LETTER TO THE EDITOR

Interpretation of the C-Statistic in the Context of ACS-NSQIP Models

TO THE EDITORS:

Borja-Cacho et al., in their report “Assessment of ACS NSQIP’s Predictive Ability for Adverse Events After Major Cancer Surgery,” evaluate the ability of ACS NSQIP to predict patient level outcomes after six major cancer operations.¹ They conclude that “ACS NSQIP variables show low predictive ability for adverse operative events after major oncologic resections” based on logistic model c-statistics that are moderate. However, their conclusions might not be justified in the context of ACS NSQIP programmatic objectives.

First, the c-statistic is not the only, or the ideal, metric upon which to judge such models. Although commonly used to assess logistic regression-based modeling, the c-statistic is a limited measure of discrimination, not calibration.² Conceptually, it quantifies a model’s ability to discriminate events from nonevents while considering patient “noise” but does not necessarily evaluate how well-observed and predicted values correlate. It is inappropriate to judge the ability of ACS NSQIP to assess cancer outcomes solely on the c-statistic.

Second, their report should be considered in the context of ACS NSQIP’s objective: to provide a robust data collection platform that permits hospitals to be fairly compared. If one selects a focused subset of patients based on type of, and indication for, operation performed, as did Borja-Cacho et al., then between-patient noise will likely decrease, the model c-statistic could approach 0.5 (randomness), and the need to risk-adjust at the patient level

could diminish. Low c-statistics can be a reflection of low patient level variability or low explanatory power of a model, and therefore, it could be incorrect to suggest that the only potential and necessary solution is to increase the number of variables collected. Evaluating ACS NSQIP on logistic regression analysis and limited model diagnostics, such as the c-statistic alone, overlooks the program’s overarching purpose of hospital level assessment and improvement.

Borja-Cacho and colleagues attempted to address an important question of how ACS NSQIP can be used for oncology. We thank the authors for raising the profile of these issues and congratulate them on their work. However, we are concerned that their conclusions might not be justified. Furthermore, some of the shortcomings of the program that are pointed out have been well known and are already targeted for improvements. The new ACS NSQIP platform is customizable and will be able to provide uniquely valuable risk-adjusted oncology-specific outcomes to hospitals.

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REFERENCES

1. Borja-Cacho D, Parsons HM, Habermann EB, et al. Assessment of ACS NSQIP’s predictive ability for adverse events after major cancer surgery. *Ann Surg Oncol*. 2010;17(9):2274–82.
2. Cook NR. Use and misuse of the receiver operating characteristic curve in risk prediction. *Circulation*. 2007;115(7):928–35.