Algorithmic Provider Attribution in Acute Care Encounters with Multiple Providers

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What might the attendee be able to do after being in your session?

Attendees of this session will be introduced to a best practice for provider attribution in acute care clinical settings. By combining sound sampling methods with sophisticated statistical techniques, an algorithm can be created to appropriately attribute a responsible provider to a specific encounter. This work informs performance improvement and enhanced accountability initiatives focused on reducing length of stay and improving physician communication composite HCAHPS scores.

Description of the Problem or Gap

Hospital and provider performance is commonly tracked and measured with data-driven scorecards. In a healthcare environment that relies on scorecards to manage and incentivize performance and payment, the way in which cases and encounters are attributed to specific providers becomes very important.

Historically, provider attribution has been based on the electronic health record (EHR) registration relationship between the provider and patient (e.g.: attending, discharge, etc.). This process often does not result in accurate attribution because many providers care for a patient during an encounter and the EHR relationship is frequently outdated or wrong. This leads to a provider being held responsible for an encounter that he or she has little influence over. Provider confidence in reportable metrics suffers when personal experience demonstrates flaws in attribution.

We sought to design and execute a provider attribution algorithm that was more accurate and fair for the hospital scorecard in our organization, which is used to monitor length of stay (LOS) and patient satisfaction through the HCAHPS physician communication composite score.

Methods

We defined the sample constraints as all inpatient service lines except behavioral health and patients discharged with a primary psychiatric diagnosis over the age of 18 years. The sample size was restricted to 200 cases due to the scarcity of manual chart abstractors with the necessary background (e.g. quality nurses and physician informaticists). To reduce potential resultant bias, great care and attention went into the design of a sampling algorithm that was as representative as possible (including geography, age, gender, service line, LOS, etc.). The chart abstractors used a standardized worksheet to review the chart, collect data, and assign a responsible provider. In tandem, data scientists used LASSO regression to identify features that best fit a model for LOS and patient satisfaction scoring. LOO cross validation was performed on the training dataset and a scoring run was executed on a holdout dataset.

Results

The new algorithm significantly improved physician attribution compared to the benchmark abstraction standard. We calculated a PPV of 65% (95% CI [55%, 74%]) with the EHR relationship method and a PPV

of 89% (95% CI [82%, 95%]) with the algorithmic method. The algorithmic method examined multiple provider-patient touch points, increasing the likelihood that the attributed provider was responsible for the encounter.

The selection and use of a LASSO regression model was important for several reasons. First, penalized regression reduces the variance of predictive error. It is a better choice for feature selection when there are many predictors and a relatively small number of cases (Thirty variables were tested in the original model.). Finally, the limited final selection of contributing variables helped us communicate the attribution logic with hospital providers along with the validated score from the algorithm.

Discussion of Results

The addition of multiple variables into the predictive model significantly improved the performance of the *Smart Physician Attribution*© (SPA) algorithm, raising the PPV from 65% to 89% compared to the existing process of manual abstraction.

Training and process improvement resources can be better allocated by focusing interventions on the providers most responsible for the episode of care. We have developed a more reliable and fair method of assigning provider attribution regardless of the EHR registration information.

Conclusion

The *Smart Physician Attribution*© (SPA) algorithm improved the predictive value of assignment of an encounter to the responsible party. This greatly increases the specificity of the process that addresses outcome measurement of the responsible provider. Our future work involves re-validating the performance of the algorithm with the addition of data from over 80 facilities after a large system merger.

Attendee's Take-away Tool

We recommend that organizations producing and tracking provider behavior on a scorecard use an algorithm to improve provider attribution. This ensures that efforts made to improve performance are targeted fairly at the responsible provider.