

Mortality of Elderly Patients With Psychiatric Disorders

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***Objective:** The goal of this study was to evaluate the impact of common late-life mental disorders on the life expectancy and causes of death of older psychiatric patients. **Method:** The study population consisted of 809 older psychiatric patients who met DSM-III-R criteria for organic mental disorders, mood disorders, or psychotic disorders and who were discharged after a comprehensive multidisciplinary evaluation and acute inpatient treatment for their behavioral disorders. Dates and causes of death during a 5.75-year follow-up period were provided by the Pennsylvania Department of Health. Univariate and multivariate survival procedures were used to compare the survival rates of the three groups to each other and to a reference population of Pennsylvania residents. Causes of death were also tabulated according to ICD-9-CM and compared across the groups. **Results:** Age, gender, race, and medical comorbidity made significant independent contributions to survival. When these variables were controlled, the survival of patients with organic mental disorders was less than half of that for patients with mood or psychotic disorders. However, all three groups experienced higher rates of mortality than the reference population, with standardized mortality ratios of 1.5 to 2.5. Deaths occurred from the usual spectrum of natural causes, with the exception that patients with mood disorders were more likely to have died from disorders of the digestive system and suicide. **Conclusions:** The mental disorders of late life have a significant negative impact on the survival of older psychiatric patients.*

(Am J Psychiatry 1997; 154:1360–1368)

We are witnessing the aging of the American population, as the number and proportion of older individuals continue to grow (1). With increasing expectations of longevity, even for those who have already entered into later life, the proportion of the entire lifespan spent in old age is also expanding. The appreciation of these population dynamics has had a substantial impact on biomedical research as well as health care policy, with increasing attention being focused on the concept of successful aging (2–4).

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Supported by NIMH research project grant MH-43261 and center grant MH-30915, NIMH Independent Scientist Award MH-00540 (Dr. Zubenko), and NIMH Scientist Development Award for Clinicians MH-01153 (Dr. Sweet).

These data were supplied by the State Health Data Center, Pennsylvania Department of Health, Harrisburg. The Pennsylvania Department of Health specifically disclaims responsibility for any analyses, interpretations, or conclusions.

Mental disorders are common in late life and are a formidable obstacle to successful aging. Progressive dementias, the most common of which is Alzheimer's disease, affect approximately 7.5% of individuals who are 65 or older and 20% of those over the age of 80 (5, 6). While a number of the behavioral complications of Alzheimer's disease and related dementias are potentially treatable (7, 8), most dementing disorders are irreversible and progressive and have tragic consequences for patients and their families (9). Mood disorders appear to affect 2% to 4% of community-dwelling elders (10), and the proportion of older individuals who manifest depressive symptoms sufficient to be of clinical importance has been estimated to be between 10% and 15% (11). While the recovery of older depressed patients in response to vigorous treatment may approximate that of younger patients (12, 13), the elderly appear to be more prone to relapse (14, 15). In addition to substantial prevalence rates among elders in the community, cognitive and mood disorders are the most common disorders among older patients treated in geropsychiatric settings (16–20) and among nursing

home residents (21–23). Anxiety disorders and alcohol and drug abuse have been reported to affect a small percentage of elders (24–26) but appear to be underrepresented among the primary diagnoses of patients in clinical geropsychiatric populations (20). The prevalence of primary psychotic disorders diminishes with age (27–30), with schizophrenia and primary persistent paranoid disorders affecting less than 0.5% of older adults (10, 31). Thoughts about suicide and suicide attempts are less common in the elderly than in younger age groups (32–34). However, suicide rates climb with age, and suicide has been reported to account for 50 per 100,000 deaths among elderly white men (34).

Much has been written on the complex interactions of mental illness, physical health, and disability among the elderly. In addition, subjective self-assessments of health have consistently been found to predict mortality in this age group (4, 35–38). However, the effects of the major late-life mental disorders on the survival of older Americans who suffer from these conditions have not been systematically studied. The goal of the current study was to assess the independent effects of organic mental disorders, mood disorders, and psychotic disorders, as described in DSM-III-R, on the survival rates of 809 elderly inpatients following acute inpatient treatment for these disorders.

METHOD

Patient Population and Characterization

A total of 869 elderly patients were admitted to the Geriatric Clinical Research Unit of Western Psychiatric Institute and Clinic between Sept. 1, 1989, and June 30, 1993. For those patients among the 869 who were admitted more than once during this interval, the first admission served as the index admission. Each patient underwent detailed neurological, medical, psychiatric, and laboratory examinations, as previously described (7, 13, 20). The number and severity of psychiatric signs and symptoms were determined by using the Brief Psychiatric Rating Scale (39) and the 17-item Hamilton Rating Scale for Depression (40, 41). Cognitive performance was assessed with the Mini-Mental State (42). The diagnostic criteria for DSM-III-R were subsequently applied at regularly scheduled consensus conferences attended by faculty psychiatrists (including each patient's attending psychiatrist), one of whom was also board-certified in internal medicine, and by research staff members, all with specialized expertise in geriatric psychiatry. The age at first onset of each primary diagnosis was determined at the same diagnostic consensus conference at which each patient's active medical problems were also reviewed. Diagnostic assessments were based on clinical, historical, and laboratory data from all available sources. The data presented in this study were prospectively obtained as part of a clinical investigation of elderly patients admitted to the Geriatric Clinical Research Unit, according to a protocol approved by the Biomedical Institutional Review Board of the University of Pittsburgh. This protocol was found to be exempt for the need for written informed consent by the institutional review board.

For each patient, a multidisciplinary diagnostic assessment was made, and active medical problems that were the focus of investigation or treatment were classified according to ICD-9-CM. Since all subjects included in this study were psychiatric inpatients, medical problems in the ICD-9-CM categories mental disorders and diseases of the nervous system and sense organs were not counted in order to avoid redundancy. The resulting total number of medical problems served as an index of medical burden. The validity of this index of medical burden is supported by several lines of evidence. First, the number of medical prob-

TABLE 1. DSM-III-R Primary Diagnoses Among 809 Elderly Psychiatric Patients

Diagnosis	N	%
Organic mental disorders	399	100.0
Primary degenerative dementia, Alzheimer type	196	49.1
Multi-infarct dementia	55	13.8
Dementia	46	11.5
Organic mood disorder	36	9.0
Delirium	28	7.0
Other ^a	38	9.5
Mood disorders	322	100.0
Major depression	254	78.9
Bipolar disorder	62	19.3
Other ^b	6	1.9
Psychotic disorders	88	100.0
Schizophrenia	44	50.0
Schizoaffective disorder	29	33.0
Delusional disorder	10	11.4
Psychotic disorder not otherwise specified	5	5.7

^aOrganic mental disorder not otherwise specified, N=11; organic delusional disorder, N=7; organic hallucinosis, N=6; organic personality disorder, N=6; amnesic disorder, N=2; other psychoactive substance-induced organic mental disorder not otherwise specified, N=2; alcohol intoxication, N=2; alcohol hallucinosis, N=1; hypersomnia or insomnia related to a known organic factor, N=1.

^bDepressive disorder not otherwise specified, N=3; dysthymia, N=3.

lems was significantly correlated with the scores of elderly depressed inpatients on the CIRS(G) (41), a version of the Cumulative Illness Rating Scale operationalized for use in geriatric patients (43). Moreover, the number of medical problems determined by this approach has been reported to predict poor treatment response among elderly inpatients with major depression (13). A similar index of physical comorbidity has been used to compare and contrast the medical burden suffered by psychiatric outpatients with Alzheimer's disease, major depression, and schizophrenia (44). Finally, the number of ICD-9-CM medical problems was used to characterize the medical burden of patients included in the National Hospital Discharge Survey compiled by the Centers for Disease Control and National Center for Health Statistics (45). A systematic description of the medical comorbidity of this study population has been previously published (20).

Of the 869 inpatients who were characterized, 809 (93.1%) were Pennsylvania residents and met DSM-III-R criteria for a primary psychiatric diagnosis within the categories of organic mental disorders (N=399), mood disorders (N=322), or psychotic disorders (N=88). The remaining 60 inpatients included 13 who were discharged to dispositions outside of Pennsylvania and 47 Pennsylvania residents who constituted a small and diagnostically heterogeneous residual group. Data and causes of death were determined for the 809 patients by using data supplied by the State Health Data Center, Pennsylvania Department of Health, Harrisburg, covering the period from Sept. 1, 1989, through May 30, 1995. For patients in whom a dementing disorder was identified as the cause of death, death certificates and available health records were reviewed to identify the medical problem that constituted the proximate cause of death. For each patient, the duration of follow-up was defined by the interval between the date of discharge from the index admission until the date of death, or the end of the surveillance period (May 30, 1995), whichever came first.

Statistical Analysis

Comparisons of continuous sociodemographic and clinical variables among and between the three patient groups were made with analyses of variance, followed by Tukey honestly significant difference post hoc tests. Comparisons of categorical clinical variables were made by using the chi-square statistic. Survival rates during the 5.75-year surveillance period were determined for the members of the three diagnostic groups with the Kaplan-Meier product limit method. A best-fitting Cox proportional hazards model was devel-

TABLE 2. Sociodemographic and Clinical Characteristics of 809 Elderly Psychiatric Patients

Characteristic	Total (N=809)		Organic Mental Disorders (N=399)		Mood Disorders (N=322)		Psychotic Disorders (N=88)		Analysis			Significant Pairwise Comparisons ^a
	N	%	N	%	N	%	N	%	χ^2	df	p	
Sex									10.05	2	0.007	Psychotic versus all groups
Female	544	67.2	253	63.4	220	68.3	71	80.7				
Male	265	32.8	146	36.6	102	31.7	17	19.3				
Race									24.32	2	<0.001	All pairwise comparisons
Black	116	14.3	61	15.3	29	9.0	26	29.5				
White	693	85.7	338	84.7	293	91.0	62	70.5				
Marital status									45.54	4	<0.001	All pairwise comparisons
Married	300	37.1	138	34.6	148	46.0	14	15.9				
Other	424	52.4	225	56.4	148	46.0	51	58.0				
Never married	85	10.5	36	9.0	26	8.0	23	26.1				
Widowed									18.31	2	<0.001	Organic versus all groups
Yes	318	39.3	185	46.4	110	34.2	23	26.1				
No	491	60.7	214	53.6	212	65.8	65	73.9				
Died during follow-up	265	32.8	180	45.1	71	22.0	14	15.9	55.76	2	<0.001	Organic versus all groups
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>F</i>	<i>df</i>	<i>p</i>	
Education (years) ^b	11.2	3.5	10.9	3.6	11.6	3.2	11.1	3.4	3.72	2, 795	0.02	Organic versus mood disorders
ICD-9-CM medical problems	5.6	3.1	5.8	3.1	5.6	3.1	4.7	3.2	4.74	2, 806	0.009	Psychotic versus all groups
Age at onset (years) ^c	61.9	19.0	72.1	12.2	55.8	18.0	38.5	17.2	214.88	2, 800	<0.0001	All pairwise comparisons
Age at discharge (years)	73.2	9.4	76.7	8.8	71.0	8.3	65.3	8.7	81.23	2, 806	<0.0001	All pairwise comparisons
For deceased patients, age at death (years)	78.3	8.8	79.8	8.2	75.7	9.2	72.5	9.1	9.47	2, 262	0.0001	Organic versus all groups

^ap<0.05.^bEducation, N=798: organic mental disorders, N=390; mood disorders, N=320; psychotic disorders, N=88.^cAge at onset, N=803: organic mental disorders, N=394; mood disorders, N=322; psychotic disorders, N=87.

oped to compare the survival rates among the members of the three groups, while differences in sociodemographic variables and medical comorbidity were controlled. Expected numbers of deaths during the average follow-up intervals of each group were determined by using data reported for Pennsylvania and in the U.S. Decennial Life Tables (46). These estimates were age specific and weighted to match the sex ratios and proportions of Caucasian and black patients in each diagnostic group. Comparisons of the proportions of observed and expected deaths were made with the chi-square statistic. Causes of death were tabulated according to ICD-9-CM categories, and their frequencies were compared between diagnostic groups with the chi-square statistic or Fisher's exact test, as appropriate. Statistical analyses were performed through use of the BMDP Statistical Software package, 1990 revision.

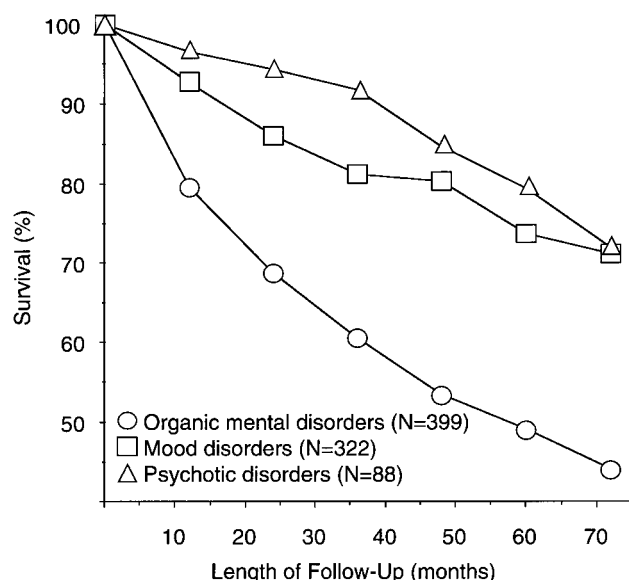
RESULTS

The 809 elderly psychiatric inpatients in the study included approximately twice as many women (N=544) as men (N=265) and a representative proportion of black subjects (N=116, 14.3%). Most patients (N=724, 89.5%) had been married, and over one-third (N=318, 39.3%) were widowed at the time of their index admission. The study population was reasonably well educated on average, as reflected by the completion of a mean of 11.2 years (SD=3.5) of education. As previously described (20), they suffered from a marked level of medical comorbidity, as reflected by a mean of

5.6 active ICD-9-CM medical problems (SD=3.1). Their mean age was 61.9 years (SD=19.0) at the onset of their primary psychiatric disorder and 73.2 years (SD=9.4) at the time of discharge from the index admission, when follow-up was initiated. Approximately one-third of the study population died during the 5.75-year surveillance period. During this interval, each patient was tracked for an average of 3.1 years (SD=1.6); the mean age at death was 78.3 years (SD=8.8).

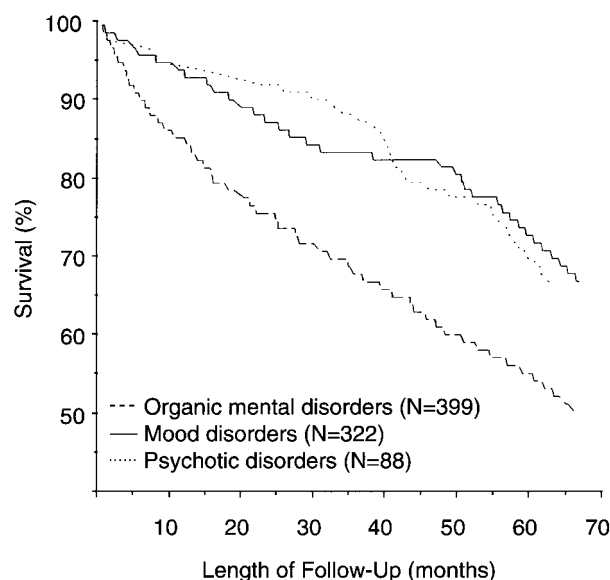
The study population consisted of three diagnostic groups as described in DSM-III-R: organic mental disorders (N=399, 49.3%), mood disorders (N=322, 39.8%), and psychotic disorders (N=88, 10.9%). As shown in table 1, primary degenerative dementia of the Alzheimer type, major depression, and schizophrenia were the most common primary diagnoses of patients in these three respective diagnostic groups. A sociodemographic and clinical description of these diagnostic groups is presented in table 2. The patients with organic mental disorders had the oldest mean ages at onset and at time of discharge. As a result, they included the highest proportion of widows and widowers. Patients in this group also had the lowest mean number of years of education, although the differences among the diagnostic groups were of unlikely practical significance. The group with mood disorders included the lowest proportion of black subjects and the highest

FIGURE 1. Kaplan-Meier Survival Analysis Depicting Survival Rates for Elderly Patients With Organic Mental Disorders, Mood Disorders, and Psychotic Disorders^a



^aSignificant differences among the survival curves for the three groups (Mantel-Cox statistic=63.8, df=2, $p<0.0001$; Breslow statistic=64.8, df=2, $p<0.0001$).

FIGURE 2. Multivariate Cox Proportional Hazards Models Depicting Survival Rates for Elderly Patients With Organic Mental Disorders, Mood Disorders, and Psychotic Disorders^a



^aCorrected for differences in sociodemographic variables and medical comorbidity (table 3).

TABLE 3. Multivariate Cox Proportional Hazards Model Predicting Survival Among 809 Elderly Psychiatric Patients

Variable ^a	Risk Ratio	95% Confidence Interval	p
Age	1.04	1.02–1.05	0.0001
Sex	2.02	1.58–2.59	0.0001
Race	0.45	0.28–0.71	0.0006
Medical burden	1.09	1.05–1.14	0.0001
Mood disorder	0.46	0.35–0.62	0.0001
Psychotic disorder	0.47	0.27–0.83	0.009

^aThe variables were coded as follows: age (years), sex (female=0, male=1), race (Caucasian=0, black=1), medical burden (number of active ICD-9-CM medical problems), mood disorder (absent=0, present=1), psychotic disorder (absent=0, present=1). Goodness-of-fit $\chi^2=147.39$, df=6, $p=0.0001$.

proportion of married subjects and had a mean age at onset in middle age. The group with psychotic disorders included the highest proportions of women, blacks, and unmarried subjects; had the lowest ages at onset and at discharge; and suffered from the least medical comorbidity. Nearly half of the patients in the organic mental disorders group died during the follow-up period, compared with only one-fifth of the patients with mood or psychotic disorders. The different proportions of patients in each diagnostic group who died during the surveillance period accounted for the differences in the mean lengths of follow-up for each group.

Survival analysis was performed for the three groups by using the Kaplan-Meier product limit method. This analysis reflected the actual survival rates, uncorrected

for intergroup differences in sociodemographic variables and medical comorbidity, observed for these groups during the surveillance period. As shown in figure 1, the survival rate for the patients with psychotic disorders was initially somewhat higher than that for the patients with mood disorders. However, this modest difference disappeared altogether by the end of the surveillance period, at which time 71% to 72% of the patients in both groups remained alive. In contrast, patients with organic mental disorders died at a considerably faster rate; only 44.1% survived beyond the fifth year of follow-up.

A best-fitting Cox proportional hazards model was developed to compare the survival rates among the three groups; differences in sociodemographic variables and medical comorbidity were controlled. The use of forward selection and backward elimination procedures produced identical models. Not surprisingly, younger age, female gender, and lower medical burden were associated with significant independent effects favoring longevity (table 3). As a group, black patients also lived longer than Caucasian patients. After control for the independent effects of these variables, patients with mood or psychotic disorders exhibited significantly greater survival than those with organic mental disorders and were indistinguishable from each other in this regard (table 3, figure 2).

Mortality rates for patients in the three groups were compared to those expected for Pennsylvania residents. Expected numbers of deaths during the mean follow-up intervals for each diagnostic group were determined by using data reported for Pennsylvania residents in the U.S. Decennial Life Tables (46). These estimates were

TABLE 4. Causes of Death by ICD-9-CM Category for 265 Deceased Elderly Psychiatric Patients^a

Category	Total (N=265)		Organic Mental Disorders (N=180)		Mood Disorders (N=71)		Psychotic Disorders (N=14)	
	N	%	N	%	N	%	N	%
Infectious and parasitic diseases	16	6.0	12	6.7	4	5.6	0	0.0
Neoplasms	29	10.9	17	9.4	10	14.1	2	14.3
Endocrine, nutritional, and metabolic diseases	7	2.6	6	3.3	1	1.4	0	0.0
Diseases of the circulatory system	121	45.7	84	46.7	33	46.5	4	28.6
Diseases of the respiratory system	54	20.4	38	21.1	12	16.9	4	28.6
Diseases of the digestive system ^b	10	3.8	3	1.7	5	7.0	2	14.3
Diseases of the genitourinary system	5	1.9	5	2.8	0	0.0	0	0.0
Symptoms, signs, and ill-defined conditions	7	2.6	3	1.7	2	2.8	2	14.3
Suicide ^c	3	1.1	0	0.0	3	4.2	0	0.0
Other external causes ^d	3	1.1	3	1.7	0	0.0	0	0.0
Unknown	10	3.8	9	5.0	1	1.4	0	0.0

^aBecause of the relatively few deaths among patients with psychotic disorders, statistical comparisons were made only for patients with organic mental disorders and those with mood disorders (chi-square analysis or Fisher's exact test, as appropriate, two-tailed, df=1).

^bSignificant difference between organic mental disorders and mood disorders ($p=0.04$, Fisher's exact test).

^cSignificant difference between organic mental disorders and mood disorders ($p=0.02$, Fisher's exact test).

^dUnspecified fall, N=1; late effects of unspecified accident, N=2.

age specific and weighted to match the sex ratios and proportions of Caucasian and black patients in each group. With this approach, 71, 47, and eight deaths would have been expected among the patients with organic mental disorders, mood disorders, and psychotic disorders, respectively; 180 ($\chi^2=69.06$, $df=1$, $p<0.0001$), 71 ($\chi^2=5.98$, $df=1$, $p=0.01$), and 14 ($\chi^2=1.47$, $df=1$, $p=0.17$) deaths were observed. The corresponding standardized mortality ratios (observed/expected) for these diagnostic groups during their respective mean follow-up intervals were 2.5, 1.5, and 1.8, compared to elderly Pennsylvanians of comparable age, gender, and race.

Causes of death were obtained from the Pennsylvania Department of Health for over 95% of the 265 patients who died during the surveillance period. Causes of death were tabulated for each group according to the ICD-9-CM categories and are presented in table 4. Diseases of the circulatory and respiratory systems, along with neoplasms, were the most common causes of death and accounted for over three-quarters of all deaths. Because of the relatively few deaths (N=14) among the patients with psychotic disorders, statistical comparisons were made only between the groups with organic mental disorders and mood disorders. The proportions of deaths from each cause were similar in these two groups, with two exceptions. While only 3.8% of all patients died from diseases of the digestive system, the rate of deaths from this cause was over four times higher among the patients with mood disorders than among those with organic mental disorders. The specific causes of death listed for the 10 patients who died from diseases of the digestive system were peritonitis (N=3), intestinal obstruction (N=2), vascular insufficiency of the intestine (N=1), volvulus (N=1), pep-

tic ulcer disease (N=1), cirrhosis of the liver (without mention of the use of alcohol, N=1), and unspecified disorders of the intestine (N=1). In addition, all three of the deaths by suicide occurred among male Caucasians whose primary psychiatric diagnosis during their index psychiatric admissions was major depression without psychotic features (one single episode, two recurrent).

DISCUSSION

Following discharge from an inpatient geropsychiatric setting, elderly patients who had an organic mental disorder died at a substantially higher rate than those with

mood or psychotic disorders. This finding was robust and persisted even after corrections were made for intergroup differences in sociodemographic variables and medical comorbidity. Approximately three-quarters of the patients in the group with organic mental disorders suffered from dementia, and the survival of this group was consistent with the average 75% 2-year survival rate reported in previous studies of demented outpatients (for review see reference 47). Not surprisingly, the reported survival rates for patients with dementia have reflected the progressive nature of most dementias and parallel the level of cognitive and functional impairment of the populations studied. Over a 5-year interval, the standardized mortality rates (observed deaths/expected deaths) for demented subjects living in the community, nursing homes, and long-term hospitals have been reported to be 1.3, 2.0, and 3.7, respectively (for review see reference 47). The standardized mortality rate of 2.5 observed for the patients from our study population with organic mental disorders is consistent with this range of estimates.

The reported survival rates of demented patients with Alzheimer's disease or vascular dementia have been similar, with only a modestly lower rate of survival (5% to 15% differential over 2 years) for patients with multi-infarct dementia (48-54). In our study population, 56.6% of patients with Alzheimer's disease were alive at the end of the surveillance period, compared to 45.5% of patients with multi-infarct dementia. Patients with dementias of mixed or uncertain etiologies also had a poor survival rate; only 50.0% were alive at the end of the surveillance period. Patients with a primary diagnosis of delirium had the poorest survival (43.4%), a finding that is consistent with the unfavorable prognosis for patients who pre-

TABLE 5. Survival Rates Reported for Older Patients With Primary Mood Disorders

Study	Population	Survival Rate (%)							Standardized Mortality Ratio
		6 Months	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	
Roth (16), 1955	Index psychiatric admissions, N=260; affective psychosis, N=220	89	—	81	—	—	—	—	—
Kay et al. (17), 1955	Index psychiatric admissions, age ≥60; affective disorders, N=189	—	—	85	—	—	—	—	—
Kay (18), 1962	Index psychiatric admissions, age >60; nondemented, N=154 (affective disorders, N=97; late paraphrenia, N=57)	—	89	—	74	—	67	—	1.4
Avery and Winokur (56), 1976 ^a	Index psychiatric admissions, age ≥60; primary affective disorder (Feighner criteria), N=147	—	85–97 ^a	—	81–92 ^a	—	—	—	—
Murphy et al. (57, 58), 1983	Index psychiatric admissions, age ≥65; primary depression (Feighner criteria), N=124	—	86	—	—	66	—	—	—
Baldwin and Jolley (59), 1986	Index psychiatric admissions, age >65; primary depression (Feighner criteria), N=100	—	92	—	—	—	—	—	—
Murphy et al. (60), 1987	General population sample (Sterling County in Canada), age ≥70 at death; affective disorders diagnosed from responses to questionnaires	—	—	—	—	—	—	—	1.6
Robinson (19), 1989	Patients consecutively referred to psychogeriatric unit, age >65; depressive illness, N=46	—	—	65	—	—	43	—	1.2–1.6
Philbert et al. (61), 1995 ^b	Index psychiatric admissions, age ≥65; DSM-III major depression, N=192	—	85–94	78–85	73–83	71–81	65–80	62–78	—
Current study	Index psychiatric admissions, mean age=73; DSM-III-R mood disorders, N=322	—	93	86	81	80	74	71	1.5
Summary ^c		89	85–97	81–86	74–92	80	67–74	71	1.2–1.6

^aValues reflect ranges for patients who received “adequate” or “inadequate” treatment for depression. Adequate treatment was associated with greater survival.

^bValues reflect ranges for patients who were or were not treated with ECT. Those who received ECT survived longer.

^cExcludes outlying survival rates reported by Robinson (19).

sent with delirium in general medical settings (54, 55). The survival rate for patients with organic mood disorders (61.1%) was intermediate between the overall rates for patients with organic mental disorders (54.9%) and mood disorders (78.0%). The last finding may be attributable to the common comorbid diagnosis of cerebrovascular disease among the patients with organic mood disorder.

Published mortality data for older patients with primary mood disorders are sparse. A comparison of survival rates reported for older patients with mood disorders is presented in table 5. Seven of the 10 published studies were conducted in Europe, beginning with the landmark article by Roth in 1955 (16). In all seven of these investigations, the study populations were identified by index admissions to psychiatric settings. While diagnostic criteria varied among these studies, consistent efforts were made to classify patients with functionally significant cognitive impairment or evidence of organic etiology separately from those with other “functional” mental disorders. Diagnoses of affective disorders were generally made by using criteria similar to those for mood disorders in DSM-III-R, and later

studies employed Feighner criteria (62) for primary affective disorders. In the two reports from Iowa, both Avery and Winokur (56) and Philbert et al. (61) observed a positive effect of treatment on the survival of a mixed-age population of depressed inpatients. Murphy and colleagues (60) studied the effects of affective disorders (diagnosed by questionnaires) on the survival of a general population sample recruited as part of the Sterling County (Canada) Study.

There was reasonably good agreement among the studies of survival rates reported in table 5, with the exception of one outlier. The older depressed patients described by Robinson (19) died at a rate nearly twice that reported in the remainder of the studies. This may have reflected an older, more severely affected patient population with greater medical comorbidity or less vigorous treatment for depression. As an example of the latter possibility, the 2-year survival for patients in that study rose to 80% for patients who received ECT; there were similar gains in survival in subsequent years of follow-up. However, the consistency of standardized mortality ratios across the studies (1.2 to 1.6) suggests that at least some of the variance resulted from regional

or epochal differences in the survival of the general populations from which the patients were drawn.

In addition to these reports, two studies have explored the relationship of major depression to survival among institutionalized individuals who were older on average than those described in table 5, in poor health, functionally impaired, and who manifested varying degrees of cognitive impairment including dementia. As expected, these multiply disabled populations of frail elders died at high rates. In a study of 454 residents of eight nursing homes in the Baltimore area, Rovner and colleagues (63) observed a 1-year survival rate of only 53% for the 57 residents who met DSM-III criteria for major depression. Moreover, the presence of major depression remained an independent predictor of survival after control for the effects of sociodemographic variables, functional disability, and hospitalization during the year. In a study of 898 institutionalized aged, Parmelee and co-workers (22, 64) reported 6-, 12-, and 18-month survival rates of 81%, 79%, and 67%, respectively, for an initial subgroup of 116 residents who met DSM-III-R criteria for probable major depression. In contrast to the former report, probable major depression did not emerge as an independent predictor of survival in the multiply disabled population of frail elderly followed by Parmelee and co-workers, after control for the effects of physical health, functional disability, and cognitive dysfunction. It is possible that the greater mortality associated with major depression in the latter study may have been mediated exclusively through these comorbid factors. Alternatively, the ability to detect risk factors whose effects on mortality are modest may be diminished in studies of very old, frail elders who suffer from high rates of mortality from multiple potent causes.

Published studies of the survival of patients over age 60 who suffer from primary psychotic disorders are rare, indeed. One reason for this is that such patients represent only a very small proportion of most populations and are uncommon even among older clinical populations. As an example, they accounted for only 11% (N=88) of the study population described in this report. Half of these patients suffered from schizophrenia, and, consistent with the estimates of Harris and Jeste (65), only six (all women) experienced onset after age 45. While decreased need for, or at least utilization of, mental health resources may contribute to this phenomenon, the survival of young patients with schizophrenia and other primary psychotic disorders into their 40s and 50s is greatly diminished by death from both natural and unnatural causes (27–30). Roth (16) reported 96% and 79% survival rates after 6 months and 2 years of follow-up of 45 paraphrenic patients over the age of 60. These survival estimates are substantially below those observed for the patients with psychotic disorders in the current study. In contrast, Kay (18) reported a standardized mortality ratio of only 1.2 (that did not significantly differ from 1.0) for 57 patients over age 60 who had late paraphrenia. The standardized mortality ratio of 1.8 observed for our group of

older patients with psychotic disorders did not reach statistical significance, most likely because of the relatively small number of deaths that occurred in this group (N=14). This inference is supported by the results of our proportional hazards analysis, which revealed indistinguishable relative risks of mortality associated with mood and psychotic disorders. Further studies will be required to definitively address this issue.

Even after control for differences in sociodemographic variables and medical burden, our results reflect substantially lower life expectancies for patients with organic mental disorders than for patients with mental disorders that arise from unidentified etiologies. However, it is important to recognize that the absolute and relative survival rates reported for the psychiatric groups in this study are age specific. The negative impact of both major depression and schizophrenia on survival is greatest in younger age groups and attenuates with advancing age (27–30, 56, 60). From the perspective of the entire lifespan, these disorders have effects on reducing survival in younger patients that may equal or exceed those associated with the organic mental disorders in older patients.

The observation that younger age, female gender, and lower medical burden were significant independent predictors of survivorship in this study population was consistent with our expectations (1, 46). However, the observation that black patients lived longer on average than Caucasian patients would not have been predicted by census data indicating that black and other minority residents have higher age-specific mortality rates, even among those who survive into their 60s and 70s (1, 46). This counterintuitive finding may be attributable to different patterns of health resource utilization that lead to a higher proportion of treatment-refractory cases among Caucasian patients. In a previous study of this patient population, black patients with major depression were significantly less likely to have received outpatient treatment before their index hospital admission than similarly depressed Caucasian patients (13). As a result, black inpatients were significantly more likely to experience the resolution of their depressive symptoms than Caucasian patients who were typically admitted after an unsuccessful course of outpatient treatment. This differential pattern of resource utilization seems unlikely to be restricted to patients with major depression and may have led to a higher proportion of Caucasian patients in our study population with treatment-refractory mental disorders. If this phenomenon accounts for the differential survival between black and Caucasian patients, it implies that unresponsiveness to treatment may be an additional risk factor for mortality in this population.

The most common ICD-9-CM causes of death for patients in all three diagnostic groups were diseases of the circulatory system, diseases of the respiratory system, and neoplasms. These represent the most common natural causes of death for individuals in this age range (1, 46). While diseases of the digestive system were uncommon (3.8%) causes of death in this study population, they were over four times more likely to have been

the cause of death for patients with mood disorders than for patients with organic mental disorders. This observation supports the validity and increases the significance of our reported finding of a greater prevalence of comorbid diseases of the digestive system among older patients with mood disorders (especially major depression) than in the other two groups (20). This association was observed during the index admission of the patients described in this study and was not readily attributed to differences in prescribed medications. Instead, it may reflect peripheral autonomic dysregulation among elderly patients with major depression that produces both greater morbidity and mortality, a phenomenon that warrants further study (66–68).

Suicide was a rare cause of death, accounting for only three (1.1%) of all 265 deaths. Consistent with the epidemiology of late-life suicide, all three were male Caucasians (34). Moreover, all had suffered from major depression during their index admissions. This observation is consistent with our previous report of a low prevalence of suicide attempts among patients with organic mental disorders (69) and with the published observation that the prevalence of suicide among patients with primary psychotic disorders declines with age and is rare among schizophrenic patients over age 50 (27–30).

Several issues regarding our methodology and the interpretation of our findings warrant further consideration. Since date and cause of death were obtained from the Pennsylvania Department of Health, the deaths of any residents who may have relocated outside of Pennsylvania would have escaped detection. This phenomenon is unlikely to have substantively affected our results because the population of western Pennsylvania is remarkably stable (70, 71) and because the lack of detection of deaths among the study population would have increased the apparent survival rates of the patient groups rather than decreasing them. Moreover, the reported dates and causes of death were supported by good agreement of these data with the medical records of individuals whose primary care was provided at our medical center, as well as with the axis III diagnoses of the patients during their index psychiatric admissions. Finally, it should be noted that our study population was identified by consecutive, nonduplicated index admissions to an inpatient geropsychiatric unit that were typically precipitated by behavioral abnormalities. As a result, our findings may not be generalizable to all clinical settings or to study populations recruited through other mechanisms.

In summary, our results support the nosologic distinction of the cognitive disorders included among the organic mental disorders described in DSM-III-R from the other major diagnostic groups of mental disorders that affect the elderly. However, they do not necessarily imply that biological factors have a smaller etiologic role in the development of the latter group of as yet idiopathic (cryptogenic) mental disorders. The survival of patients in this group was less than half that of patients with mood or psychotic disorders, even after con-

trol for differences in sociodemographic variables and medical burden. All three groups appeared to experience higher rates of mortality than did the general population, with standardized mortality ratios ranging from 1.5 to 2.5. For the most part, deaths occurred from the usual spectrum of natural causes in late life, with the exception that patients with mood disorders were more likely to have died from disorders of the digestive system and suicide than were the other two groups. Further studies of this population that systematically explore the sociodemographic and clinical correlates of survival within each major diagnostic group may advance our understanding of the clinical biology and treatment of the mental disorders of late life.

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