

Development of a Predictive Model for Hospital Admissions by Utilizing Frequencies of Specific CEDIS Presenting Complaints

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Introduction

With hospital occupancy rates frequently approaching 100%, even small variations in daily admission numbers can have a large impact. The ability to predict variance in emergency admission rates would provide administrators with a significant advantage in managing hospital daily bed requirements.

There is a growing interest in patterns of hospital admissions, and many EDs utilize historical admission patterns to attempt to predict daily bed requirements. Previous studies have utilized patient demographics and past medical history to develop an admission likelihood model. We wished to examine the predictive strength of individual CEDIS presenting complaints (PC) on admission likelihood.

Methods

Using a database analysis of over 285,000 ED presentations (2013-2017), we calculated visit frequencies and admission rates by PC. Using a logistic regression analysis PCs were ordered from high to medium predictive strength.

Results

Of 285,155 presentations, there were 38,090 hospital admissions, a rate of 13.36%. Based on the number of visit frequencies and admission rates, the PCs demonstrating high predictive strength were Direct Referral (effect = 0.36, binomial CI: 0.28 to 0.44); Shortness of Breath (0.32: 0.26 to 0.41); General Weakness; Weakness/Query CVA; & Chest Pain Cardiac Features (each 0.30: 0.25 to 0.42); Altered level of consciousness (0.24: 0.16 to 0.31); and Confusion (0.18: 0.08 to 0.26). With our sample size, all remaining CEDIS PCs had low predictive value (the effect is < 0.1), or were not predictive at all.

Conclusion

We have demonstrated that, for our population, certain PCs are associated with an increased likelihood of admission and have quantified this effect using logistic regression analysis. Variance from the average daily admission rate may be predicted, in our population, by identifying these PCs at registration.

We plan to develop a tool, based on this data and implemented at registration, to predict cumulative likely daily admission requirements as patients present over a 24hr period.