Article

Dementia in Elderly Persons in a General Hospital

Constantine G. Lyketsos, M.D., M.H.S.

Jeannie-Marie E. Sheppard, B.A.

Peter V. Rabins, M.D., M.P.H.

Objective: This study investigated the prevalence of dementia in a general hospital, reasons for which patients with dementia were admitted, and the relationship between dementia and length of stay, cost, and in-hospital mortality rate.

Method: The study focused on data from the hospital database on 21,251 patients aged 60 and older who were discharged in 1996 and 1997. Patients were grouped as with or without a discharge diagnosis of dementia by ICD-9-CM criteria. The groups were compared on sociodemographic characteristics, principal discharge diagnoses, lengths of stay, costs, and in-hospital mortality rates.

Results: The prevalence of dementia among discharged patients was 3.9% (N=823); it was dependent on age (age 60–64, prevalence=2.6%; age 85 and older, prevalence=8.9%). The primary discharge diagnoses of the groups were different. The mean length of stay was 10.4 days for patients with dementia and 6.5 days for patients without dementia. Per capita hospital costs were $4,000 higher for patients with dementia. Differences in lengths of stay and per capita costs were statistically significant after adjusting for age, race, and sex. Lengths of stay and hospital costs for patients with dementia were significantly higher for eight primary discharge diagnoses after adjusting for age, race, and sex.

Conclusions: Dementia is present in a significant proportion of patients admitted to general inpatient units. Patients with dementia are admitted for different reasons than patients without dementia and appear to have longer stays, which are associated with higher costs. Efforts to identify dementia early during hospitalization could improve patient care and reduce costs.

(Am J Psychiatry 2000; 157:704–707)

Dementia is a serious, chronic, and costly public health problem (1). A substantial portion of the costs associated with dementia involve the medical care of patients with the disorder (1, 2). At times the disorder necessitates admission to the medical-surgical units of general hospitals. A recent study (2) reported that 63% of the Medicare costs for patients with dementia of the Alzheimer's type consists of payment for inpatient hospital care.

Little is known about the care of patients with dementia in medical-surgical units of general hospitals. Several studies, mostly from outside the United States, have reported that the prevalence of dementia among persons discharged from general hospitals is 8%–27% (3–10). Others have reported that hospital length of stay is longer for patients with dementia (4, 8–14) and that this prolonged length of stay might be reduced when a "social model" is applied, including an intensive effort to identify dementia and work on discharge soon after admission (12, 15, 16). Only two studies have investigated the in-hospital mortality rates of patients with dementia, and they report contradictory results (11, 12).

The goals of this study were to investigate the frequency of dementia among patients admitted to the Johns Hopkins Hospital and to compare the costs, lengths of stay, diagnoses, and mortality rates for patients with dementia to those for patients without dementia.

Method

The computerized records of Johns Hopkins Hospital, collected as part of routine clinical care after each patient discharge, were analyzed without the presence of identifying information for this study. The study was thus exempt from institutional review board review. Data from psychiatric units were excluded. In 1996 and 1997 there were 76,856 discharges from the medical-surgical units of the hospital. Analyses were initially conducted for 1996 and 1997 separately, but the findings were so similar that pooled results are reported. If patients were discharged more than once, each discharge contributed a different set of observations. In these records 21,251 (28%) of the discharges involved persons age 60 and older at the time of admission. The analyses were limited to this age group because of the low prevalence of dementia before age 60.

To estimate the frequency of dementia in the study group, the proportion of all discharge diagnoses for which the attending physician recorded an ICD-9-CM code indicative of any form of dementia (290 or 331 series) was calculated. Patients with a diagnosis of dementia were then compared to patients with no discharge diagnosis of dementia on age, race, sex, primary discharge diagnosis (an indicator of the reason for which they were admitted), length of stay, and total hospital cost billed to the patient. The rates of in-hospital mortality between the two groups were compared as well.

The differences in sociodemographic characteristics or mortality rates were assessed by using t tests (age) or chi-square tests (gender, sex, and mortality rates). Differences in lengths of stay, total costs, and inpatient mortality rates were assessed for statistical significance in univariate and multivariate logistic (mortality rates) or linear (lengths of stay and costs) regression models; the latter were adjusted for age, race, and sex.

Results

Frequency of Dementia

The cumulative frequency of dementia in the study group was 3.9% (823 of 21,251) compared to 4.5% in the general population of east Baltimore, which surrounds the hospital (17). In patients aged 60–64 this frequency was 2.6% (128 of 4,935). No regional population figures were available for comparison with this group. In patients aged 65–74 the frequency was 3.2% (319 of 9,954) compared to 1.2% in the general population of east Baltimore (17). In those aged 75–84 the frequency was 5.3% (281 of 5,298) versus 5.3% in general population of east Baltimore. In those 85 years and older the frequency was 8.9% (95 of 1,064) versus 25.6% in the general population of east Baltimore.

Comparison of Patients With and Patients Without Dementia

Patients with dementia were significantly older (mean age=74 years, SD=8.2) than patients without dementia (mean age=71 years, SD=7.4) (t=12.4, df=21249, p<0.001). Patients with dementia were also significantly more likely to be nonwhite than patients without dementia (47% and 51%, respectively) (χ^2=4.80, df=1, p=0.03). There was no significant difference between the proportions of women in the two groups (with dementia, 49%; without dementia, 51%) (χ=1.22, df=1, p=0.27).

Table 1 compares the two groups on the attending physician's primary discharge diagnoses (presumably the principal reason for the hospitalization). Given the wide range of discharge diagnoses in this group, only the 20 most frequent, along with their frequency of occurrence, are shown in the table.

Table 1 shows several differences in the primary diagnoses between groups. In both groups chronic ischemic heart disease was the principal discharge diagnosis. However, it was the primary diagnosis for 9.2% of the patients without dementia compared to 4.9% of the patients with dementia. The dementia itself, its causes (e.g., Alzheimer's or Parkinson's disease), or its complications (e.g., drug psychoses or psychotic symptoms) were the principal reasons for admission in 12.2% (N=100) of the patients with dementia but in none of the patients without dementia. Dehydration was three times more common in the dementia group, and urinary tract infection accounted for 3% of the diagnoses. Alcoholic and drug psychoses affected 5.7% of the dementia group, as opposed to 0.2% (N=41) of the group without dementia.

TABLE 1. Top 20 Principal ICD-9-CM Discharge Diagnoses of Patients Over Age 60, With and Without Dementia, Who Were Dsicharged From Johns Hopkins Hospital in 1996 and 1997

Group and Diagnosis	N	%
Patients with dementia (N=823)		
Chronic ischemic heart disease	40	4.9
Senile and presenile organic psychotic conditions	38	4.6
Cerebral degenerations (e.g., Alzheimer's disease and Pick's disease)	31	3.8
Alcoholic psychoses	28	3.4
Disorder of fluid or electrolyte balance	27	3.3
Acute myocardial infarction	26	3.2
Urinary tract infection	25	3.0
Heart failure	24	2.9
General symptoms	21	2.6
Pneumonitis	20	2.4
Mechanical complications of graft or implant	20	2.4
Drug psychoses	19	2.3
Secondary cancer	18	2.2
Occlusion of cerebral arteries	18	2.2
Disease of the endocardium	15	1.8
Septicemia	13	1.6
Cardiac dysrhythmias	13	1.6
Aortic aneurysm	13	1.6
Parkinson's disease	12	1.5
Pneumonia, organism unspecified	12	1.5
Patients without dementia (N=20,428)		
Chronic ischemic heart disease	1,879	9.2
Malignant neoplasm of prostate	817	4.0
Mechanical complications of graft or implant	735	3.6
Acute myocardial infarction	695	3.4
Heart failure	633	3.1
Cardiac dysrhythmias	511	2.5
Occlusion stenosis of precerebral arteries	347	1.7
Complications of procedures	306	1.5
Pancreatic cancer	306	1.5
Secondary cancer	286	1.4
Osteoarthritis	245	1.2
Respiratory disorder	245	1.2
Secondary cancer of respiratory or digestive system	245	1.2
Cancer of respiratory system	245	1.2
Aortic aneurysm	245	1.2
Atherosclerosis	225	1.1
Disorder of fluid or electrolyte balance	225	1.1
General symptoms	225	1.1
Occlusion of cerebral arteries	225	1.1
Cataracts	204	1.0

The two groups were also compared on rates of in-hospital mortality. A total of 5.2% (N=43) of the patients with dementia died in the hospital compared to 3.8% (N=776) of the patients without dementia (odds ratio=1.36, 95% confidence interval=0.99–1.88) (χ^2=3.23, df=1, p=0.07). In a logistic regression model, the difference between mortality rates remained nonsignificant (dementia versus no dementia: odds ratio=1.25) (χ^2=1.89, df=1, p=0.17) after adjusting for age, race, and sex.

Relationship Between Dementia and Length of Stay or Per Capita Cost

The mean length of stay for patients with dementia was 10.4 days (SD=10.4) compared to 6.5 days (SD=6.4) for patients without dementia (t=16.6, df=21249, p<0.0001). The modal length of stay for patients without dementia was 1 day, whereas for those with dementia, it was 3 days. A total of 18% (N=148) of the patients with dementia had lengths

of stay of more than 15 days compared to 6.5% (N=1,328) of the patients without dementia. The per capita hospital cost for patients with dementia was $17,542 compared to $13,552 for patients without dementia.

We also compared mean lengths of stay and per capita hospital costs for patients in eight common diagnostic subgroups (from Table 1): chronic ischemic heart disease, acute myocardial infarction, heart failure, disorder of fluid or electrolyte balance, all cancers, mechanical complications of graft or implant, occlusion of cerebral arteries, and aortic aneurysm. For all diagnoses patients with dementia had a length of stay that was approximately 3–4 days longer than that of patients without dementia. Per capita hospital costs were approximately $4,000 more for patients with dementia. Differences in lengths of stay and per capita costs were consistent across diagnostic subgroups.

To confirm that differences in lengths of stay and per capita costs between patients with and patients without dementia were not due to the effects of age and sex, a series of linear regression models was computed. In the first set of models length of stay was the dependent variable, and dementia status, age, race, and sex were the independent variables. These models were estimated for the entire group and for each of the eight diagnostic subgroups just noted. In all instances, and for all diagnostic subgroups, dementia was associated with significantly longer lengths of stay, after adjusting for age and sex (in all cases, $p<0.05$).

In the second set of regression models total hospital cost was the dependent variable, and dementia status, age, race, and sex were the independent variables. The statistically significant relationship between dementia and higher hospital cost was maintained after adjusting for age, race, and sex (in all cases, $p<0.05$).

Discussion

Dementia afflicts a substantial portion of elderly patients on the medical-surgical units of general hospitals—in this study, 3.9% of the patients aged 60 and older discharged from Johns Hopkins Hospital. This estimate is comparable to the population prevalence of dementia in east Baltimore (17), the neighborhood in which the hospital is located. Similar rates have been reported in other studies at general hospitals (3–10). This appears to be the first estimate of the frequency of dementia in a group of this size. In addition, we found that dementia is not associated with a higher rate of in-hospital mortality.

These findings strongly support the view that patients with dementia are admitted to general hospitals for reasons that are different than those for patients without dementia. Many of the conditions that were more prevalent in patients with dementia—such as urinary tract infections, drug psychoses, senile and presenile organic psychotic conditions, and behavioral, functional, or social complications of dementia—could potentially be prevented, recognized earlier, or managed in other settings, reducing the need for acute hospitalization (6, 8, 13). This issue merits further investigation.

A discharge diagnosis of dementia was associated both with a longer length of stay and with higher per capita cost. Higher costs are likely driven directly by longer lengths of stay. The reasons for the longer stays of patients with dementia are uncertain and can only speculated on. Since patients with dementia are predisposed to developing delirium (8), it might take them longer to recover from the complications of illness and hospital treatment. Alternatively, many patients with dementia may be admitted to the hospital, or their discharge may be delayed, because of difficulties in securing appropriate placement.

Several limitations of this investigation must be considered. Because this study was conducted at a single tertiary-care hospital, generalizability may be limited. The diagnosis of dementia relied on clinicians' using standardized criteria. These clinicians might not have identified the condition or might not have recorded it in the chart for some patients, particularly those with milder or less complex dementia. *Thus, the frequency given for dementia is likely an underestimate.* Additionally, if dementia were more likely recorded for patients with more complex presentations, a bias in favor of a false association between dementia and longer length of stay or higher per capita cost would be introduced. The study also suffered from its reliance on a discharge database. There was no estimate of how critically ill the patients were at admission, and there were no data on where patients were before admission or to where they were discharged.

In summary, patients with dementia are admitted to general medical hospitals for different diagnostic problems than are patients without dementia. They also have longer hospital stays and increased associated costs. Since European studies have reported that in hospitals employing an intensive program of early screening and intervention, the lengths of stay of patients with dementia are comparable to those of patients without dementia (12, 15, 16), the screening and early identification of dementia in general hospitals should be evaluated as a means of reducing lengths of stay and costs. This would also benefit patients with dementia because they would spend less time in the hospital, an environment that is at times confusing and hostile to them. If the lengths of stay for the patients with dementia in our study had been the same as those for patients without dementia, a cost savings of $3,292,000 would have been achieved over 2 years (a per capita difference of $4,000 over 823 cases).

Received Jan. 4, 1999; revisions received April 22 and July 27, 1999; accepted Aug. 24, 1999. From the Neuropsychiatry and Memory Group, Department of Psychiatry and Behavioral Sciences, School of Medicine, Johns Hopkins University. Address reprint requests to Dr. Lyketsos, Osler 320, Johns Hopkins Hospital, Baltimore, MD 21287; kostas@jhmi.edu (e-mail). Supported by a grant from the Alzheimer Association and NIMH grant MH-56511.

References

1. Ernst RL, Hay JW: The US economic and social costs of Alzheimer's disease revisited. Am J Public Health 1994; 84:1261–1264
2. Weiner M, Powe N, Weller WE, Shaffer TJ, Anderson GF: Alzheimer's disease under managed care: implications from Medicare utilization and expenditure patterns. J Am Geriatr Soc 1998; 46:762–770
3. Fulop G, Strain JJ, Fahs MC, Schmeidler J, Snyder S: A prospective study of the impact of psychiatric co-morbidity on length of stays of elderly medical-surgical inpatients. Psychosomatics 1998; 39:273–280
4. Saravay SM, Lavin M: Psychiatric comorbidity and length of stay in the general hospital: a critical review of outcome studies. Psychosomatics 1994; 35:233–252
5. Bickel H, Cooper B, Wancata J: [Psychiatric disorders in elderly general hospital patients: incidence and long-term prognosis]. Nervenarzt 1993; 64:53–61 (German)
6. Kolbeinsson H, Jonsson A: Delirium and dementia in acute medical admissions of elderly patients in Iceland. Acta Psychiatr Scand 1993; 87:123–127
7. Lazaro L, de Pablo J, Nieto E, Vieta E, Vilalta J, Cirera E: [Psychiatric morbidity in elderly patients admitted to a general hospital: a day-prevalence study]. Med Clin (Barc) 1991; 97: 206–210 (Spanish)
8. Lledo R, Martin E, Jimenez C, Roca R, Gil A, Godoy E, Trilla A, Grau J, Asenjo MA: Characteristics of elderly inpatients at high risk of needing supportive social and health care. Eur J Epidemiol 1997; 13:903–907
9. Erkinjuntti T, Autio L, Wikstrom J: Dementia in medical wards. J Clin Epidemiol 1988; 41:123–126
10. Erkinjuntti T, Wikstrom J, Palo J, Autio L: Dementia among medical inpatients: evaluation of 2000 consecutive admissions. Arch Intern Med 1986; 146:1923–1926
11. Mayou R, Hawton K, Feldman E: What happens to medical patients with psychiatric disorder? J Psychosom Res 1988; 32:541–549
12. Pautas E, Verny M, Holstein J, Bouchon JP, Saint-Jean O: [Dementia syndromes and length of stay of elderly patients in internal medicine]. Ann Med Interne (Paris) 1997; 148:301–306 (French)
13. Tran B, Zureik M, Davido A, Levy A, Trouillet JL, Lang T, Lombrail P: [Hospital discharge planning and length of hospital stay in elderly patients admitted through the emergency department]. Rev Epidemiol Sante Publique 1995; 43:337–347 (French)
14. Torian L, Davidson E, Fulop G, Sell L, Fillit H: The effect of dementia on acute care in a geriatric medical unit. Int Psychogeriatr 1992; 4:231–239
15. Dinkel RH, Lebok UH: The effects of dementia in German acute care hospitals. Dement Geriatr Cogn Disord 1997; 8: 314–319
16. Slaets JP, Kauffmann RH, Duivenvoorden HJ, Pelemans W, Schudel WJ: A randomized trial of geriatric liaison intervention in elderly medical inpatients. Psychosomatics 1997; 59: 585–591
17. Folstein MF, Bassett SS, Anthony JC, Romanoski AR, Nestadt GR: Dementia: case ascertainment in a community survey. J Gerontol 1991; 46:M132–M138