Data Visualization Report

Overview:

We decided to create a web application that provides information about diseases treated in the country of U.S.A. The data set we used provides information about which diseases are treated at which hospital, the total payments associated with each disease, the total number of discharges per hospital for a particular disease, and the location of the hospital (City, State).

Purpose:

1. We want to provide medical information to the user about the different diagnosis-related group (DRG) information.
2. We want to provide the user with information about the different hospitals in the US that provides treatment of certain diseases.
3. We want to provide information about the cost for the treatment.
   - What’s the average cost for a certain disease nationwide?
   - What’s the average cost for a certain disease in my state?
   - What’s the average cost for a certain disease in my city?
   - What’s the average cost for a certain disease for a specific hospital?
4. We want to provide information about the amount of patients that were discharged per hospital to give the user an idea of how experienced a hospital is for diagnosing/treating a particular disease.
5. For a certain disease, how the charges vary among hospitals, cities, states?
6. What are the most prevalent diseases? (list of top 10? different states, cities?)
7. What are the least prevalent diseases? (list of top 10? different states, cities?)
8. What are the most costly diseases? (list of top 10? different states, cities?)
9. What are the least costly diseases? (list of top 10? different states, cities?)

Who will use it and what are their goals?

1. Targeted for users who know about the disease they have and would like further information about treatment for that particular disease.
2. Users who would like to know the average total payment per hospital.
3. Users who would like to know the total discharge of a particular disease per hospital.
4. Users who want to know some basic statistical information about the medical system.
5. For Medical Users who want to know which diseases are the most prevalent.
6. Users who possess knowledge about various states in United States and knows the acronyms used to represent them, for example CA represents California; or has internet available to search for them.

What are your data sources?

**Data Provider** - Data.CMS.gov
**Link** - [https://data.cms.gov/Medicare/Inpatient-Prospective-Payment-System-IPPS-Provider/97k6-zzx3](https://data.cms.gov/Medicare/Inpatient-Prospective-Payment-System-IPPS-Provider/97k6-zzx3)

**DataSet Overview :**

The data includes hospital-specific charges for the more than 3,000 U.S. hospitals that receive Medicare Inpatient Prospective Payment System (IPPS) payments for the top 100 most frequently billed discharges, paid under Medicare based on a rate per discharge using the Medicare Severity Diagnosis Related Group (MS-DRG) for Fiscal Year (FY) 2011. These DRGs represent more than 7 million discharges or 60 percent of total Medicare IPPS discharges.

The attributes in the data set are:

- **DRG Definition** – This attribute represents code and description identifying the DRG. DRGs are a classification system that groups similar clinical conditions (diagnoses) and the procedures furnished by the hospital during the stay.
- **Provider Id** - Provider Identifier billing for inpatient hospital services.
- **Provider Name** - Name of the provider.
- **Provider Street Address** - Street address in which the provider is physically located.
- **Provider City** - City in which the provider is physically located.
- **Provider State** - State in which the provider is physically located.
- **Provider Zip Code** - Zip code in which the provider is physically located.
- **Hospital Referral Region Description** - HRR in which the provider is physically located.
- **Total Discharges** - The number of discharges billed by the provider for inpatient hospital services.
- **Average Covered Charges** - The provider's average charge for services covered by Medicare for all discharges in the DRG. These will vary from hospital to hospital because of differences in hospital charge structures.
- **Average Total Payments** - The total of Medicare payments to the provider for the DRG including the DRG amount, teaching, disproportionate share, capital, and outlier payments for all cases. Also included are co-payment and deductible amounts that the patient is responsible for.
- **Average Medicare Payments** - The average of Medicare payments to the provider for the DRG including the DRG amount, teaching, disproportionate share, capital, and outlier payments for all cases. Also included are co-payment and deductible amounts that the patient is responsible for.
How did you fulfill the goals?

We used Dashboards because user can look at the monitor and analyze the information presented in dashboard at a glance. Also, we used boxplots so that user can see the summary of data and compare two states for different parameters.

On our homepage we included a carousel which also displays word clouds based on total number of patients discharged state wise and average covered charges state wise. On each page a help button is displayed that stores metrics used in graphs.

In addition we added a question section where user can send us questions regarding the dataset.

Some of the Design Patterns used -

a. Dynamic Queries - Helps in filtering out unnecessary details in the graph
b. Data Tips - Pops out information on mouseover
c. Sortable Table - Displays sorted numeric data to the user
d. Multi-Y Graphs - Helps in letting the users know that the graphs are related. Encourages comparisons among the graphs.
e. Box plot - Helps in visualizing summary of the data

What do your visualizations show?

Our visualization provides answers to the questions provided in Purpose Section by using Dashboard Design Pattern.

How did you create the visualizations?

We used the following tools -

a. Bootstrap loader - For building website, link - [http://getbootstrap.com/2.3.2/](http://getbootstrap.com/2.3.2/), main feature of bootstrap is that it automatically adjusts the website according to monitor size.
b. Javascript, CSS
c. R programming language - For creating boxplots using shiny package
d. Tableau - For analyzing and creating Dashboards.
e. Heroku - For hosting application online

Screen shots.
Team Name - SPTX
Team Members:
1. Name - Shweta Shweta
   Email ID - shwetasahmaria@gmail.com
2. Name - Peter Chou
   Email ID - peterus@gmail.com
3. Name - Tim Kang
   Email ID - got.ownage@gmail.com
4. Name - Julian Zhu
   Email ID - xianhui_zhu@gmail.com

CS 235
User Interface Design

Name:

Email address:

Enter your Question:

Submit
Overview Tab with help command clicked

Break Down Tab
About Tab

Inpatient Charge Data FY 2011
The data provided here includes hospital-specific charges for the more than 3,000 U.S. hospitals that receive Medicare Inpatient Prospective Payment System (IPPS) payments for the top 100 most frequently billed discharges, paid under Medicare based on a rate per discharge using the Medicare Severity Diagnosis Related Group (MS-DRG) for Fiscal Year (FY) 2011. These DRGs represent more than 7 million discharges or 60 percent of total Medicare IPPS discharges.

Hospitals determine what they will charge for items and services provided to patients and these charges are the amount the hospital bills for an item or service. The Total Payment amount includes the MS-DRG amount, bill total per item, beneficiary primary payer claim payment amount, beneficiary Part A inpatient deductible amount, beneficiary blood deductible amount, and DRG outlier amount.

For these DRGs, average charges, average total payments, and average Medicare payments are calculated at the individual hospital level. Users will be able to make comparisons between the amount charged by individual hospitals within local markets, and nationwide, for services that might be furnished in connection with a particular inpatient stay.

Fields
The following fields are available on the Inpatient Prospective Payment System (IPPS) Provider Summary for the Top 100 Diagnosis-Related Groups (DRG) API:

- DRG Definition: Type: Text Code and description identifying the DRG. DRG Definitions are a classification system that groups similar clinical conditions (diagnoses) and the procedures furnished by the hospital during the stay.
- Provider ID:
- Type: Number
- Provider ID:
- Text
- Billing for inpatient hospital services.
- Provider Name:
- Type: Text
- Name of the provider.
- Provider Street Address:
- Type: Text
- Street address in which the provider is physically located.
- Provider City:
- Type: Text
- City in which the provider is physically located.
- Provider State:
- Type: Text
- A state in which the provider is physically located.
- Provider Zip Code:
- Type: Text
- Zip code in which the provider is physically located.
- Hospital Referral Region Description

How to run your application?

Go to link [https://ipps.herokuapp.com/](https://ipps.herokuapp.com/), the website is hosted there

(Loading might be a bit slow based on your internet speed)

or Use apache2 to run the code on localhost

a. **Windows** -
   2. Store the website in htdocs sub folder of your apache folder (place where you installed apache server)
   3. Go to your browser.
   4. Type localhost://your_directory_name_in_htdocs/index.html

b. **Ubuntu** -
   1. Store the website in /var/www/html/ directory
   2. Go to command prompt.
   3. Type man apache2
   4. If its installed in your pc then it will display details about apache else install it by using following command `sudo apt-get install apache2`
   5. Store whole code in /var/www/html/
   6. Go to your browser.
   7. Type localhost://your_directory_name_in_html/index.html