

Changes in Sickness at Admission Following the Introduction of the Prospective Payment System

Emmett B. Keeler, PhD; Katherine L. Kahn, MD; David Draper, PhD; Marjorie J. Sherwood, MD; Lisa V. Rubenstein, MD, MSPH; Ellen J. Reinisch, MS; Jacqueline Kosecoff, PhD; Robert H. Brook, MD, ScD

We developed disease-specific measures of sickness at admission based on medical record data to study mortality of Medicare patients with one of five conditions (congestive heart failure, acute myocardial infarction, cerebrovascular accident, pneumonia, and hip fracture). We collected an average of 73 sickness variables per disease, but our final sickness-at-admission scales use, on average, 19 variables. These scales are publicly available, and explain 25% of the variance in 30-day postadmission mortality for patients with acute myocardial infarction, pneumonia, or cerebrovascular accident. Sickness at admission increased following the introduction of the prospective payment system (PPS). For our five diseases combined, the 30-day mortality to be expected because of sickness at admission was 1.0% higher in the 1985-1986 period than in the 1981-1982 period (16.4% vs 15.4%), and the expected 180-day mortality was 1.6% higher (30.1% vs 28.5%). Studies of the effects of PPS on mortality must take this increase in sickness at admission into account.

(*JAMA*. 1990;264:1962-1968)

THE INTRODUCTION in 1983 of the prospective payment system (PPS) has raised clinical and policy questions. Did the change in financial incentives from a cost-plus reimbursement system to a fixed-price system result in fewer sick patients' being admitted to the hospital? Did mortality within 30 or 180 days following hospitalization change, after ad-

justing for sickness at admission? Measuring how sick a patient is at the time of hospital admission is a prerequisite for answering such questions. In this report we present measures of sickness at admission for five diseases: congestive heart failure, acute myocardial infarction, pneumonia, cerebrovascular accident, and hip fracture. These measures can also be used to aid clinical decisions at the individual patient level and help hospitals monitor their outcomes. After describing the measures, we present data that show how sickness at admission changed after the introduction of prospective payment.

PATIENTS AND METHODS

The sample for this study includes 14 012 patients who are aged 65 years or

older. We present details of the sampling design and inclusion criteria elsewhere.¹²

Variables That Measure Sickness at Admission

In developing our measures of sickness at admission, we used previously published severity measures, including those developed to predict death for patients admitted to intensive care units^{3,5} and measures developed for specific diseases.^{6,9} We used literature review, clinical judgment, and disease-specific consensus panels to identify other variables that have been considered important clinical predictors of the outcomes we chose to study.²

We used disease-specific abstraction forms to collect data about sickness at admission from the medical records of hospitalized patients.¹⁰⁻¹⁴ We collected data about acute and chronic morbid and comorbid diseases, function, the number of body systems with pathologic findings, and the APACHE II (*Acute Physiology and Chronic Health Evaluation*) Acute Physiological Score (APS) variables.² For patients who had an acute myocardial infarction, we also collected data used to score the Killip Scale and the Norris Coronary Prognostic Index.^{6,7} For patients who had hip fractures, we collected data for the Goldman Preoperative Risk Index.⁸ We always collected the first available data. If the patient had missing data on day 1, we accepted data from day 2, because day 2 values may represent the admission status of patients who were admitted late at night.

From the Health Program of the RAND Corp, Santa Monica, Calif (Drs Keeler, Kahn, Draper, Sherwood, Brook, and Rubenstein and Ms Reinisch); the Department of Medicine (Drs Kahn, Brook, Rubenstein, and Kosecoff) and Department of Health Services (Drs Brook and Kosecoff), UCLA, School of Medicine; and Value Health Sciences Inc, Santa Monica, Calif (Dr Kosecoff).

The opinions, conclusions, and proposals in the text are those of the authors alone and do not necessarily represent the views of any of these organizations, the RAND Corp, or UCLA.

Reprint requests to the RAND Corp, 1700 Main St, PO Box 2138, Santa Monica, CA 90406-2138 (Dr Keeler).

