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Master's in Data Science

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Role: Will be doing the project independently.

Title: Adequacy Analysis of Dialysis Treatment across the United States.

Abstract:

This project involves analyzing the data collected by the Centers for Medicare and Medicaid Services (CMS) to provide dialysis facilities, consumers, the public, CMS and its affiliates with valuable information on patient characteristics, treatment patterns, hospitalization, mortality, and transplantation patterns in Medicare certified dialysis facilities across the US. The dataset includes the data elements contained in the each Medicare certified dialysis facility's DFR (Dialysis Facility Report) for the year indicated, subject to dialysis facility exclusion for small numbers of patients based on the end of the year count in the Annual Facility Survey.

Introduction/Overview:

Kidney disease often has no symptoms in its early stages and can go undetected until it is very advanced. Hence, kidney disease is also referred to as a 'silent disease'. The adjusted incidence rate of ESRD in the United States rose sharply in the 1980s and 1990s, leveled off in the early 2000s, and has declined slightly since its peak in 2006.Compared to Caucasians, ESRD prevalence is about 3.7 times greater in African Americans, 1.4 times greater in Native Americans, and 1.5 times greater in Asian Americans. Each year, kidney disease kills more people than breast or prostate cancer. In 2013, more than 47,000 Americans died from kidney disease.

The overall prevalence of CKD in the general population is approximately 14 percent. High blood pressure and diabetes are the main causes of CKD. Almost half of individuals with CKD also have diabetes and/or self-reported cardiovascular disease (CVD).More than 661,000 Americans have kidney failure. Of these, 468,000 individuals are on dialysis, and roughly 193,000 live with a functioning kidney transplant.

Dialysis is a process for removing waste and excess water from the blood and is used primarily as an artificial replacement for lost kidney function in people with kidney failure either until suitable transplant is made available or in case of acute kidney failure. Dialysis care is intricate and multiple factors may influence patient survival. As a result finding good facility and treatment measures becomes crucial for patients to avoid further complications and/or prolong survival rate.

Problem Statement: Through this project we will try to find analyze the prevalence of kidney failure across the US and summarize the results with recognizing best clinics providing better facilities and success rates for dialysis procedures.

Importance: The analysis will not only help evaluate the facilities and care provided to current CKD patients nation-wide but also help take preventable measures to reduce morality rate in the patients and increase success rate of the dialysis treatment. (Note: References mentioned at the end of the document.)

Objectives: The goal is to study patient characteristics, treatment patterns and patient outcomes for chronic dialysis patients. The research will also include trends of type of dialysis treatment opted by the patients nation-wide, compare the success rates and scores of clinics offering the procedure region-wise and overall scores. By identifying clinics that provide better treatment procedure we can improve the success rate region-wise and prolong the patient's survival rate.

The cost for providing care for patients on hemodialysis due to end stage kidney disease is high. Finding ways to improve patient outcomes and reduce the cost of dialysis is important. To ensure that proper care is offered nation-wide an annual survey and analysis is necessary. This could help improve the quality of treatment provided at the clinics.

Methodology: Methodology defines the methods and logic steps that will be taken to solve the project problem and to achieve proposed objectives.

SWOT Analysis:

Strength:

- Help build a better network of dialysis clinics nation-wide
- Strengthen the R&D for Renal Dialysis treatment with the help of collective patient database.
- Will help reduce the mortality rate in CKD patients

Weakness:

- Understanding the collective role of these parameters in determining outcomes for an individual patient and administering individualized treatments allowing specific interventions is a challenge. Individual patient survival may depend on a complex interrelationship between multiple demographic and clinical parameters, medications, medical interventions, and the dialysis treatment prescription.
- Find better clinics and better treatment measures for the patients.
- Sharing database and results of treatment will help speed the process of treatment.

Opportunities:

- Increase in reliability of patient care.
- Venturing into other verticals of healthcare will be easier
- Scope for globalizing and expanding the initiative world-wide.

Threats:

- Risk of increase in treatment costs
- The analysis is limited to a single nation hence the results cannot be globalized
- Environmental factors and other factors affecting the recovery progress of the patient could get ignored.

Submitted By Amruta Chavan

Dataset Links:

1) https://dialysisdata.org/content/dialysis-facility-report-data
2) https://catalog.data.gov/dataset/esrd-qip-dialysis-adequacy-payment-year-2015

References:

1) http://catalyst.nejm.org/the-big-business-of-dialysis-care/
2) http://www.medicalnewstoday.com/articles/152902.php
3) http://www.webmd.com/a-to-z-guides/kidney-dialysis#1
4) https://www.kidney.org/atoz/content/dialysisinfo
5) https://www.niddk.nih.gov/health-information/kidney-disease/kidney-failure/hemodialysis