Capstone Project Proposal

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**Premise**: Patient hospital satisfaction is of profound relevance in our current healthcare environment impacting patients and providers alike. Patient satisfaction now plays a consequential role in determining levels of Medicare reimbursement1, which places significant financial pressure on hospitals to understand facets of care that contribute to patient experience. Additionally, the rising emphasis on patient choice in the healthcare market will likely penalize hospitals that fail to meet patient expectations by reducing patient demand. These trends may be further driven by the growing utility of big data that will make metrics of patient satisfaction at regional hospitals more transparent to patients themselves, which may influence healthcare purchasing behavior.

**Problem**: While the data related to hospital patient satisfaction is publically available to consumers at [data.medicare.gov](https://data.medicare.gov/), the API for these databases is difficult to navigate. Moreover, patient satisfaction data was generated using patient surveys. Thus, it is difficult to generalize using the patient satisfaction at a particular hospital to hospitals not included in the Medicare data base. Therefore, the goal of this project will be to develop a model to predict patient satisfaction using publically available Medicare data. Briefly, this undertaking will address the following questions:

* How does publically available Medicare Hospital Compare data (e.g. geographic location, hospital type, hospital model of ownership, the use of electronic medical records, effective use of imaging, timeliness of care, hospital readmissions performance, Medicare spending per patient) predict patient satisfaction?
* What features provide the greatest predictive value toward patient satisfaction?

**Potential Client**: Predictive analytics on patient satisfaction could be valuable to multiple client types. Two examples are provided below:

* + - A **government agency or policy maker** tasked with evaluating hospital performance metrics as they relate to patient satisfaction.
    - A firm developing **patient facing hospital ratings software** designed to provide indicators of patient satisfaction at various types of hospitals. Machine learning models used in this project could predict satisfaction at hospitals not currently in the Medicare data base (i.e. they could be used to generalize to a wider range of hospitals).

**Data Sources:** Data is derived from several datasets available on at [data.medicare.gov](https://data.medicare.gov/).

Specifically:

* Hospital General Information
* Readmissions information
* Medicare hospital spending per patient (Medicare Spending per Beneficiary)
* The data set was also merged with a dictionary of time zones to better inspect regional variations.

**Approach**:

* + **Data Preparation**:
  + Tidy Medicare data and merge all data sets.
  + **Data Exploration**:
    - Perform exploratory data analytics. In deference to practicality, this will focus on parameters as they relate to patent satisfaction. Deeper dives will be undertaken to interrogate interesting relationships.
  + **Machine Learning**:
    - Supervised learning: I will test several machine learning algorithms and assess their relative predictive accuracy and sensitive. Tentatively, I plan to use logistic regression to predict patient satisfaction but will expand beyond this.
    - Unsupervised learning: I will perform a cluster analysis to investigate common attributes across hospital information in the Medicare dataset.

**Deliverables**:

* + Written report/slide deck and code highlighting key findings and methodology of analyses.
  + Clear conclusions about the uses of features in predicting patient satisfaction.
  + Identification of unexpected relationships that may be of client value.

1. [Frequently Asked Questions Hospital Value-Based Purchasing Program Last Updated March 9, 2012. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HVBP/HVBP-FAQs.pdf. Last accessed 3/25/17](https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/HVBP/HVBP-FAQs.pdf)