CDI Patient Mortality Pathways

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DASH Data Analytics in Student Hands

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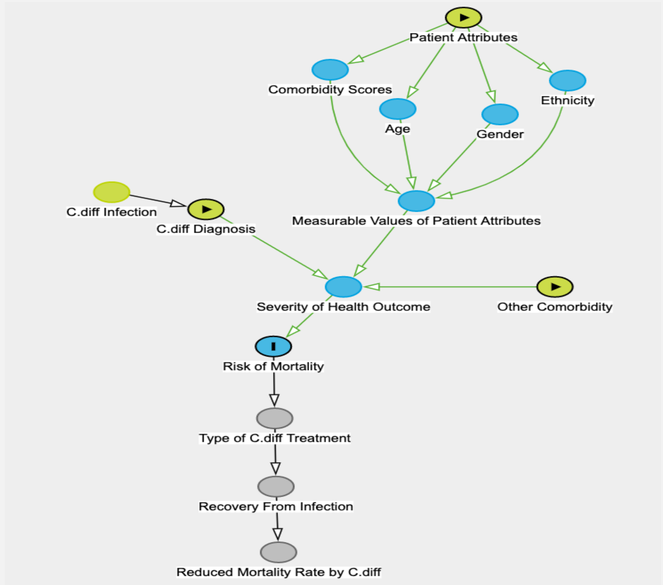
Introduction

Background

- C.difficile (CDI): Transmittable bacteria that causes symptoms ranging from diarrhea to life-threatening abdominal inflammation
- The Problem: There is no way to predict upon infection if a CDI patient is at a higher risk for mortality. This makes it difficult to provide effective treatment.
- How Can This Research Lead to Intervention: Clinicians will be able to provide more effective treatments at earlier stages of CDI based on patterns patients exhibit.

Directed Acyclic Graph (DAG):



- 3 causational variables determining severity of health outcome: CDI Diagnosis, Pattern of Patient Attributes, Other Comorbidities

Goals

- The research's goal is to look at the resulting health outcome within patients with CDI and other attributes they had to distinguish if patients with certain combinations of attributes were more likely to die post CDI diagnosis.
- To ensure observed attribute correlations were unique to CDI patients, attribute trends within CDI patients were compared against attribute trends within patients with other comorbidities and no CDI
- This study has thus far looked at attribute patterns of 2 other comorbidities: Liver Disease and Renal Disease

Methodology

The Idea

- Look at how patterns late patients with CDI exhibited stood out from patterns late patients with other comorbidities and no CDI exhibited
- Make attribute comparisons for each comorbidity on the Charlson Comorbidity Scale individually
- Identify type of patterns late patients with both CDI and the concerned comorbidity have that late patients with the concerned comorbidity and no CDI have

Patient Attributes Compared

- Age
- Ethnicity
- Charlson Weighted Comorbidity Score
- Gender

2 Primary Comparisons

1. Between CDI patients with Liver Disease that died within 30 days of CDI diagnosis and Liver Disease patients without CDI that have also died
2. Between CDI patients with Renal Disease that died within 30 days of CDI diagnosis and Renal Disease patients without CDI that have also died

3 Sets of Data Used from Humana

1. All claims of CDI patients that died within 30 days of CDI diagnosis
2. Claims of Liver Disease patients, without CDI, that had died
3. Claims of Renal Disease patients, without CDI, that had died

Number of Unique Patients per Dataset

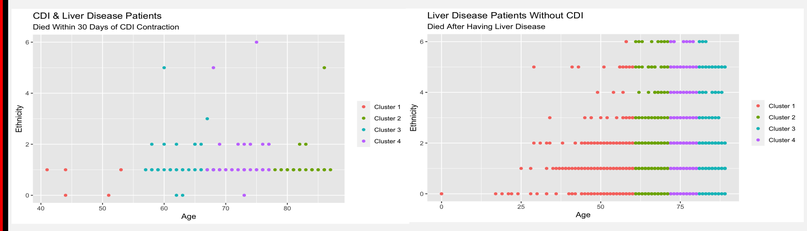
1. CDI Dataset: ~ 2,700 patients
2. Liver Disease Dataset: ~ 15,000 patients
3. Renal Disease Dataset: ~ 15,000 patients

Results

Attribute Comparison: Age vs Ethnicity

Ethnicity Legend:
0 – Unknown 1-White 2-Black 3-Other 4-Asian 5-Hispanic 6-N American Native

Liver Disease & CDI:



Renal Disease & CDI:

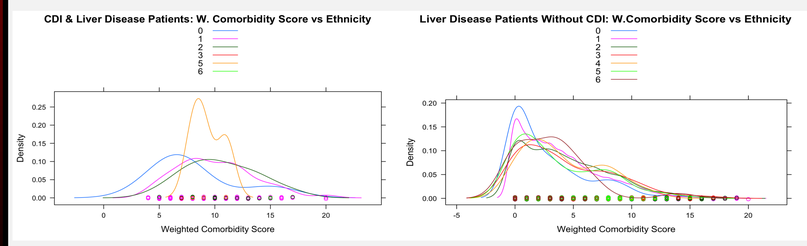
Unique CDI patient patterns exhibited from Liver Disease and Renal Disease patient comparisons

- White patients with CDI are more likely to suffer more adverse outcomes compared to other populations [higher frequency of infection / infection at a younger age]

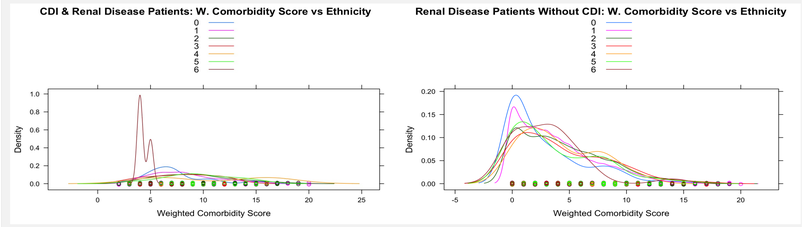
Attribute Comparison: Weighted Comorbidity Score vs Ethnicity

Ethnicity Legend:
0 – Unknown 1-White 2-Black 3-Other 4-Asian 5-Hispanic 6-N American Native

Liver Disease & CDI:



Renal Disease & CDI:



- Unique CDI patient patterns exhibited from Liver Disease and Renal Disease patient comparisons
  - ➢ Patients of all ethnicities with CDI are more likely to have higher comorbidity scores
  - ➢ A few ethnicities have a narrow pattern of scores → This is something to keep track of while comparing against all other comorbidity data

Attribute Comparison: Age vs Gender, Age vs Weighted Comorbidity Score

- No notable patterns were discerned amongst the groups of patients within these 2 attribute comparisons

Conclusion

Overall CDI Patient Patterns from First 2 Comorbidity Analyses

Ethnicity:
- The White population is affected the most by CDI irrespective of their comorbidity status

Age:
- Older patients with CDI are more likely to die except in conditions where ethnicity plays a role in risk of mortality

Gender:
- Males and females with CDI are equally affected

Weighted Comorbidity Score:
- Patients with CDI are more likely to have higher comorbidity scores

Future Work

- For now, only rough conclusions can be drawn on what patterns within CDI patients' attributes leads to a higher risk of mortality
- More conclusive results require similar attribute comparisons to be made with CDI patients and patients with other comorbidity diagnoses that have not been observed yet
- Conduct attribute comparisons for CDI patients and all other comorbidities on the Charlson Scoring Index

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