Project Overview

Background: A count of the historical influenza deaths gives an indication of the severity of flu in an area. Deaths can be prevented with flu shots and adequate medical staff. In the United States, each state has a different population composition, meaning that some states will have more vulnerable populations.

Objective: Examine influenza trends across the United States and provide recommendations to the medical staffing agency on how to best allocate their resources (staff) in each state.

Scope: The agency covers all hospitals in each of the 50 states of the United States, and the project will plan for the upcoming influenza season.

Stakeholder Communication

Meetings: At the project outset, arrange a video conference with the representatives of the identified stakeholders: medical staffing agency, medical agency frontline staff, and those at the hospital and medical clinics utilizing the medical staffing agency's services; the data analyst will also identify a number of representatives among the influenza patients in select hospitals across the United States via a survey administered by the respective hospital or medical clinic they were treated in. During the meeting, which will be recorded and accessible to all participants, the business plan and requirements will be discussed as well as clarifying, funneling, adjoining, elevating, and privacy and ethics-related questions and topics. The estimated timeline for each step of the process will also be discussed, but it is also outlined below for future reference. Stakeholders are encouraged to ask questions and submit requests regarding what they would like included in the final report.

Calls: Video calls will be scheduled on a monthly basis to update stakeholders on the progress of the project. During this time, stakeholders are encouraged to ask questions and submit additional requests; however, after the third meeting (two meetings after the project outset), it would not be feasible to continuously add or make major changes to the project if it were to be completed by the determined deadline. While these calls will be recorded and accessible later, all stakeholders are encouraged to attend these meetings.

Written Communication: The analyst will send updates on the progress of the project on a monthly basis *before* the monthly video calls. Questions regarding the updates can be discussed during the video call or by email afterwards. The analyst will be answer email(s) from stakeholders within 72 hours during business days and will communicate if they are unavailable for an extended amount of time such as during the holidays.

Emergency/Contingency Plan: Any urgent issues should be communicated via email with the word "urgent" in the subject line. Please allow the analyst up to 48 hours to respond; a follow-up call may also be scheduled to further discuss the issues.

[1] World Health Organization (WHO). 2018. Source: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)
[2] Centers for Disease Control and Prevention (CDC). Source: https://www.cdc.gov/flu/about/season/flu-season.htm

Schedule & Milestones

Week 1: Brainstorming & Designing a Data Research Project

- Create a list of data questions needed for analysis
- Design data research project
- Formulate a research hypothesis

Week 2: Sourcing the Right Data

- Describe the data set available for the project
- Explain the relevance and limitations of each data set for the project

Week 3: Data Profiling & Integrity

- Create a data profile for each data set used in the analysis
- Include information on data types, data integrity issues (accuracy and consistency), any
- cleaning you conducted, as well as summary statistics in each profile

Week 4: Data Quality Measures

- Implement additional data quality measures to your data profiles related to completeness, uniqueness, and timeliness

Week 5: Data Transformation & Integration

- Integrate data from two sources into one cohesive data set using data transformations

Week 6: Conducting Statistical Analyses

- Calculate the variance and standard deviation for key variables
- Identify variables with a potential relationship and test for a correlation

Week 7: Statistical Hypothesis Testing

- Formulate a statistical hypothesis regarding an outcome of interest around two groups within the data set
- Conduct hypothesis testing and interpret the results

Week 8: Consolidating Analytical Insights (First Deliverable)

- Create an interim report consolidating the findings of your analysis

Week 9: Visual Design Basics, Composition & Comparison Charts, Temporal Visualizations & Forecasting

- Create a data visualization design checklist
- Explain how the visualizations in each example can be improved
- Create a pie, bar, or column chart, as well as a tree map in Tableau
- Create a time forecast for a variable and display it in Tableau
- Use visualization design checklist to design your chart

Week 10: Statistical Visualizations: Histograms & Box Plots, Scatter Plots & Bubble Charts

- Create visualizations that look at the distribution of a variable
- Create visualizations that look at the correlation between variables
- Use visualization design checklist to design your chart

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[2] Centers for Disease Control and Prevention (CDC). Source: https://www.cdc.gov/flu/about/season/flu-season.htm

Week 11: Spatial Analysis & Textual Analysis

- Map a variable and justify your spatial visualization choice (heat, density, or choropleth)
- Use visualization design checklist to design your chart

Week 12: Storytelling & Presenting Findings to Stakeholders (Second Deliverable)

- Create a narrative to communicate research findings and insights in relation to the research goals
- Publish analysis as a Tableau Storyboard
- Record a video presentation for stakeholders

Project Deliverables

- Interim Report Consolidating Analysis Findings
- Recorded Video Presentation for Stakeholders

Audience Definition

- Medical Staffing Agency Administrators
- Medical Agency Frontline Staff Members (Doctors, Nurses, Physician Assistants, Etc.)
- Hospital and Medical Clinics Using the Medical Staffing Agency's Services
- Influenza Patients

As these deliverables will be presented to a wide audience that may not all be trained in privacy and ethical practices, no personal identifying information (PII) nor data protected by HIPAA will be included. All data will be presented in an aggregated format and categorized by each state to protect the privacy of individual hospitals and medical clinics across the country.

Context

- Vulnerable population that are recommended to obtain the influenza vaccine annually:
    - pregnant women at any stage of pregnancy
    - children aged between 6 months to 5 years
    - elderly individuals (aged more than 65 years)
    - individuals with chronic medical conditions
    - health-care workers
        - "*Health care workers are at high risk acquiring influenza virus infection due to increased exposure to the patients and risk further spread particularly to vulnerable individuals.*"[1]
- "*In temperate climates, seasonal epidemics occur mainly during winter, while in tropical regions, influenza may occur throughout the year, causing outbreaks more irregularly.*" [1]
- "*While seasonal influenza (flu) viruses are detected year-round in the United States, flu viruses typically circulate during the fall and winter during what's known as the flu season. The exact timing and duration of flu seasons varies, but flu activity often begins to increase in October. Most of the time flu activity peaks between December and February, although significant activity can last as late as May. Since the start of the COVID pandemic, the timing and duration of flu activity has been less predictable.*" [2]

[1] World Health Organization (WHO). 2018. Source: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)
[2] Centers for Disease Control and Prevention (CDC). Source: https://www.cdc.gov/flu/about/season/flu-season.htm

- The Center for Disease Control and Prevention (CDC) publishes a weekly influenza summary map to demonstrate the activity level of each state: https://www.cdc.gov/flu/weekly/usmap.htm From there, we can drill down to each state.

Hypotheses

- If the hospital or medical clinic is in a rural area with limited funding, then those locations are likely to be under-staffed and would need additional staff during influenza season.
- If the state has a large proportion of their population under the age of 5 or over the age of 65 (vulnerable population), then the influenza rates are likely to be higher.
    - Subsequently, these states will likely need more additional staffing.
- If hospitals and medical clinics do not receive the adequate amount of staff during influenza season, their state's influenza rates will increase.
    - Alternatively, if hospitals and medical clinics *do* receive adequate amount of staff during influenza season, their state's influenza rates will decrease.

Data Wishlist

- Population of each state
- Influenza prevention efforts for each state
- Influenza rates (hospitalization, vaccination, and mortality) for each state
    - Include age, gender, location, and socioeconomic status of patients
    - At minimum, for the past five years, but preferably the past ten years
    - Day of week and time of day patients get vaccinated
- Current number of staff at the hospital or medical clinic
    - Include pay range for each position
    - General retention rate for each position
    - Staff-patient ratio, legally required and actuality
    - Day of week and time of day that the hospital or medical clinic are likely to be short-staffed (e.g., during the holiday season)
- The medical staffing agency's employment, deployment, and retention rates
    - Historical data of where the agency has sent staff in the past, and how many

[1] World Health Organization (WHO). 2018. Source: https://www.who.int/news-room/fact-sheets/detail/influenza-(seasonal)
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