filter)

* Click “Admission Level” title 🡪 “Edit Title” 🡪 change or paste:

Admission Level (Click to Filter)

* Right click in the age of readmissions box 🡪 choose “Hide Title”.
* Right click in the age of readmissions box 🡪 choose “Show Captions”.

Legends and Filter column

* Working top to bottom 🡪
* Keep the top two filters.
* Click the “State” filter box, 🡪 choose “More options” 🡪 change to “floating” 🡪 drag to upper R corner of State box.
* Remove the “Wgu Readmit” filter.
* Right-click the "Wgu Readmit" legend 🡪 "Edit Title," 🡪 change to "Readmission."
* Click the new “Readmission” box, 🡪 choose “More options” 🡪 change to “floating” 🡪 drag to upper right corner of MD visits box.
* Remove the remaining filters or legends EXCEPT the “Initial Days” filter/ slide bar.
* From the left side menu “Objects” drag a “Vertical Box” underneath “MD visits”.

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Description automatically generated

* Click the “Initial Days” box, 🡪 choose “More options” 🡪 change to “floating” 🡪 drag under the chart of MD visits box.
* The boxes will have to be resized to fit.
* Drag the MD visits the Legend / Filter column and position in top position in the column.
* From the left side menu “Objects” drag a “Text” box underneath “MD visits”.
* In the text box enter or paste the following:

Use the filters below to narrow down information.

Click inside the visualizations to filter information for deeper insights.

* From the left-side menu "Objects" drag a "Text" box underneath "Patient has Diabetes" Filter.
* In the text box enter or paste the following:

To end filtering, click on the same point or use the reset view button in the bottom right corner of the dashboard

* Adjust sizing of individual boxes as needed.

C5: Results of Analysis

An essential data discovery made during the analysis was that although average MD visits appeared equal across both the non-readmission and readmission groups, patients with extended stays and higher readmission rates often had long periods between seeing an MD. A disparity in the level of care a patient received was revealed.

Significant findings concerning the type of admission were also revealed. All admission types had similar number readmission rates, which could be a concern as well. Elective admissions compromise a large portion of scheduled surgeries. The data showed that some elective admissions can stay as long as emergent admissions, which must be investigated further. Often, the risks of elective admissions can be mitigated before the actual admission, so it will be essential to investigate the cause of the high readmission rate among the lowest-risk group.

The UCI data revealed that the highest number of diabetic readmissions was in the age group between 40 and 90. This will allow the hospital services to be adapted to the medical needs of middle-aged and geriatric patients and focus staff training on the specific needs of this demographic.

The average number of labs performed for readmission and non-readmission groups is almost the same. This could lead to further investigation to determine whether the MDs should order more labs for readmitted patients or less for those who did not return within 30 days.

C6: Limitations

A disadvantage of this analysis is that the UCI data did not have any information on patients that had more extended stays than 14 days, making an accurate comparison between the WGU and UCI groups complex since the WGU data had a maximum stay of 72 days.

Another disadvantage of both data sets is that it has no information concerning the timing of stays, when MD visits were done, labs performed, or when admissions happened, making this a static analysis. Time data could reveal further trends.

D: Web Sources

Edmond, S., & Crabtree, M. (2023, December 1). *Power BI vs Tableau: Which is The Better Business Intelligence Tool in 2024?* Retrieved June 10, 2024, from <https://www.datacamp.com/blog/power-bi-vs-tableau-which-one-should-you-choose>

Flohr, Y., & Ilyas, H. (2024). The Best Fonts for Dyslexia (Guidelines for Website Owners). Accessibility Checker. Retrieved May 15, 2024, from <https://www.accessibilitychecker.org/blog/best-fonts-for-dyslexia/>

Strack, B., DeShazo, J. P., Gennings, C., Olmo, J. L., Ventura, S., Cios, K. J., & Clore, J. N. (2014, May 2). *Diabetes 130-US Hospitals for Years 1999-2008*. Retrieved May 15, 2024, from <https://archive.ics.uci.edu/dataset/296/diabetes+130-us+hospitals+for+years+1999-2008>

<https://doi.org/10.24432/C5230J>.

I: Sources

Bier, P. (2024, May 15). D210 Representation and Reporting. *WGU MSDA*.

Knaflic, C. N. (2015). Story Telling with Data (1st ed., p. 117). Wiley.

Stiefel, M., & Nolan, K. (n.d.). A Guide to Measuring the Triple Aim: Population Health, Experience of Care, and Per Capita Cost. IHI Innovation Series White Paper. Retrieved May 15, 2024, from <https://www.ihi.org/resources/white-papers/guide-measuring-triple-aim-population-health-experience-care-per-capita-cost#downloads>

References

Bier, P. (2024, May 15). D210 Representation and Reporting. *WGU MSDA*.

Edmond, S., & Crabtree, M. (2023, December 1). *Power BI vs Tableau: Which is The Better Business Intelligence Tool in 2024?* Retrieved June 10, 2024, from <https://www.datacamp.com/blog/power-bi-vs-tableau-which-one-should-you-choose>

Flohr, Y., & Ilyas, H. (2024). The Best Fonts for Dyslexia (Guidelines for Website Owners). Accessibility Checker. Retrieved May 15, 2024, from <https://www.accessibilitychecker.org/blog/best-fonts-for-dyslexia/>

Knaflic, C. N. (2015). Story Telling with Data (1st ed., p. 121). Wiley.

Strack, B., DeShazo, J. P., Gennings, C., Olmo, J. L., Ventura, S., Cios, K. J., & Clore, J. N. (2014, May 2). *Diabetes 130-US Hospitals for Years 1999-2008*. Retrieved May 15, 2024, from <https://archive.ics.uci.edu/dataset/296/diabetes+130-us+hospitals+for+years+1999-2008>

[**https://doi.org/10.24432/C5230J**](https://doi.org/10.24432/C5230J)**.**

Stiefel, M., & Nolan, K. (n.d.). A Guide to Measuring the Triple Aim: Population Health, Experience of Care, and Per Capita Cost. IHI Innovation Series White Paper. Retrieved May 15, 2024, from <https://www.ihi.org/resources/white-papers/guide-measuring-triple-aim-population-health-experience-care-per-capita-cost#downloads>