

Error Analysis of Machine Learning Predictions on Asthma Hospital Encounters

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Rationale: To guide the allocation of finite preventive care resources for asthma management, we recently developed the world's most accurate machine learning model to predict which asthmatic patients will have poor outcomes of incurring asthma hospital encounters (AHEs) in the following 12 months, where an AHE is an emergency department visit or an inpatient stay for asthma. In this abstract, we present an error analysis of our model's predictions.

Methods: The patient cohort included all 14,644 adult asthmatic patients at the University of Washington Medicine (UWM) in 2018. We used the prescription of systemic corticosteroids in the following 12 months, encounters of any type for asthma exacerbations in the following 12 months, and AHEs between the following 13-24 months as surrogates of poor outcomes in the following 12 months. For each patient whom our model incorrectly predicted to experience ≥ 1 AHE in 2019, we used administrative and clinical data in the UWM enterprise data warehouse to assess whether the patient had any surrogate of a poor outcome.

Results: Our model incorrectly predicted that 1,310 adult asthmatic patients would experience AHEs in 2019. Among these patients, 316 were prescribed systemic corticosteroids in 2019, 126 had encounters for asthma exacerbations in 2019, and 18 experienced AHEs in 2020. In total, 358 patients (27.3%) had ≥ 1 surrogate of poor outcomes.

Conclusions: A large percentage of adult asthmatic patients for whom our model's predictions were false positives had surrogates of poor outcomes and were reasonable candidates for receiving preventive interventions.