MSBA 7004 Operations Analytics

Group Assignment – Hospital Readmission Reduction Program

Patient readmissions—return visit to a hospital—is widely viewed as a negative sign for quality of health care. In the United Sates, since 2012, hospitals with excessive 30 day readmissions have been penalized under the Hospital Readmissions Reduction Program (HRRP) as mandated by the Affordable Care Act (ACA). The HRRP aims to incentivize hospitals to embrace efforts to reduce readmissions through improving patient care quality and transitions.

In general, the HRRP penalizes hospitals for excessive readmissions by adjusting Medicare (a type of government funded insurance) payments based on a ratio of excess readmissions. In fiscal year 2015, more than 2,610 hospitals were penalized a total of approximately $482 million for excess readmissions.

Despite these penalties, hospitals with excess readmissions may face the prospect of losing revenue from overall reduced inpatient volume from efforts to reduce readmissions. With the high proportions of patients being readmitted, these readmissions constitute a significant amount of Medicare revenue to these hospitals. This dilemma of avoiding the readmissions penalty versus the potential cost of reducing hospital volume and associated revenue may attenuate enthusiasm for readmission reduction efforts.

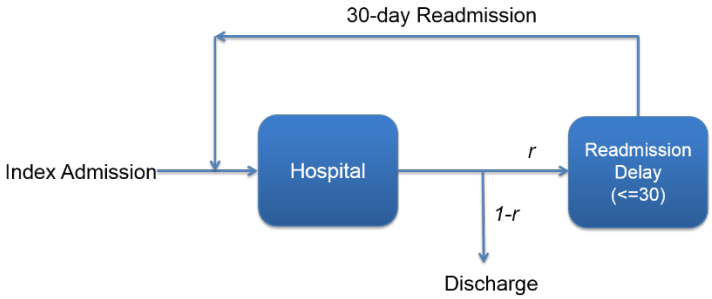
You are asked to examine through financial modeling the financial incentives of hospitals to engage in readmissions reduction efforts, considering both the HRRP penalty and the potential of loss of revenue from lower hospital patient volume. Specifically, you are asked to model hospitals as net income maximizers and link operational parameters to hospital financials.

According to the HRRP guideline, a hospital's excess readmissions penalty calculation is based on a risk-adjusted performance metric as the Excess Readmission Ratio, which is equal to Risk-adjusted Predicted Readmissions (RPR) divided by Risk-adjusted Expected Readmissions (RER). RPR can be viewed as a hospital's actual readmissions performance measure after adjusting for patient risk factors, while RER represents the benchmark (target) performance measure to which a hospital's RPR rate is compared. RER is an estimation of expected readmission performance of a national average hospital subject to the HRRP with the same patient risk factors as the evaluated hospital.

If the hospital's Excess Readmission Ratio exceeds 1, it incurs a financial penalty proportional to the level of excessiveness (Excess Readmission Ratio - 1) multiplied by the Centers for Medicare & Medicaid Services (CMS) payment for Medicare patients. However, the total readmissions penalty is limited to a maximum equal to a predetermined percentage of total Medicare payments the hospital receives for treatment. Within the HRRP policy the penalty cap is operationalized as being equal to 1 – Floor Adjustment Factor (FAF). Under the current structure, this penalty cap is set at 3% (FAF 0.97). Thus, a hospital receiving the full 3% penalty would receive payment equal to 97% of full possible Medicare payments.

Make the following assumptions to analyze whether a hospital would be incentivized to reduce readmissions:

1. Hospitals are revenue maximizers.
2. Do not consider the cost of reducing readmissions. (In reality, hospitals will have to make improvements/changes to their process to reduce readmissions which will cost them. We will not model these cost components in our analysis, but it should certainly be considered by the hospital manager when she is making a reduction decision.)
3. Hospital revenue is proportional to the patient volume.
4. Hospitals have two types of patients by whom they receive payment from: Medicare patients and private patients which hospitals are paid by CMS and private insurers respectively.
5. HRRP only affects Medicare payments and not private payments.
6. The payment amount (revenue) per patient is identical for Medicare and private patients. (Hint: Revenue can be normalized as a function of only patient volume and penalty structure. Exact payment per patient is not necessary for analysis.)
7. Readmission performance, RPR, is identical for both patient types.
8. If a hospital decides to reduce readmissions, it will reduce readmissions for both types by equal amount.
9. A hospital will not intentionally increase readmissions.
10. A hospital's patient treatment process with readmission rate, r, can be simplified as the following:



Questions

1. Mathematically state the objective of the hospital as a function of the relevant factors.
2. Graph hospital 50158 and 50245's normalized revenue as a function of readmission rate. And analyze whether the hospitals would be incentivized by the HRRP to reduce readmissions.
3. Assess the effectiveness of HRRP: analyze all 183 hospitals and report the effectiveness of HRRP in incentivizing hospitals to reduce readmissions. Visually present your findings in the most efficient way with managerial insights.

Report format:

For question 2, describe when a hospital is incentivized to reduce readmissions by the HRRP penalty. Report the two graphs and provide a concise description of your finding and compare the two hospitals. For question 3, submit the data file by appending a new column indicating whether a hospital is incentivized or not. Hint for visualizing your findings: what are the key parameters that affect hospital decisions. In the report, provide a summary of your findings including the percentage of hospitals incentivized to reduce readmissions. Strict 4-page limit excluding title page and appendix. Attach code (Python recommended) in appendix. Do not write the questions. Peer evaluation scores will be collected, and free riders will be penalized accordingly.

Data Dictionary:

1. County: County the hospital is located in.
2. HospitalID: Hospital identifier.
3. MedicareFr: Fraction of Medicare patients
4. RPR: Risk-adjusted Predicted Readmissions (in percentage)
5. RER: Risk-adjusted Expected Readmissions (in percentage)