

Development and Implementation of a Predictive Model of Hospitalization Risk among Pediatric Home Care Patients



Daniel Kurowski¹, David Russell¹, Tasha Hamilton¹, Rocco Napoli², Robert Rosati³

PREDICTIVE models of hospitalization risk can be used to identify patients who may benefit from more intensive services and transitional care interventions. Previous work on predictive hospitalization risk models for adult home care patients has been undertaken. The aim of this presentation is to describe the development and implementation of a predictive model of hospitalization risk for a pediatric homecare population using information collected at the start of home care. We examined a range of demographic and clinical characteristics including: referral source, prior admission status, the presence of a complex chronic condition, self-rated general health, the use of therapy equipment, and prescription medications.

Methods: We conducted a retrospective observational study of pediatric home care patients who were served by a large, urban, not-for-profit home healthcare agency and who were admitted and discharged from 2008 to 2011 (N=14,216). Information was obtained from patient intake, clinical assessment and medication history databases. We employed a logistic regression model with backward selection to examine the demographic and clinical characteristics associated with hospitalization within 60 days of admission to home care. Predicted probabilities were calculated from the model and used to estimate each patient's level of hospitalization risk. Concordance between predictive model scores and judgments of hospitalization risk made via chart reviews by three clinical nurse specialists was evaluated using Cohen's kappa statistic.

Results: A number of clinical factors were found to be significantly associated with hospitalization, including: the presence of a complex chronic condition, use of medical therapy equipment (oxygen, IV/infusion therapy, and enteral/parenteral nutrition), fair or poor self-rated health, and prescriptions within certain therapeutic classes of medications (i.e. ulcer medications, psychotropic medications, anticonvulsants, anti-nauseates, penicillins, hematinics, and sedative barbiturates). We also identified service characteristics that were significantly associated with hospitalization risk, including: referral from the hospital, a prior history of home care service, and enrollment in a managed care insurance plan. Patients with the highest predicted level of risk had a hospitalization rate of 28.7% compared to a hospitalization rate of 1.2% among patients with the lowest predicted level of risk. Results from the model validation indicated a moderate level of agreement between the predictive model and the nurse specialist's risk judgment (Cohen's kappa=0.44); reasons for moderate agreement will be reviewed in detail. Hospitalization risk scores for newly admitted patients are disseminated to supervisors once a week via e-mail using an automated SAS program.

Discussion: Our findings suggest that information collected at the start of home care can be used to identify pediatric patients who have a greater risk of hospitalization. In our population of pediatric patients, 63% of hospitalized home care patients were discharged to the hospital within 14 days of admission to home care. Special attention must be paid to the information technology (IT) requirements associated with moving data into an analytic warehouse that is capable of processing and returning a risk score. IT applications that reduce the lag time between assessment and processing may be useful to home care organizations.

Conclusion: The use of data-driven risk measures can be used to assist administrative staff in managing clinical resources for pediatric home care patients, however, special attention should be made to ensure timely dissemination. Further research is needed to evaluate whether strategies implemented to mitigate risk factors are effective in reducing hospitalization rates among this population.

¹Visiting Nurse Service of New York

²CenterLight Healthcare

³VNA Health Group