

and (5) confirmation of timely medical follow-up by primary care or specialist physicians.

Unplanned hospital readmissions are associated with several factors, including aging.² Dr Feingold points out that readmissions can be reduced by targeting high-risk elderly persons with comprehensive multidisciplinary discharge planning and home care interventions.³

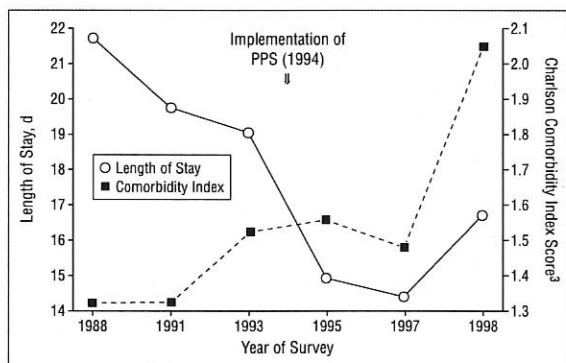
Improved communication and information transmission around transitions is an area in need of further research. As part of our health care system's efforts to improve patient safety across the continuum of care, we are planning to undertake such studies. A key piece of this effort will be improving access to patient medical records among diverse providers. Distributing patient-related data among health care providers accurately, quickly, securely, and seamlessly will require substantial effort, but it is possible with today's information technology. Such solutions will require significant investments. Internet-based applications (eg, e-mail, Web-based patient medication records, medical information resources) will soon allow patients and families to participate in ensuring safer health care for discharged patients. Further data are needed to demonstrate that such investments will improve quality associated with posthospitalization care of the elderly.

Jeffrey M. Rothschild, MD, MPH
David W. Bates, MD, MSc
Lucian L. Leape, MD
Boston, Mass

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Prospective Payment System and Hospitalization for Pneumonia in Italy

Metersky et al¹ reported that a shorter length of stay as a result of the introduction of the prospective payment system (PPS) among older patients with pneumonia admitted to acute care hospi-



Length of stay and Charlson Comorbidity Index score³ of patients with pneumonia by year of survey. PPS indicates prospective payment system.

tals in the United States between 1991 and 1997 was associated with a more frequent placement in nursing homes and with an excess risk of mortality within 30 days after discharge. A similar payment system was introduced in Italy in 1994; and despite many reports of effects similar to those in the United States, there is no information available on pneumonia. We investigated whether the outcomes of medical care delivered to older patients with pneumonia in academic and community hospitals in Italy have changed since the implementation of PPS.

To this end, we used the database of the Gruppo Italiano di Farmacovigilanza nell'Anziano (GIFA).² The GIFA database was used to compile information on the clinical and functional characteristics and pharmacological treatments of all patients admitted to 40 medical centers distributed throughout Italy during 5 surveys conducted from 1988 to 1998. We compared the characteristics of patients discharged before the introduction of the PPS (1988, 1991, and 1993) with those of patients discharged afterwards (1995, 1997, and 1998).

Of a total of 23 120 patients 65 years or older, 13 903 (60.1%) were hospitalized before and 9217 (39.9%) after the implementation of the PPS. Overall, 963 patients (4.2%) were discharged with a diagnosis of pneumonia, with no difference before and after PPS implementation (4.2% and 4.1%, respectively). Mean \pm SD length of stay declined from 20.6 ± 14.5 before PPS implementation to 15.4 ± 9.3 days after ($P < .001$), and this occurred despite the fact that the patient mean \pm SD age was older after implementation than before (80.9 ± 7.8 years vs 79.6 ± 7.3 years, respectively; $P = .01$), and mean \pm SD patient condition more clinically complex (Charlson Comorbidity Index,³ 1.70 ± 1.72 vs 1.38 ± 1.70 , respectively; $P = .005$). Likewise, in-hospital mortality declined from 23.2% to 12.5% following PPS implementation ($P < .001$). The discharge to nursing facilities did not show appreciable differences (9.1% before vs 8.4% after PPS implementation).

Length of stay declined steadily until 1997. It showed a slight increase in 1998, and this was apparent also for patients younger than 65 years. While we cannot conclusively rule out a leveling effect of the impact of PPS implementation, we found an interesting phenomenon with regard to the clinical complexity of the patients' conditions (**Figure**). The nearly identical comorbidity index scores in the 1993 (1.52 ± 1.93), 1995 (1.54 ± 1.73), and 1997 (1.50 ± 1.53) surveys would suggest that a progressively shorter length of stay was achieved through the elimination of inappropriate hospital days. In contrast, a sharp increase in the medical complexity of the conditions of patients admitted in 1998 (comorbidity index 2.1 ± 1.80) could be responsible for the greater than 2-day increase in the hospital length of stay that year. This might have occurred because of preferential admission of patients with diagnoses associated with higher payments and longer lengths of stay.

The results observed in Italy are similar to the findings of Metersky et al.¹ However, because of the lack of follow-up information available for patients once they were discharged from the hospital, we cannot determine effects on patient outcomes. Interestingly, the proportion of patients admitted to nursing facilities has re-

mained stable following the institution of PPS in Italy. This phenomenon, in addition to illustrating the inadequacy of the health care system, highlights the peculiarity of our society, in which the care of the elderly is almost exclusively the concern of the families.⁴

Graziano Onder, MD
Winston-Salem, NC,
and
Rome, Italy
Roberto Bernabei, MD
Matteo Cesari, MD
Giovanni Gambassi, MD
for the GIFA investigators
Rome

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In reply

We would like to thank Dr Onder and his colleagues for their interest in our article. We are especially gratified that our work¹ has prompted more investigation into the important issues that both of our reports explore. Similar to what we observed in Connecticut, Onder et al found that, in Italy, the mean hospital length of stay for elderly patients with pneumonia declined during the 1990s, both before and after the institution of a PPS. However, in marked contrast to our results, they found that the percentage of patients discharged to nursing facilities actually declined from 9.1% to 8.4% during the study period.

Dr Onder et al postulate that the lack of increase in the percentage of patients being discharged to nursing facilities could be due to "inadequacy of the health care system," presumably suggesting that there are not enough beds to allow an increase. While this may be the major factor, we note that the mean hospital length of stay in Italy only dropped to 15.4 ± 9.3 days compared with the 7.7 ± 7.2 days we noted in Connecticut. This greater length of stay in Italy may have resulted in less need to discharge patients to nursing facilities than in Connecticut.

As Dr Onder et al point out, outside of the United States, family members are often the caretakers after hospitalization. Whether the discharge destination is to a nursing facility or to the care of family members, the effect of the declining hospital length of stay on patient outcomes is poorly understood. It will also be important to determine how the declining hospital length of stay affects the emotional and financial well-being of the family members who act as caretakers after hospital discharge.

Mark L. Metersky, MD
Thomas P. Meehan, MD
Farmington, Conn

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Tea and Coronary Heart Disease: the Flavonoid Quercetin Is More Bioavailable From Rutin in Women Than in Men

Several epidemiological studies indicate an inverse association between intake of tea and coronary heart disease. However, the results of these studies have been somewhat controversial. In the older cohort of the Rotterdam Study, Geleijnse et al¹ found an inverse association between drinking tea and aortic atherosclerosis. The protective effect was more pronounced in women than in men. In the Health Professionals Follow-up Study² and the Caerphilly Study,³ which both included men only, no protective effect of tea or flavonoids was found.

In a letter published in the November 27, 2000, issue of the ARCHIVES, Geleijnse et al⁴ speculated on the above-mentioned results and hypothesized that estrogen-related mechanisms may account for the protective effect of tea on coronary heart disease. We do not object to this hypothesis; however, we offer another explanation: better bioavailability of quercetin from rutin in women compared with men, especially in women using oral contraceptives.

The flavonol quercetin is one of the most potent dietary antioxidants known. The compound is present in plants as glycosides, such as rutin (quercetin-rutinoside) in tea. In rutin, quercetin aglycone is bound to the sugars glucose and rhamnose. Quercetin from rutin is absorbed from the distal parts of the small intestine or the colon after hydrolysis of the sugar moieties by intestinal enzymes,^{5,6} most likely of bacterial origin. Quercetin aglycone is absorbed from the proximal parts of the gastrointestinal tract, although at higher doses absorption probably occurs further down the intestinal tract as well.⁵

We performed a diet-controlled, double-blind, crossover study to evaluate the relative bioavailability and pharmacokinetics of quercetin from rutin and quercetin aglycone.⁵ We administered 3 different doses (8, 20, and 50 mg, expressed as quercetin equivalents) of quercetin aglycone and rutin to 16 healthy volunteers (7 women and 9 men). The chosen doses were similar to those attainable from the diet. In our study, quercetin from rutin was much more bioavailable in women than in men, especially in women using oral contraceptives. For the 50-mg dose, for instance, the mean area under the plasma concentration-time curve (AUC) from 0 to 24 hours was 678 $\mu\text{g} \cdot \text{h/L}$ for men and 1946 $\mu\text{g} \cdot \text{h/L}$ for women ($P = .008$). The corresponding values for women using and women not using oral contraceptives were 2364 $\mu\text{g} \cdot \text{h/L}$ and 1454 $\mu\text{g} \cdot \text{h/L}$, respectively. Sex or use of oral contraceptives did not affect the relative bioavailability of quercetin when given as quercetin aglycone.

There could be several explanations for the sex difference in bioavailability and the effect of oral contraceptives on plasma quercetin levels after ingestion of ru-