Further Limitations of the HOSPITAL Score in US Hospitals

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To the Editor

We congratulate Donzé and colleagues on their large, multicenter, international study[1] validating the HOSPITAL score for predicting readmissions, an important topic. However, there are some potential limitations worth considering that may reduce the usefulness of HOSPITAL in real world practice.

First, the authors report the predictive accuracy of the HOSPITAL score for predicting potentially avoidable 30-day readmissions, which is inconsistent with the definition of readmissions in the United States subject to financial penalties under the Hospital Readmissions Reduction Program. Further, the SQLape tool used to identify avoidable readmissions is proprietary and has only been validated in Switzerland.[2] Preventable readmissions in the United States are highly related to health systems–level factors[3] that are likely to be different in the United States vs other countries. Given the uncertainty of whether these readmissions were truly preventable, it would be interesting to know the C-statistic and calibration of the HOSPITAL score for predicting all unplanned readmissions—the primary policy metric in the United States. In a diverse cohort of 16 430 medicine patients from 6 US hospitals, we found the HOSPITAL score had a modest C-statistic of 0.64 for predicting all unplanned 30-day readmissions and did not perform as well as other models, including the LACE index.[4]

Second, the HOSPITAL score cannot be calculated until discharge. Over half of potentially preventable readmissions in the United States are owing to gaps in care during hospitalization.[3] Accordingly, the most effective transitional care interventions are initiated well before discharge.[5] To circumvent this limitation, Donzé and colleagues[1] suggest using the 3 HOSPITAL elements available on admission for earlier risk stratification, but the validity of this approach was not assessed. We found that predicting readmissions using electronic health record data available on admission works nearly as well as using data from the entire hospitalization.[4]

Finally, Donzé and colleagues propose that the HOSPITAL score be implemented to allow targeted intervention of high-risk patients. However, the proposed high-risk score of greater than or equal to 7 has a likelihood ratio of 2.3,[1] meaning that such a score only modestly

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increases readmission risk. This is also true of our electronic health record–based models that had comparable likelihood ratios of 2.4 despite better discrimination and calibration.[4] Readmissions prediction modeling may be reaching the maximum achievable performance using hospital-based electronic health record data. Better prediction will likely require integration of more data, despite the desire for parsimony. Much of the unexplained variation in risk is likely owing to patient, system, and community factors not captured in electronic health records.

References

1. Donzé JD, Williams MV, Robinson EJ, et al. International validity of the HOSPITAL score to predict 30-day potentially avoidable hospital readmissions. JAMA Intern Med. 2016; 176(4):496–502. [PubMed: 26954698]

2. Halfon P, Eggli Y, Prêtre-Rohrbach I, Meylan D, Marazzi A, Burnand B. Validation of the potentially avoidable hospital readmission rate as a routine indicator of the quality of hospital care. Med Care. 2006; 44(11):972–981. [PubMed: 17063128]

3. Auerbach AD, Kripalani S, Vasilevskis EE, et al. Preventability and causes of readmissions in a national cohort of general medicine patients. JAMA Intern Med. 2016; 176(4):484–493. [PubMed: 26954564]

4. Nguyen OK, Makam AN, Clark C, et al. Predicting all-cause readmissions using electronic health record data from the entire hospitalization: model development and comparison. [published online February 29, 2016]. J Hosp Med. 2016; doi: 10.1002/jhm.2568

5. Rennke S, Nguyen OK, Shoeb MH, Magan Y, Wachter RM, Ranji SR. Hospital-initiated transitional care interventions as a patient safety strategy: a systematic review. Ann Intern Med. 2013; 158(5 Pt 2):433–440. [PubMed: 23460101]