

## AMERICAN COLLEGE OF CARDIOLOGY

The 37th Annual Scientific Session will take place in Atlanta, March 27-31. Contact Meeting Services, American Coll. of Cardiology, 9111 Old Georgetown Rd., Bethesda, MD 20814; or call (800) 253-4636 (natl.), or (301) 897-5400 (Md. and Alaska).

## NEW YORK UNIVERSITY MEDICAL CENTER

The following programs will take place: "Anesthesiology Comprehensive Review VIII" (March 13-18); "Seminar in Advanced Rheumatology" (March 14-18); and "Emergency Medicine Board Review" (Tuesdays, March 29-Nov. 1).

Contact NYU Medical Ctr. Post-Grad. Medical School, 550 1st Ave., New York, NY 10016; or call (212) 340-5295.

## CORRECTION

Impaired Forearm Vasodilator Reserve in Patients with Microvascular Angina: Evidence of a Generalized Disorder of Vascular Function? (November 26, 1987; 317:1366-70). In the abstract, on page 1366, the first sentence of the second paragraph should have read, "After 10 minutes of ischemia, peak forearm flow was  $39.9 \pm 5.0$  ml per minute per deciliter in the controls and  $31.7 \pm 10.5$  in the patients. . . ." We regret the error.

## SPECIAL REPORT

## HOSPITAL INPATIENT MORTALITY

## Is It a Predictor of Quality?

**Abstract** Various potential measures of quality of care are being used to differentiate hospitals. Last year, on the basis of diagnostic and demographic data, the Health Care Financing Administration identified hospitals in which the actual death rate differed from the predicted rate. We have developed a similar model. To understand why there are high-outlier hospitals (in which the actual death rate is above the predicted one) and low-outlier hospitals (in which the actual death rate is below the predicted one), we reviewed 378 medical records from 12 outlier hospitals treating patients with one of three conditions: cerebrovascular accident, myocardial infarction, and pneumonia.

After adjustment for the severity of illness, the death rate in the high outliers exceeded that predicted from the severity of illness alone by 3 to 10 percent, and in the low outliers, the actual death rate fell short of the severity-adjusted predictions by 10 to 15 percent ( $P < 0.01$ ). Reviews of the process of care using 125 criteria revealed no differences between the high and low outliers. However, detailed reviews by physicians of the records of patients who died during hospitalization revealed a higher rate of preventable deaths in the high outliers than in the low outliers. For the three conditions studied, we project that 5.7 percent of a standard cohort of patients admitted to the high-outlier hospitals would have preventable deaths, as compared with 3.2 percent of patients admitted to the low-outlier hospitals ( $P < 0.05$ ).

A meaningful comparison of hospital death rates requires adjustment for severity of illness. Our findings indicate that high-outlier hospitals care for sicker patients. However, these same hospitals or their medical staffs may also provide poorer care. Our results need confirmation before death-rate models can be used to screen hospitals.

DEATH rates among hospitalized patients have increasingly been used to compare hospitals and set policy. Some authors have used them to argue for regionalization of procedures, citing data indicating that hospitals performing a large number of a specified procedure have lower death rates after the procedure than do hospitals performing a small number.<sup>1-7</sup> Others have suggested that hospital death rates may be a useful screening tool for identifying hospitals that provide inadequate care.<sup>8-11</sup>

In part, hospital death rates have become popular as potential indicators of quality because they are available. Unadjusted hospital death rates, however, may chiefly reflect differences in the mix of patients admitted — not differences in the quality of care. For this reason, a variety of models have been developed to adjust a hospital's death rate for its patient mix. Drawing on information in computerized data bases, these models typically account for differences in patients' demographic and diagnostic characteristics but do not correct for differences in the severity of illness or comorbidity.<sup>8,10,11</sup> These models produce an expected death rate for each hospital, that can be compared with its actual death rate.

How should we view hospitals that according to these models have death rates much higher or lower than expected? Do the hospitals with death rates that are higher than expected provide lower-quality care, or do they care for a group of patients who are sicker than average but whose sickness is not adequately reflected by the variables in the model? Are discrepancies in the coding of diagnoses or errors in the data base the source of the apparent differences in hospital mortality? The answers to these questions will determine whether death-rate models can appropriately be used as indicators of hospital quality.

Using multiple regression, we recently developed a model that predicts inpatient mortality rates.<sup>12</sup> It was based on 205,000 patient discharges from all 93 hospitals in one investor-owned chain. The model had four independent variables (the percentage of patients older than 70 years, percentage of admissions from the emergency department, percentage of admissions from nursing homes, and hospital case-mix index) and accounted for 64 percent of the variance in hospital death rates. The model identified 11 hospitals in which the observed death rate exceeded the expected death rate by more than 2 SD (high outliers). At nine hospitals, the expected death rate exceeded the actual death rate by a similar margin (low outliers).

In this study, we used clinical data from medical records to assess the quality of care provided by a sample of the outlier hospitals and the severity of illness of the patients admitted to them. Our purpose was to compare the results of the assessments of the medical records with the predictions based on the death-rate model and to comment on the value of using data on in-hospital patient mortality as a screening tool to identify hospitals whose medical or nursing staffs provide inadequate care.

