

Predicting Hospital-Associated Mortality for Medicare Patients

A Method for Patients With Stroke, Pneumonia, Acute Myocardial Infarction, and Congestive Heart Failure

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We created a microcomputer-based system that uses characteristics of the patient at admission to predict death within 30 days of hospital admission for Medicare patients with stroke, pneumonia, myocardial infarction, and congestive heart failure. These conditions account for 13% of discharges and 31% of 30-day mortality for Medicare patients over 64 years of age. The system was calibrated on a stratified, random sample of 5888 discharges (about 1470 for each condition) from seven states, with stratification by hospital type to make the sample nationally representative. The predictors must be specially abstracted from the medical record. The cross-validated R^2 for predictions is 0.14 to 0.25, which is better than the values for other systems for which we have data. Risk-adjusted predicted group mortality rates may be useful in interpreting information on unadjusted mortality rates, and patient-specific predictions may be useful in identifying unexpected deaths for clinical review.

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RELEASE of hospital mortality data by the Health Care Financing Administration (HCFA), state organizations,

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and private groups is forcing physicians and hospitals to evaluate whether mortality rates provide clues to the effectiveness of hospital care. So far, however, these rates have been difficult to interpret because they derive wholly from administrative data and contain little adjustment for the clinical condition of patients on admission. Several commercially available systems (APACHE II, Computerized Severity Index, and MedisGroups)¹ are designed to predict relative risk of death, but they are not calibrated to produce abso-

lute estimates of likelihood of death; moreover, APACHE II and MedisGroups are not disease-specific, and the Computerized Severity Index is in very limited use. More recently, Kahn and colleagues² developed disease-specific risk adjustment instruments as part of a study of the impact of the Medicare prospective payment system on quality of care, but data collected with these instruments have been only partially analyzed. On the basis of their work, Kahn's

See also pp 3611 and 3625.

collaborator Brook suggested that the HCFA create instruments to help hospitals estimate expected mortality for patients with a few conditions; the HCFA and the Health Data Institute (HDI) then convened a series of expert panels (see acknowledgments) and designed this study.

The following report and a companion article³ describe the Medicare Mortality Predictor System (MMPS), a microcomputer-based system developed under a cooperative agreement between the HCFA and HDI to produce predicted mortality rates that are adjusted for

