quality summary scores. Thus, higher SSI scores may not truly reflect poor quality of care and may instead be indicative of the measurement bias and validity issues that have been previously suggested for other HAC program component measures.

There are several possible explanations. First, surveillance bias can result from variability in institutional clinical practices regarding the threshold at which potentially infected wounds are opened or cultured. Second, the different data collection methods used by hospitals reporting to the Centers for Disease Control and Prevention National Healthcare Safety Network may lead to hospital-level variation in event capture. Hospitals using an electronic surveillance system, which triggers review by an infection preventionist when a possible infection is detected, may uncover more events than would a manual review. These differences may be compounded by infection preventionists’ variable experience, workload, and auditing practices. Moreover, 38% of National Healthcare Safety Network–enrolled facilities do not have an infection preventionist, which may lead to hospital-level variation in detection. Hospitals may also fail to report events in a standardized fashion with strict adherence to the abstraction guidelines. Increased documentation when trainees are involved may also partly explain the higher rates of identifying events among teaching hospitals.

Third, although these SSI measures are risk-adjusted for limited patient and procedure characteristics, the adjustment is likely inadequate, potentially resulting in hospitals that treat sicker patients being incorrectly categorized as poor performers.

Implementing more rigorous surveillance and data abstraction standards and requiring formal audit programs to ensure standardized coding may help to address some of these factors. Furthermore, changes to the measures’ risk adjustment should be expanded to include hospital case mix, patient comorbidities, and other relevant procedural factors. It is possible that our findings reflect a lack of a conceptual link between Centers for Medicare and Medicaid Services’ definition of high-quality care and hospital characteristics that affect performance on various measures. Still, the paradoxical relationship between SSI measure performance and hospital quality warrants reconsideration of the addition of the current SSI measures to the HAC Reduction Program in federal fiscal year 2016.

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Obtained funding: Bilimoria.

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Conflict of Interest Disclosures: Dr Bilimoria received honoraria from hospitals and professional societies for clinical care and quality improvement research presentations. No other disclosures are reported.

Funding/Support: Dr Bilimoria has received support from the National Institutes of Health, the Agency for Healthcare Research and Quality, the American Board of Surgery, the American College of Surgeons, the Accreditation Council for Graduate Medical Education, the National Comprehensive Cancer Network, the American Cancer Society, the Health Care Services Corporation, the California Health Care Foundation, Northwestern University, the Robert H. Lurie Comprehensive Cancer Center, the Northwestern Memorial Foundation, and Northwestern Memorial Hospital.

Role of the Funder/Sponsor: These funding sources had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.


Association of DiaRem Score With Cure of Type 2 Diabetes Following Bariatric Surgery

There is great anticipation for the predicted impact that the Precision Medicine Initiative will have on health outcomes. However, we do not need to wait to sequence the DNA of the proposed 1 million–person cohort for this initiative; we can make significant strides in improving the precision of care delivery now. There are sufficient data in existing electronic health record systems that can be used to facilitate tailored treatment decisions. For example, the DiaRem score, a validated...
score generated from data readily available in the medical record, can be used for patients with type 2 diabetes to predict whether bariatric surgery will lead to short-term remission of diabetes.2,4,5 Herein, we examine whether this score can be used to predict patients for whom bariatric surgery will result in cure of type 2 diabetes.5

Methods | We conducted electronic health record reviews up to 8 years after Roux-en-y gastric bypass (RYGB) surgery at Geisinger Medical Center for 407 patients with type 2 diabetes. These patients had RYGB surgery between June 2001 and December 2010. We conducted data analysis in October 2015. The sample was a subset of patients from the original validation study of DiaRem who had at least 5 years of electronic health record data postoperatively.2 For each patient, we determined their preoperative DiaRem score (a weighted score, ranging from 0-22 points, based on age, insulin dependence, diabetes medication use, and hemoglobin A1c [HbA1c] level) and the extent of their diabetes remission based on American Diabetes Association criteria after RYGB surgery.2,5 (Table). Complete remission was defined as return to normal glycemic measures (HbA1c level <5.7% of total hemoglobin [to convert to proportion of total hemoglobin, multiply by 0.01]; fasting glucose level <100 mg/dL [to convert to millimoles per liter, multiply by 0.0555]) and no treatment for 1 year.5 Patients were classified as cured if complete remission lasted at least 5 years, based on a published consensus statement.5 Partial remission was defined as hyperglycemia below diagnostic thresholds for diabetes (HbA1c level <6.5% of total hemoglobin; fasting glucose level <125 mg/dL) and no active treatment or procedures for 1 year.5 Patients were classified as having prolonged partial remission if partial remission lasted at least 5 years.5 Patients were stratified into groups by DiaRem score (scores of 0-2, 3-7, 8-12, 13-17, and 18-22 points). The percentage of patients within each stratum who were cured and who achieved prolonged partial remission were compared using Cochran-Armitage trend tests. This study was approved by the Geisinger Institutional Review Board and participants provided written informed consent.

Results | The 407 patients who underwent RYGB (mean [SD] age, 51.1 [9.5] years; 75% female) had a median follow-up of 7.1 years (interquartile range, 5.8-8.0 years) (Table). Of the 407 patients, 144 (35%) experienced 1 or more years of complete remission and another 97 (24%) had partial remission lasting at least 1 year. Cure of diabetes was found in 83 patients (20%), and another 102 (25%) had prolonged partial remission. For remissions of any duration, the proportion of patients achieving remission decreased as DiaRem scores increased (P < .001) (Figure). Among the 100 patients with a score from 0 to 2, 82 (82%) experienced prolonged partial remission compared with none of the 33 patients with a score of 18 or higher. Fifty of the 100 patients (50%) with a score of 0 to 2 were cured of diabetes compared with none of the 33 patients with a score of 18 or higher.

Discussion | Precision medicine does not have to be complicated. The DiaRem score is an algorithm based only on age, medication use, and HbA1c level that can predict the likelihood that a patient with type 2 diabetes will be cured by surgery. We previously demonstrated that the DiaRem score predicts remission lasting at least 12 months. However, more than one-third of patients with remission will have relapse within 5 years. We now show that the DiaRem score predicts who will be cured by surgery, defined as complete remission lasting at least 5 years. The recent efforts to build larger cohorts, gather more data, and develop new analytical capabilities do not preclude continued exploration into how existing data assets can be used to improve the precision of care today.

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COMMENT & RESPONSE

Question About the Analysis of Missing Data and Identification of an Error

To the Editor We read the study by Li et al1 with great interest and have been inspired to consider new prophylactic strategies against Clostridium difficile infection because the surgical patients in our departments are similar to those in their study. However, we have 2 questions for the authors.

First, the authors mentioned that missing data on preoperative demographics and clinical characteristics in the Veterans Affairs Surgical Quality Improvement Program were rare, but item 12(c) in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement recommends that one should “explain how missing data were addressed.”2(p346) Precisely how much data were missing? We would like to know whether these missing data had the prior condition for multiple imputation3 and why they were missing.

REFERENCE