Who receives an Annual Wellness Visit in the University of Utah Healthcare System?

Basic Info :

Title:
Who receives an Annual Wellness Visit in the University of Utah Healthcare System?
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Github Link: https://github.com/rviertel2/dataviscourse-pr-wellnessvisits

Background and Motivation:

The Annual Wellness Visit

The health care and medical insurance systems are driving a shift in focus on patient care. Health care must prioritize keeping healthy people healthy and helping people with illnesses manage their care better. It means shifting the focus from a "sick care" model to one where the individual is engaged in reducing their health risks, and managing their chronic conditions. This will empower people to make lifestyle changes and go in for health screenings to detect undiagnosed disease. The primary care physician seen at the community clinics is an ideal setting to screen patients and identify their needs. A preventive wellness care visit, The Annual Wellness Visit, implemented by Medicare, is being used to systematically assess and trigger the proper care to identify and prevent chronic diseases and mental health disorders among patients.

Unfortunately, many primary care practices are overwhelmed by their workload and competing demands, and annual wellness visits are not readily promoted. Additionally, patients may not know to ask for the AWV. In 2014, only 31% of Medicare beneficiaries received an AWV. In order to boost participation, one of us has been working on a project that has put much effort into educating clinicians on the benefits of the AWV and streamlining the workflow by implementing an electronic template to provide a checklist of tasks to perform during the visit. We are now comparing the characteristics of patients completing an AWV with those that do not participate. With this information in hand, we hope to recruit patients and increase participation in AWVs. Our goal is to recruit a population that represents the demographics of the general Medicare clinic population in age, ethnic, racial and socio-economic levels.

University of Utah Health Care system

The University of Utah healthcare (UUHC) system is a research and teaching institute. It provides care for Utahns and residents of the five surrounding Intermountain West states. It includes 12 community clinics under the wing of the University of Utah Hospitals and Clinics. The clinics are distributed throughout the Salt Lake Valley and Park City, with the main hospital located on the University of Utah campus.

Project Objectives:

To measure the effectiveness of receiving early assessment and intervention during the AWV, we identify patients that may require management of a particular health condition. In this study we track the diabetic and the cognitively impaired populations. We hypothesize that those patients who are able to control and maintain their diabetes, or are able to address mental health problems, should have fewer hospitalizations and emergency room visits than the general population. Evidence of the benefits of receiving AWV's will promote a proactive health care model.

Data:

Patient data is extracted from the electronic medical records for the UUHC system. Data is available for Medicare patients, who are predominantly over the age of 65, and who have visited one of the UUHC community clinics between the years of 2013 – current year 2015. All Medicare visits are identified by primary care physician seen and age of patient. All data has been de-identified.

Visit data. Descriptive information for each visit from 2013 to 2015 is collected: the specialty department and clinic, month and year of visit and the current age of the patient at visit. Also collected at each visit are the presence of a diabetes or cognitive impairment diagnosis and whether the visit is an AWV.

Patient data. For each patient identified with a visit, demographic data such as: gender, race, ethnicity, primary language and zip code are collected for each patient.

Hospitalizations. In-patient hospitalizations and emergency department visits for each Medicare patient is collected as an aggregated count of visits per calendar year.

Data Processing:

1. The raw data from the electronic medical records has been edited to create categorical fields from insurance billing codes. For example, the field "Has diabetes" is generated and set as TRUE if the billing codes related to diabetes are present. We want to change a few of the records into binary quantifiers in such a way that makes it easy to aggregate.

2. We want to create data objects using Json load function. We want to use a globalized data selection. As we have two selectors, we are going to use two globalized selections. This makes it easy for us to use the selected data and pass between visualizations. This way each view doesn't have to re-process the data for every change in selection. For the other internal filters for each view, we use a different selection on selected data.

3. Creation of utility functions, such as filters, getters, setters, aggregators, averaging, etc. will help to promote code re-use.

4. Our data is stored in multiple excel data files, with a foreign key reference of patient_id. We are combining all the excels and generating a spread sheet containing 60k records. We have more than 14 different attributes. There are two approaches. One, we are going to load all the data and we want to aggregate and filter the data on the run. Two, we want to load different aggregate level data as csv.

Below is the data flow diagram:
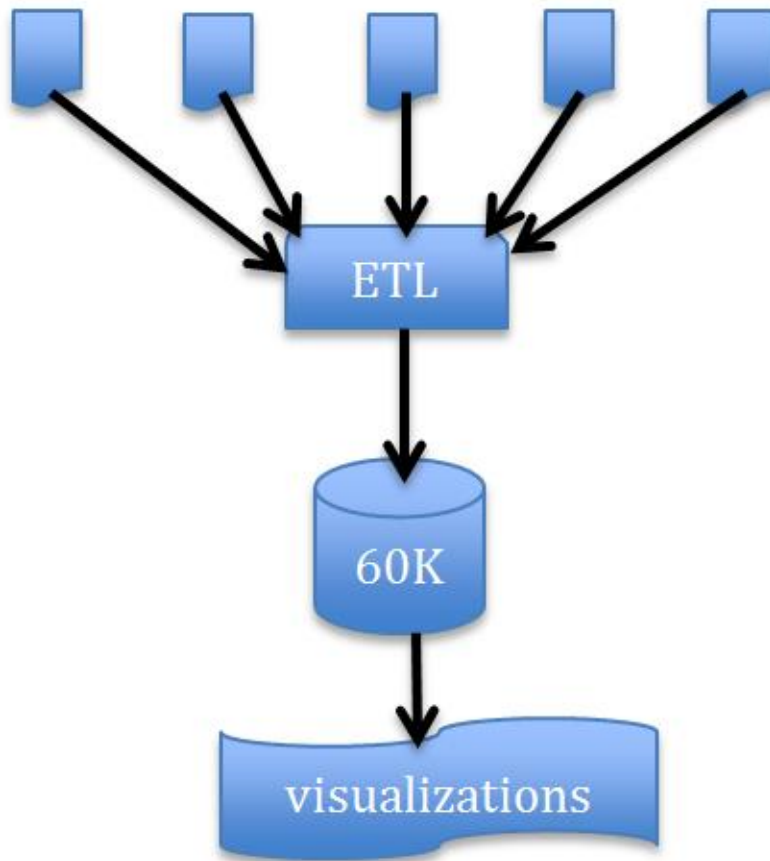
Visualization Design:
Each of us came up with individual designs. The preliminary files are attached as pdfs with this submission. The final design sketch with descriptions is also attached as a pdf.

Must-Have Features:
- A map of Salt Lake County with clinic locations appearing on the map. Representations of the clinics will be clickable to filter data by clinic location.
- Toolbar to filter data by other demographics such as race, ethnicity, primary language, age, and gender
- A way to clearly distinguish data for patients who get annual wellness checkups vs patients who do not. All views of data should make this

distinction. This will be directly encoded on the visualization, (distinct from just a selectable filter) as one of the goals of this visualization is to compare patients who get annual wellness checkups to those who do not.
- Multiple views the data for a given demographic selection, including a time series of clinic visits, comparison of total clinic visits, and proportion of patients who were later hospitalized.
- A view to compare proportions of wellness checkup patients for two different demographics

Optional Features:
- Map will include zip code boundaries so that data for each zip code can be encoded and displayed directly on the map
- A way to flag clinics who have low numbers of patients who receive wellness checkups for a given demographic.

Project Schedule:
We decided to incorporate the project schedule as a google calendar so that it would be flexible and simple to integrate with the calendars that we already use. Here is a link to the calendar.
https://www.google.com/calendar/embed?src=hhr2j97k1jf7sbmo0usth8oq58%40group.calendar.google.com&ctz=America/Denver

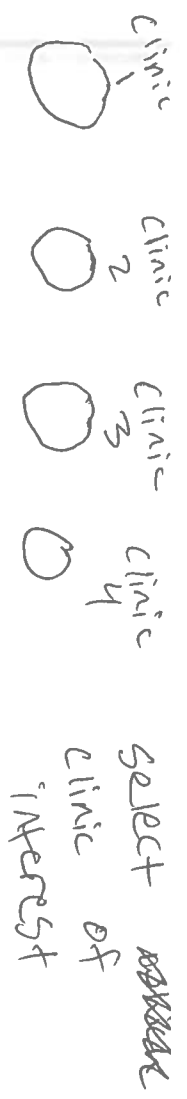time series of total clinic visits (as a stacked line chart)

clinic 1

clinic 2

clinic 3

Jan 2012

Dec 2015

Shows proportion of zip code that goes to this clinic

0

0
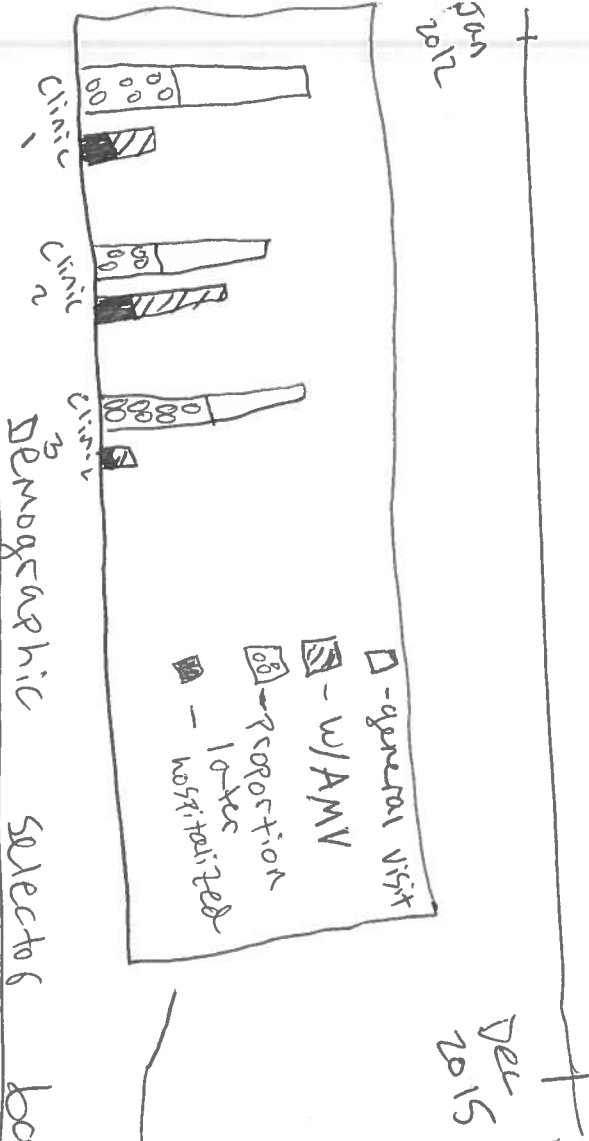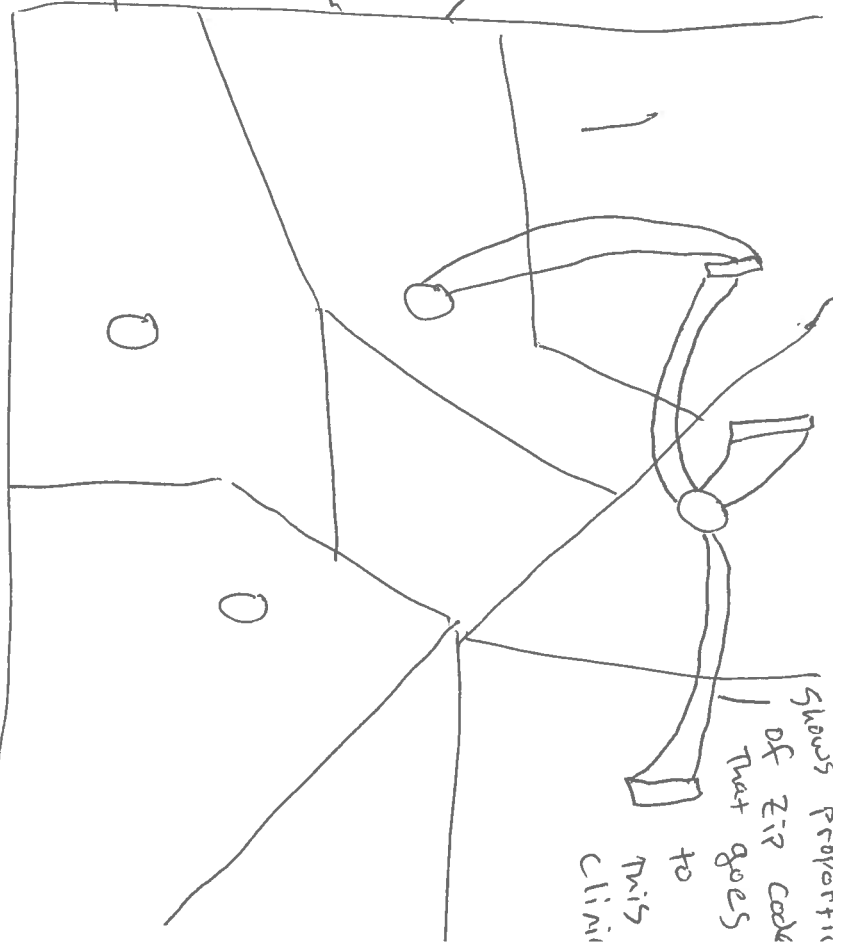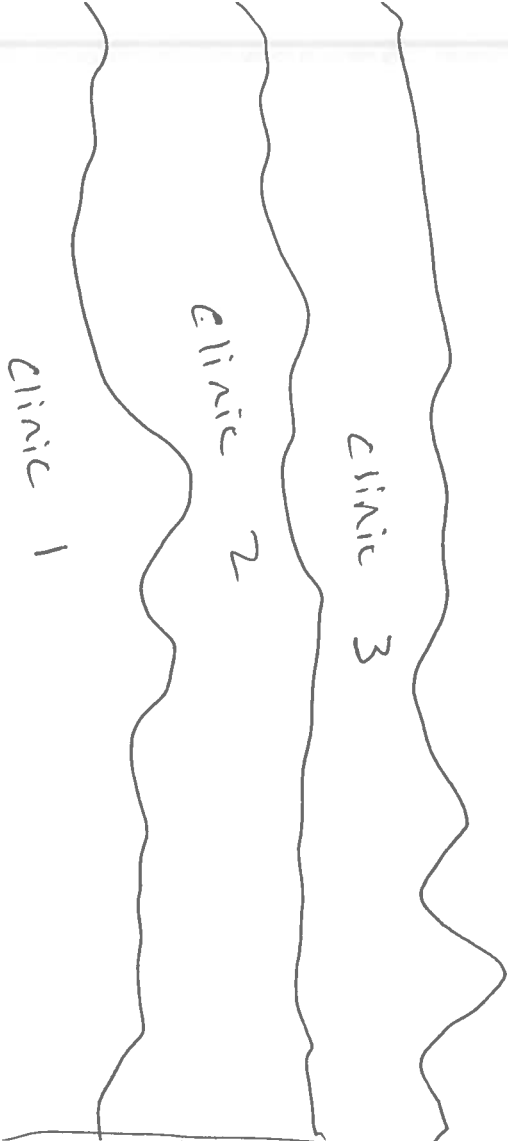
map of salt lake county w/ boundary lines for zip code regions. circles represent clinics. total visits can be encoded by size

clinic 1
clinic 2
clinic 3

☐ - general visit
▨ - w/ AMV
🔳 - proportion later
◼ - hospitalized

bar graph showing visits w/ AMV to general visits. The idea is to compare these for different demographics

Demographic selector bar

age range   ☐ - ☐   gender ⦿ male   language
                              ○ female

male ▭◀   language ▭◀

clinic 1   clinic 2   clinic 3   clinic 4

select clinic of interest

brushable to filter

histogram of ages

gender Pie Chart

Female   male

Clickable to filter

white   hispanic/latino   asian   black   polynesian

Demographic breakdown by clinic
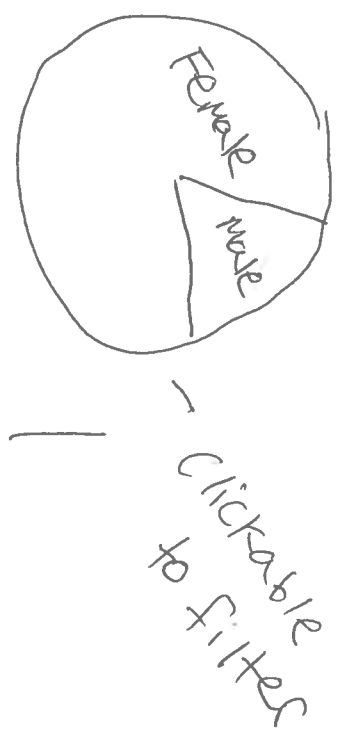
everything on both pages will have a tooltip on hover to show the key metric

Filters

[ ] Gender
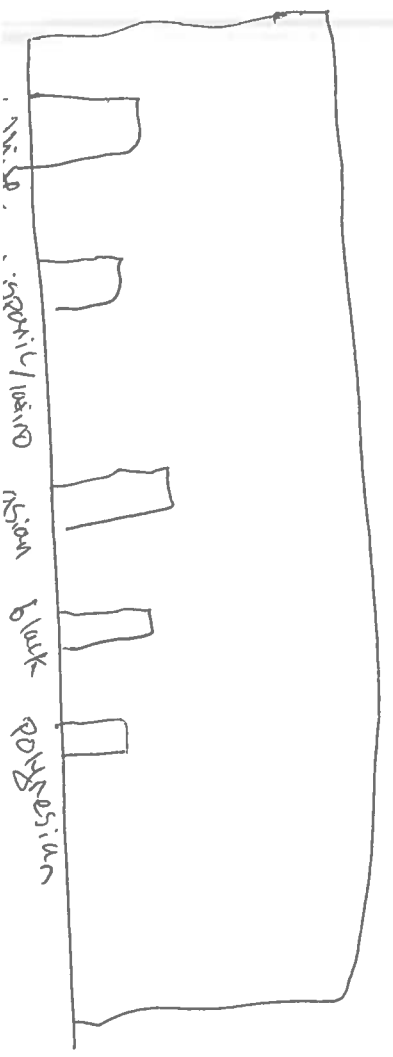
[ ] Language

Bar chart
Selection

[_____] [▽]
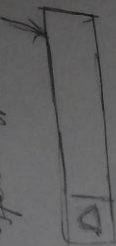
Choose the option
you need to filter
on the data

Main.Html

Map

× - Geo locations
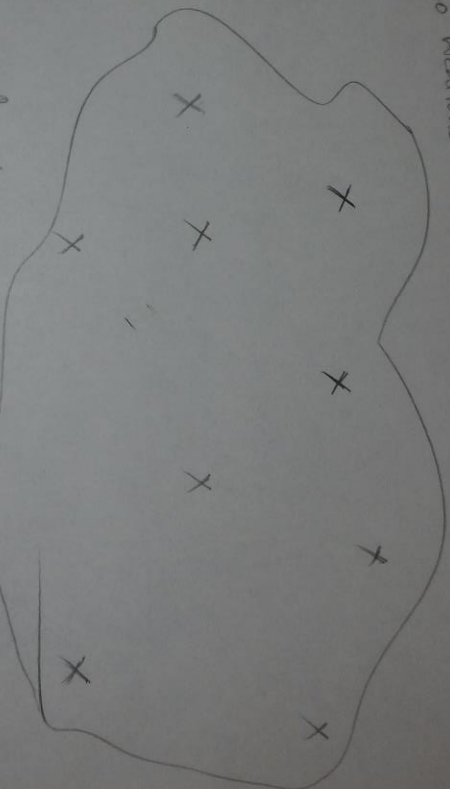
Bar chart . for the selected Geo.
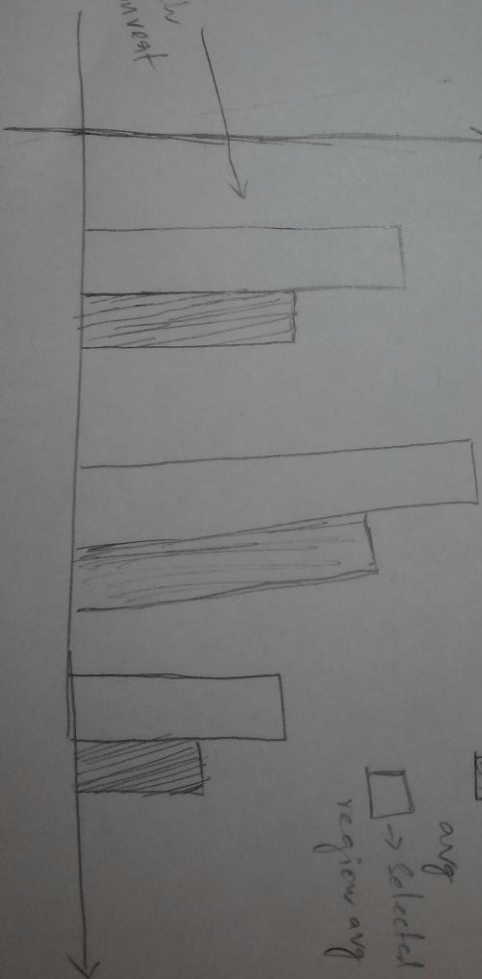
▨ → Overall
avg
☐ → Selected
region avg

Click on
the gap which
inturn will convert
into another
graph.

The big graph converts into this
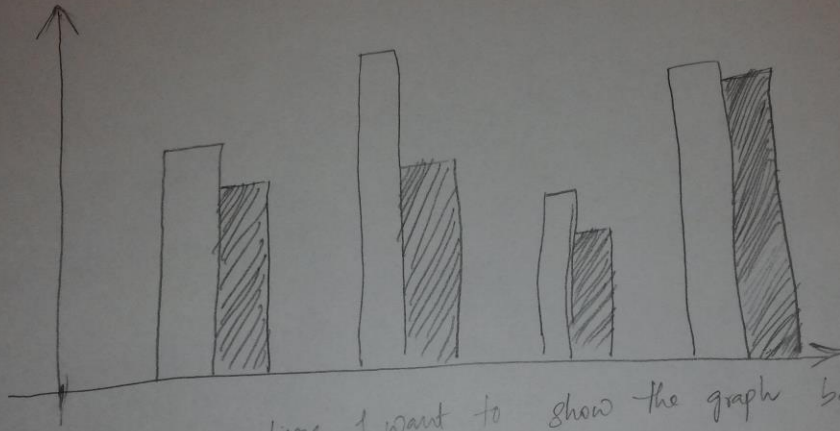
so here I want to show the graph between
is   AWS vs non-Aws.

Filters

☐ 🔽 Gender

☐ 🔽 category

Bar graph [_____ 🔽]

comparision
On whole
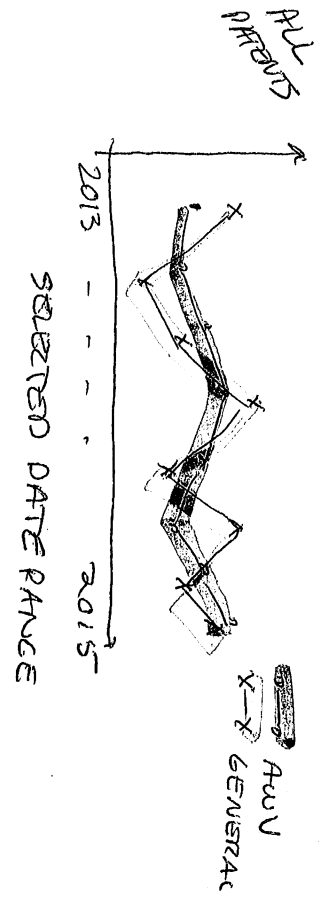set of data

──→ All the clinics ⟵──

☐ ──→ clinic data

▨ ──→ Avg data.

CHARACTERISTICS OF THE GENERAL ELDERLY POPULATION AT UUHC COMMUNITY CLINICS COMPARED TO THOSE WITH ANNUAL WELLNESS VISITS

SALT LAKE CITY & VICINITY ZIPCODES
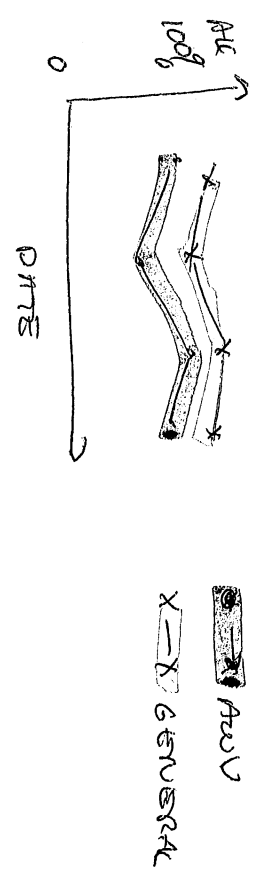
PARK CITY
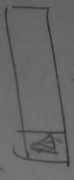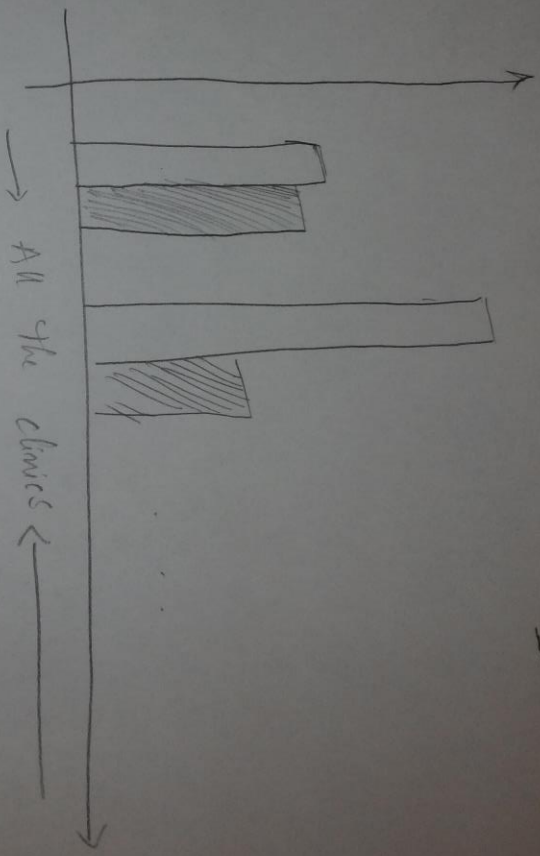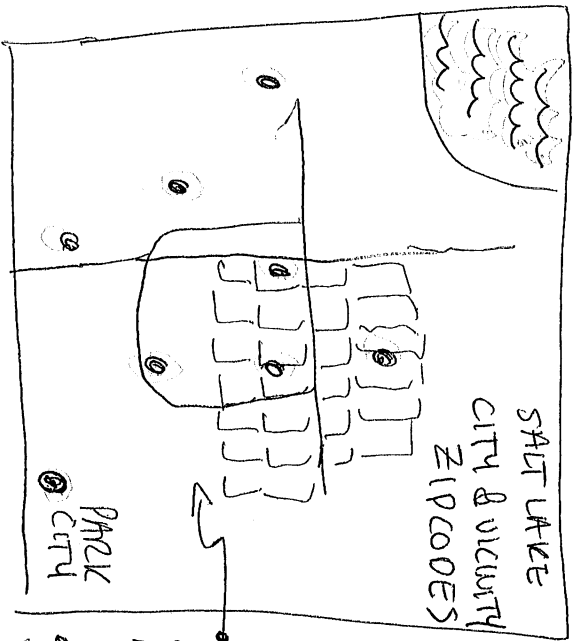
2013   2014   2015

2 BRUSHES FOR DATE AND TIME INTERVAL SELECTION ONE FOR GENERAL ONE FOR AWV

CLICK ON CIRCLE FOR SPECIFIC CLINIC, CLICK ON SURROUNDING AREAS TO SHOW ALL CLINIC DATA

ZIPCODE REGIONS HIGHLIGHTED BY FRACTION OF PATIENTS SEEN AT CLINIC → CHLOROPLETH MAP

CONTROL CENTER FOR SELECTING LOCATION AND TIME PERIOD

LANGUAGES
GENERAL
AWV
PER CENT 100%
ENGL   SPAN   OTHER

MEDIAN AGE 100%
60-70   70-80   80-90   >90

RACE 100%
CAUC   AFRI   ASIAN

ETHNICITY 100%
NOT HISP   HISP   OTH

SOCIO ECONOMIC STATUS 100%
LOW   MED   HIGH

GENDER 100%
M   F

(NEXT TAB PAGE)

DOES THE AWV PROVIDE BENEFITS?

RATE OF HOSPITALIZATIONS = $\dfrac{\text{\# HOSP. VISITS}}{\text{\# PATIENTS}}$

PROPORTION OF PATIENTS = $\dfrac{\text{\# PTS w/ HOSP}}{\text{\# PATIENTS}}$
WITH HOSP. VISIT.

ALL PATIENTS

AWV
X—X GENERAL

DIABETIC PTS

2013 - - - - 2015
SELECTED DATE RANGE

COGNITIVE IMPAIRMENT

AWV 100%
0
DATE

AWV
X—X GENERAL

DIABETIC 100%
0
DATE

COG IMP 100%
0
DATE

OBJECTIVE: DISCOVERY AND INFORMATIVE PLOTS ABOUT THE DISTRIBUTION OF PATIENTS SEEN IN THE COMMUNITY CLINICS

TARGET AUDIENCE: PEOPLE INTERESTED IN GENERAL HEALTHCARE, IN PARTICULAR PROACTIVE, PREVENTATIVE WELLNESS VISITS AROUND THE SALT LAKE CITY VICINITY.
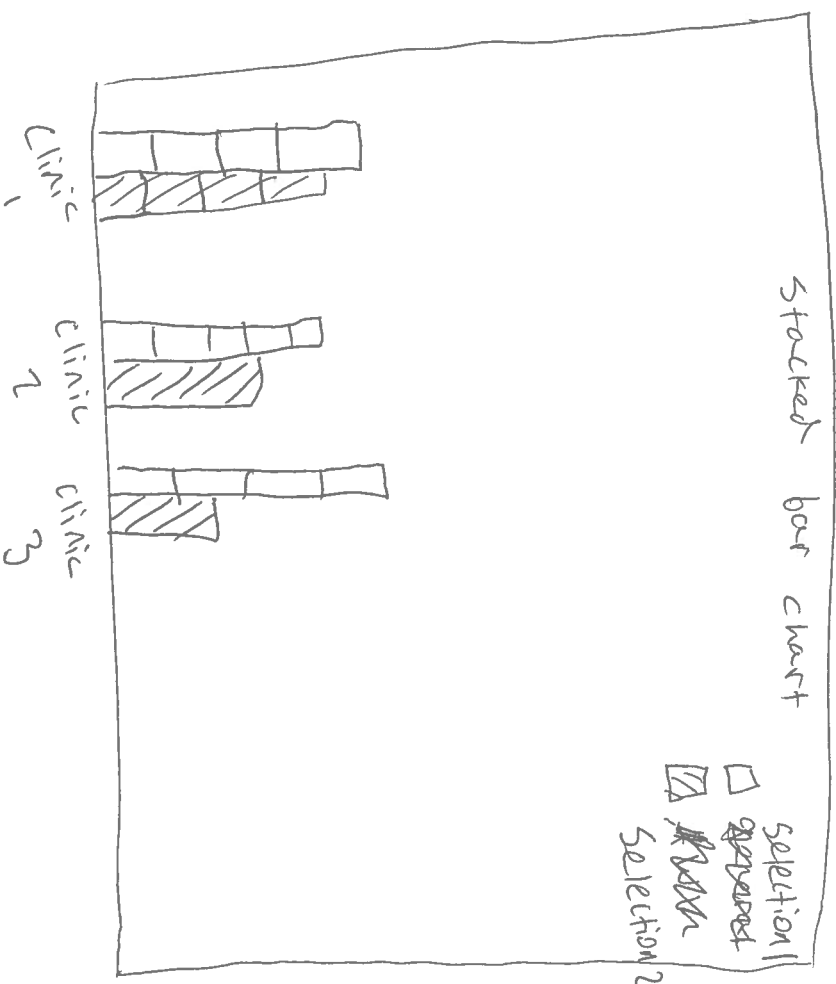
ALSO RESPONDS TO CLINIC LOCATION SELECTION AND TIME INTERVAL SELECTION FROM FRONT PAGE

Map
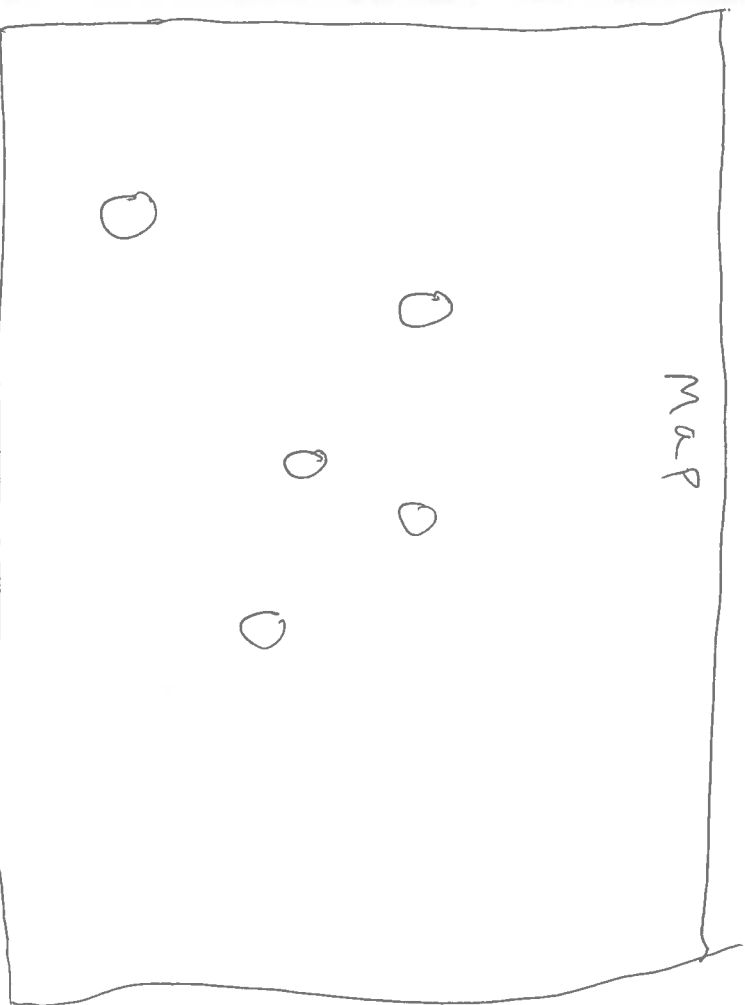
Stacked time series lines

Clinic 1

Clinic 2

Clinic 3

Dec 2014

Stacked bar chart

Clinic 1

Clinic 2

Clinic 3

□ Selection 1
☑ approved
✖ both
Selection 2

Selector 1

Selector 2
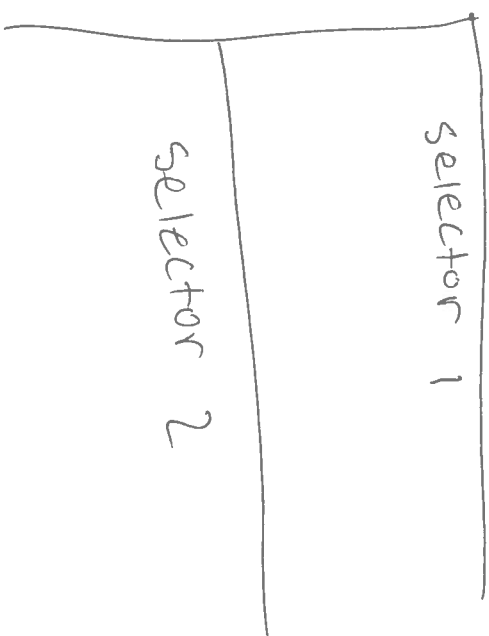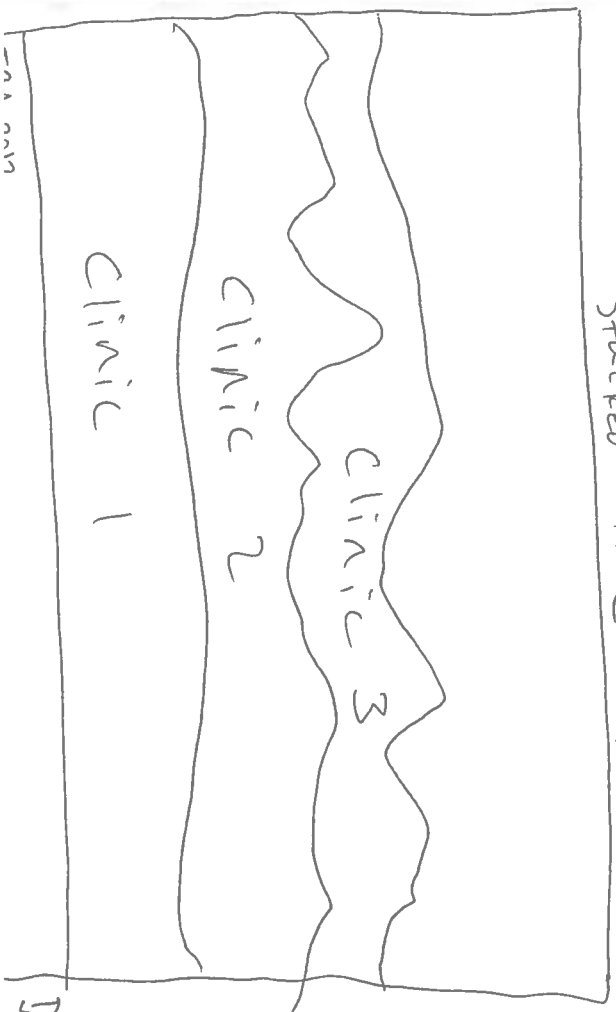
Map — Map of salt lake county with clinic locations displayed. clinic locations will be clickable and data will be filtered on click. Hover will display a tooltip with key metrics

Bar chart — This bar chart will show 2 bars for each location based on 2 demographic selections made by the user. Bars will be stacked to show general vs. AWV visits and proportions of hospitalizations. If a single clinic is selected stacked bars will unstack themselves to make the data even easier to read

Stacked time — time series of total vs. AWV visits for each series clinic (or a single clinic if one is selected). This will be a stacked area chart that varies over time

Selectors — toolbars to make 2 separate selections (for purposes of comparison) based on demographic data

Design System

Clinic Selector box

Bar Charts

race
□ general
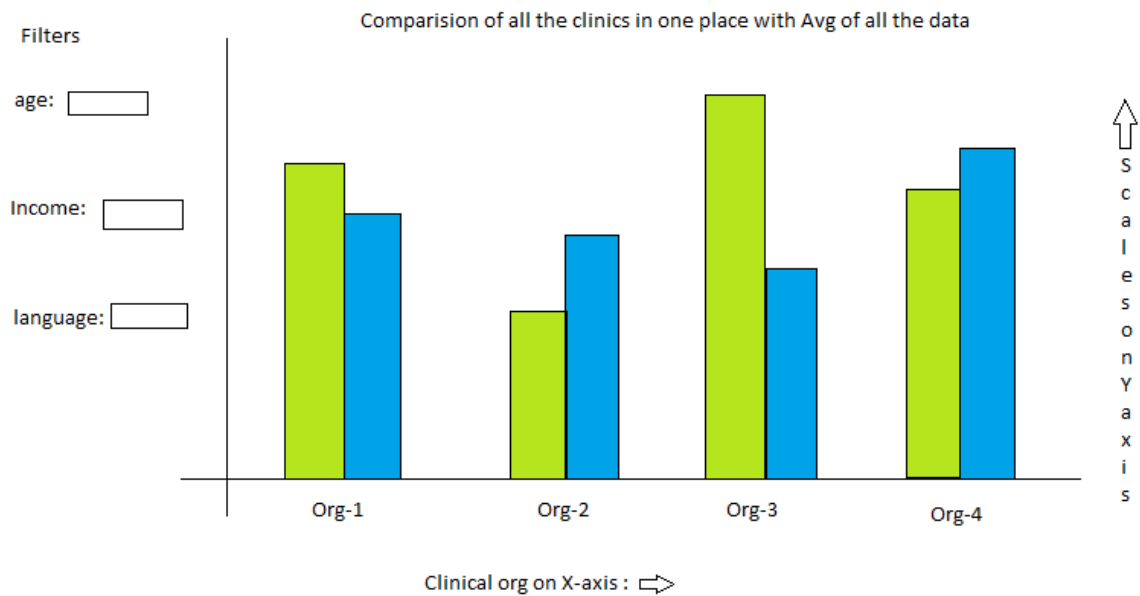☑ awv

language

average Income

gender

age area Chart

Clinic Selector — Box to select a specific clinic to filter data

Age area chart — area chart showing total visitors by age.

Bar Charts — a bar chart breakdown of all relevant
demographics. The point of this page
is to display demographic information since
on the previous page it was used
as a filter

all items will show key information on
hover

Comparision of all the clinics in one place with Avg of all the data

Filters

age:

Income:

language:

Scales on Y axis

Org-1   Org-2   Org-3   Org-4

Clinical org on X-axis :

This is the page 3 of the project. In the page 1, we are visualizing the data based on the geo and selection wise. It shows the comparison between two selections. In page 2 , we are visualizing the data with respect to a selection. In page 3,we are visualizing the data with respect to all the clinics. This gives the overall comparison between data in different dimensions (attributes).We can choose the dimensions from the given dropdown filter. We also want to compare each org data with the average of overall data. So we are representing the bar graph as mentioned above. Green represents data for that clinic and blue represents the overall data.