Predictors of all cause 30-day readmission among type II diabetic Medicare Advantage members

Background
Close to one fifth of Medicare members who are hospitalized will experience a 30-day readmission. Readmission is costly among Medicare members with type II diabetes (T2DM), and identifying patients at high risk for readmission may be useful for targeting readmission reduction programs.

Objective
To develop a claims-based algorithm to predict all cause 30-day readmissions among Medicare Advantage Prescription Drug plan members with T2DM.

Methods
This was a retrospective study using administrative claims data from 1/1/2012 through 1/1/2014 from a cohort of Medicare Advantage Prescription Drug plan members with T2DM, aged 18-89 with ≥12 months’ continuous enrollment before an unplanned hospitalization and ≥1 month of continuous enrollment post discharge. Patients in long term care ≥30 days prior were excluded. Multivariate logistic regression was used to predict the likelihood of all cause 30-day readmission following hospitalization in 2013. The final analytic file was randomly split into a training dataset to build the model and test dataset to validate results. Candidate variables included provider and patient demographics, baseline clinical conditions, and health care utilization metrics. Baseline clinical conditions were classified using the healthcare cost and utilization project (HCUP) clinical classification system (CCS) for ICD-9-CM.

Results
Of 61,237 individuals, 10,783 (17.1%) experienced an all-cause 30-day readmission. Females had lower likelihood of readmission. Older age, number of emergency room visits and total cost of care in the hospitalization were associated with higher likelihood of readmission. Comorbidities that were postively associated with higher levels of readmission included diagnoses of the urinary system, fluid and electrolyte disorders, diagnoses of white blood cell disorders, other nervous system disorders, renal failure, gastrointestinal hemorrhage, heart, liver, and other respiratory diagnoses and other unspecified conditions. Among the nearly 300 candidate variables, 35 were predictors of 30-day readmission. The final model demonstrated good discriminatory ability (c-statistic = 0.823).

Conclusions
Provider characteristics did not appear to influence the likelihood of all cause 30-day readmission. Certain patients’ clinical and demographic characteristics and healthcare utilization were associated with higher likelihood of readmission, and results in an algorithm with good discriminate ability that could target readmission reduction programs.

Figure 1. Patient Selection

Figure 2. Baseline Clinical Characteristics

Table 1. Characteristics at 30 days Readmission

Table 2. Baseline Clinical Characteristics

Table 3. Predictors of 30-day Readmissions

Table 4. Predictive Model Characteristics

Discussion
The model identified a number of factors significantly predicting readmission within 30 days. Female gender was a predictor of a lower likelihood of readmission. Age was generally linear, with increasing age also increasing the likelihood of 30-day readmission. The significant quadratic function of the number of ER visits demonstrated that the likelihood of 30-day readmission increases at a decreasing rate.

Limitations
Limitations include lack of certain information in the database and error in claims coding. This study used data from Humana members only, thus the results may not be generalizable to populations outside of Humana.

Conclusion
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