A Predictive Model for Decreasing Clinical No-Show Rates in a Primary Care Setting

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A Predictive Model for Decreasing Clinical No-Show Rates in a Primary Care Setting

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Background

A challenging obstacle to primary care delivery in the United States (US) is patient no-shows or missed appointments.
- No-show rate in can vary from 5.5% to 50%.1–6
- Loss to revenue from a no show rate of 5.5% was salary of three nursing staff1
- Requires tailored prediction tool to target reduction strategies efficiently5
- Solutions: phone reminders3, automated phone reminders3, text messages5, exit interviews10, fee3,11, overbooking12–14, predictive modeling15–20, and predictive modeling with overbooking21–30

Problem Statement

The clinical no-show rate is a cause of lost productivity in primary care, predictive models may help reduce the rate.

Methods

An IRB approved study was conducted to retrospectively develop a predictive model and prospectively test the model.
- Staff interviews and process mapping defined the problem.
- Patient visits from 2014–2015 were analyzed with regression using STATA 13
- Variables included month, day, age, gender, race, ethnicity, insurance type, visit type, and number of previous no shows
- A threshold for classifying no shows was determined using a histogram
- The model was tested on patient visits in 2016 with sensitivity, specificity, and receiver operating characteristic (ROC) curve calculated
- The model was used to simulate overbooking by visit day on the prospective sample

Results

6,758 patient visits were analyzed with probit regression.
- Significant variables included: 18 to 25 years of age, 36 to 39 years of age, check up visits, no insurance, and two previous no-show visits.
3,571 patient visits were used to test the model
- Model performed at 47% sensitivity and 79% specificity
- Simulated predictive overbooking resulted in 3.67 vs. 6.87 unused appointments, p<0.000 (mean diff 3.2, 95% CI, 2.9 to 3.5). Visit utilization increased from 69% with normal scheduling to 82% with predictive overbooking.
- The receiver operating characteristic (ROC) curve area under curve (AUC) was 0.72 (95% CI, 0.69 to 0.76) for the model and 0.70 (95% CI, 0.65 to 0.74) for predicted visits.

Discussion

Age, visit type, insurance status, and two previous no show visits were significant in our model.
- Previous research is mixed on age and insurance status6,31
- No association between no shows and race or gender which conflicts previous research19,20
- Predictive modeling with overbooking has not been studied in single physician practices, but is effective21–30
- Visits for chronic illness or hospital admissions have higher no show rates32
- SELECT: Leadership and knowledge of health systems with technology can improve practice efficiency while emphasizing improved patient care as it relates to chronic illness and hospital follow ups.

Conclusions

It is possible to develop a predictive model for no shows for clinics as small as single physician practices.
- Some significant variables were similar to prior research, however, others differed.
- Predictive modeling in conjunction with overbooking may provide an opportunity to mitigate the effect of no shows.
- SELECT tools would be necessary to balance staff wellness, patient care, and revenue goals

REFERENCES

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