Suicide Mortality among Patients Treated for Depression in an Insured Population

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Studies of inpatient and specialty samples have estimated that 15% of depressed patients eventually die by suicide. This report examines suicide mortality among members of Group Health Cooperative of Puget Sound, a large health plan in western Washington state, who were treated for depression. Computerized discharge diagnoses, outpatient visit diagnoses, and outpatient prescription records were used to identify all enrollees who received treatment for depression during 1992, 1993, and 1994. Computerized death certificate data were used to identify all deaths and all suicide deaths in this sample before January 1, 1995. During the study period, 35,546 individuals received some treatment for depression and accounted for 62,159 person-years of follow-up. Of 850 deaths, 36 (4.2%) were classified as definite or possible suicides. Overall suicide mortality rate was 59 per 100,000 person-years, and was significantly higher among men than women (118 vs. 36 per 100,000 person-years, respectively). Risk per 100,000 person-years declined from 224 among patients who received any inpatient psychiatric treatment to 64 among those who received outpatient specialty mental health treatment to 43 among those treated with antidepressant medications in primary care to 0 among those treated in primary care without antidepressants. These data suggest that overall suicide risk among patients treated for depression is considerably lower than previous estimates based on specialty and inpatient samples. Risk is strongly related to treatment history—a likely indicator of illness severity. *Am J Epidemiol* 1998;147:155–60.

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Reference textbooks for clinicians (1–3) as well as educational materials for patients (4) often report that 15 percent of patients treated for depression will eventually die by suicide. This estimate is based on several studies that have examined eventual cause of death among depressed inpatients. As reviewed by Guze and Robins (5), long-term studies with more complete mortality data generally agree that suicide will account for approximately 15 percent of all deaths.

Data from inpatients are likely to yield biased estimates of suicide risk among all patients. Among outpatients treated for depression, suicidal ideation and suicide attempt are frequent indications for hospitalization. Consequently, depressed inpatients should suffer a higher suicide mortality than depressed patients with no history of hospitalization. The available data do suggest a lower suicide risk among outpatient samples. Morrison (6) reported that the suicide risk

among community psychiatric outpatients treated for depression (42 per 100,000 person-years) was significantly lower than that seen in inpatient samples. Amaddeo et al. (7) found that suicide mortality in a community-based psychiatric case registry (including all persons with inpatient or outpatient psychiatric treatment) was 17 times that in the general population. In a sample of 500 referral center psychiatric outpatients with mixed diagnoses, Martin et al. (8) observed a suicide rate 15 times that in the general population (based on six suicide deaths).

Nearly half of patients treated for depression are managed exclusively by general medical providers (9). None of the clinical samples described above estimate the risk of suicide in this group, and few data are available regarding suicide risk among depressed patients not treated by specialists. Hagnell et al. (10) reported a suicide risk of 650 per 100,000 person-years among men with depression in the Lundby community sample (based on 15 suicide deaths). Absent directly relevant data, primary care physicians and patients must base treatment decisions on data from specialty and inpatient samples (1–3).

This report examines suicide mortality among the entire population of patients treated for depression in a

large health plan. This population-based sample includes patients who received all levels of treatment: inpatient, mental health outpatient, and primary care. With the use of pharmacy data, outpatient visit registration and diagnosis data, and hospital discharge data, we identified all members of the health plan who received inpatient or outpatient depression treatment over a 3-year period. This sample was then linked to computerized death certificate data to estimate suicide mortality rate.

MATERIALS AND METHODS

Study setting

Group Health Cooperative of Puget Sound (GHC) is a large staff-model health maintenance organization that serves approximately 450,000 residents of western Washington state. GHC provides comprehensive care on a capitated basis with members typically receiving GHC coverage through employer-subsidized plans. The GHC enrollment includes approximately 45,000 Medicare members and 35,000 members covered by Medicaid or by Washington state's Basic Health Plan (a state program for low-income residents). GHC members are similar to Seattle area residents except for a higher mean educational attainment and less representation of the highest and lowest strata of income (11). The overall suicide risk in the GHC population during this period (approximately 16 per 100,000 person-years) was slightly higher than the crude US population suicide mortality rate during 1993 (12.1 per 100,000 person-years) (12). Previous research on suicide deaths in the GHC population (13) found that approximately 40 percent had some record of treatment for depression, a proportion similar to that reported in other samples (14). At GHC, primary care for adults is provided by approximately 360 physicians (full-time and part-time) with each full-time physician being responsible for a defined panel of approximately 1,600 members. Specialty mental health services are available through either physician-referral or self-referral from six mental health clinics staffed by approximately 20 psychiatrists and 90 non-physician providers. Specialty mental health clinics emphasize short-term individual psychotherapy, pharmacotherapy, and group therapy. Typical coverage arrangements provide for unlimited psychiatric medication management visits (subject to $5 to $10 visit copayments) and 10–20 outpatient psychotherapy visits (subject to $10 to $20 visit copayments). No referral or authorization is required for seeking specialty mental health care, and primary care physicians have no incentive to limit mental health service use. Over 90 percent of primary care physicians and psychiatrists

are certified by appropriate specialty boards. GHC's computerized information systems include data on all outpatient visits to GHC clinics and all outpatient prescriptions filled at GHC pharmacies. Previous surveys of GHC members have found that over 95 percent of prescriptions filled by GHC members (including those for antidepressant drugs) are filled at GHC pharmacies (15).

Selection of study sample

Potential subjects were all GHC members aged 18 years and over who were enrolled in the health plan at any time from January 1, 1992 to December 31, 1994. We identified members who received any depression treatment based on two criteria: 1) any diagnosis of depressive disorder from a GHC provider during the study period; or 2) any diagnosis of adjustment reaction from a GHC provider accompanied by a prescription for an antidepressant drug.

For each member selected, the period of observation began with the first treatment "event" during the study period and ended with death, disenrollment from the health plan, or December 31, 1994 (whichever occurred first). A treatment event was defined as any of the following: outpatient medical visit with a recorded diagnosis of depression, antidepressant medication fill or refill, outpatient mental health visit, or psychiatric hospitalization. For members who continued treatment begun prior to the study period (i.e., treatment event between July 1, 1991 and December 31, 1991), the period of observation began on January 1, 1992.

Mortality data

Date and cause of death were determined from Washington State Department of Health computerized mortality records. Computerized mortality data were linked to GHC computerized records by name and birth date with hand-coding of ambiguous matches. We considered all persons with cause of death coded as *International Classification of Diseases*, 9th Revision (ICD-9) codes E950 to E959 to be suicide deaths and all those with cause of death coded as ICD-9 codes E980 to E989 ("External injury undetermined whether self-inflicted") as possible suicide deaths.

Data analysis

Cox proportional hazards regression (16) was used to compare suicide mortality risk among patient subgroups. The Mantel-Haenszel chi-square statistic (17) was used to determine linear association.

In studies with complete mortality data (i.e., follow-up until all members of the cohort have died), the cumulative lifetime risk of suicide is simply

calculated as the proportion of all deaths due to suicide. Because 50 years or more of follow-up may be required to record complete mortality, most estimates of lifetime risk rely on shorter follow-up periods (i.e., not all members of cohort have died). Because risk of suicide declines with time since starting treatment (18, 19) while mortality from other causes increases with age, the proportion of total deaths due to suicide tends to decline with increasing length of follow-up. Consequently, data from samples with shorter follow-up will tend to overestimate cumulative lifetime suicide risk (5).

RESULTS

The above eligibility criteria identified 35,546 individuals who received some treatment for depression between January 1, 1992 and December 31, 1994. Age ranged from 18 to 98 years (mean age 45 years (standard deviation, 17); median age of 43 years), and 71 percent of those identified were female. During the period of observation, 31,142 (88 percent) filled one or more prescriptions for an antidepressant drug, 20,823 (59 percent) made one or more outpatient visits to any specialty mental health provider in the health plan, 10,280 (29 percent) made one or more visits to a psychiatrist in the health plan, and 911 (2.6 percent) had one or more psychiatric hospitalizations. Using data on treatment received, we classified patients into four hierarchical, mutually exclusive categories: any inpatient treatment, any outpatient visit to a specialty mental health provider, any prescription for antidepressant drugs, and none of the above.

During the follow-up period, 850 deaths were recorded in the study sample, including 36 (4.2 percent) classified as definite or possible suicides. In table 1, the left columns display the number of deaths and number of suicide deaths by patient age, sex, and level of treatment received. While the number of suicide deaths was approximately equal in older and younger patients, suicide accounted for a much larger proportion of overall mortality in younger age groups (Mantel-Haenszel chi-square for linear association = 61.2, $p < 0.001$). The proportion of total mortality due to suicide increased dramatically with level of treatment (Mantel-Haenszel chi-square for linear association = 14.3, $p < 0.001$).

The sample accumulated 61,158 person-years of observation during the follow-up period. Table 1 shows the suicide mortality rate (number of deaths per 100,000 person-years of follow-up) according to patient age, sex, and treatment received. The relations between these patient characteristics and suicide mortality rate were examined in a series of Cox regression models. While risk appeared to be higher in the lowest age group (18–30 years) and the highest age group (≥65 years), suicide risk did not differ significantly among the four age groups (likelihood ratio statistic (LRS) = 2.96, degrees of freedom (df) = 3, $p = 0.39$). As shown in figure 1, suicide mortality was significantly higher among men than women (LRS = 12.04, df = 1, $p < 0.001$). As shown in figure 2, risk also increased in an approximately linear fashion with increasing level of treatment (LRS = 8.2, df = 1, $p = 0.004$). The suicide mortality rate for the two groups

TABLE 1. Total mortality and suicide mortality among Group Health Cooperative of Puget Sound health plan members treated for depression in 1992–1994 by age, sex, and level of treatment

|	No. of deaths	No. of suicides	% of deaths due to suicide	No. of person-years	Suicides per 100,000 person-years	95% CI* for suicide rate
Total	850	36	4.2	62,159	59	40–78
Age (years)						
18–30	23	6	26.1	9,927	60	12–109
31–45	82	13	15.9	24,855	52	24–81
46–60	110	6	5.5	14,405	42	8–75
≥61	635	11	1.7	11,979	92	38–146
Sex						
Male	412	20	4.9	16,936	118	66–170
Female	438	16	3.7	44,242	36	18–54
Level of treatment						
Any psychiatric inpatient	20	4	20.0	1,782	224	5–444
Any mental health specialty visit	426	24	5.6	37,380	64	39–80
Any antidepressant	336	8	2.4	18,422	43	13–74
None of above	63	0	0	3,540	0	–

* CI, confidence interval.
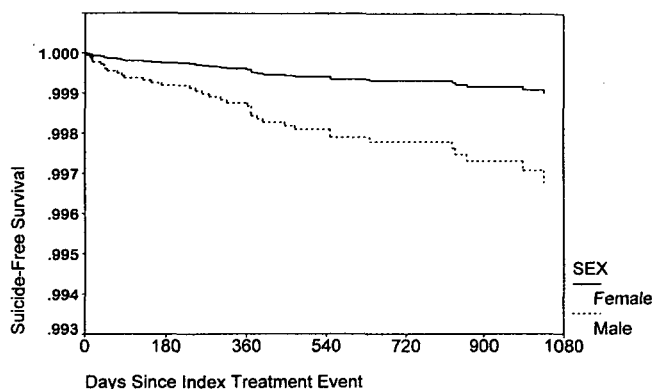
FIGURE 1. Suicide mortality among Group Health Cooperative of Puget Sound health plan members treated for depression in 1992–1994 by sex.
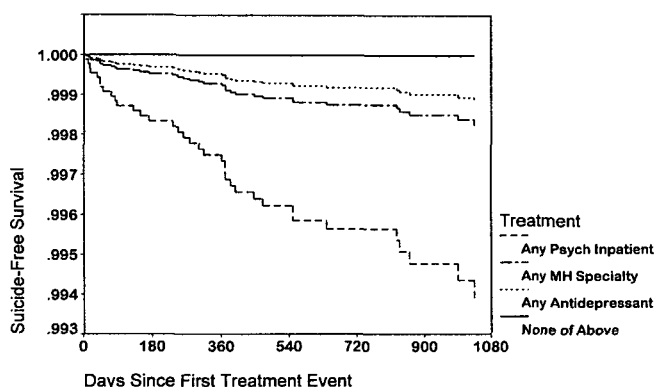

FIGURE 2. Suicide mortality among Group Health Cooperative of Puget Sound health plan members treated for depression in 1992–1994 by type of treatment received. (Any Psych Inpatient, any psychiatric inpatient; Any MH Specialty, any mental health specialty.)

that were treated exclusively in primary care (with or without antidepressants) was 36 per 100,000 person-years (95 percent confidence interval (CI) 11–62) compared with 71 per 100,000 person-years (95 percent CI 45–98) among those that received any specialty mental health treatment (either inpatient or outpatient).

These analyses classify patients according to highest level of treatment received at any time during the observation period. An alternative classification based on level of treatment in the 120 days prior to death or disenrollment yielded an even stronger risk gradient. Risk declined from 1,275 per 100,000 person-years among persons who received inpatient treatment to 35 per 100,000 person-years among persons treated in primary care.

Because the follow-up period in our sample (maximum of 3 years) was much shorter than that in most inpatient follow-up studies, we examined the risk of suicide with increasing time since treatment. For each

patient, we computed the interval between final treatment event (antidepressant prescription fill/refill, mental health specialty visit, primary care visit with depression diagnosis, psychiatric hospital discharge) and the date of death or disenrollment. Suicide risk declined progressively with time since the last treatment. Suicide mortality fell from approximately 80 per 100,000 among patients within 60 days of the last treatment event to approximately 18 per 100,000 among those 60–120 days from the last treatment event down to zero among those more than 300 days since the last treatment event.

DISCUSSION

During a 3-year period, over 35,000 members of this large health plan received some treatment for depression. In over 60,000 person-years of follow-up, we observed 850 deaths, including 36 (4 percent) classified as definite or possible suicides. Risk of suicide was higher among men and strongly related to treatment history. Suicide risk among persons with histories of inpatient or specialty treatment was similar to previously reported rates. Average risk for the entire population of treated patients, however, was considerably lower than frequently cited estimates.

The major limitation of these data is the accuracy of death certificate information. As several earlier sources have pointed out, death certificate information may under-represent suicide mortality (20, 21). Accuracy of suicide ascertainment depends on the training of the certifying authority and the thoroughness of postmortem study. Efforts to quantify this under-reporting have typically concluded that 10–25 percent of suicide deaths may be misclassified as accidental or due to undetermined cause (22, 23). We have attempted to account for this under-reporting by including "undetermined" injuries as possible suicide deaths. Including this group increased our estimates of suicide mortality by approximately 10 percent.

We must consider the possibility that characteristics of this sample account for a lower suicide risk than reported in earlier samples. First, those with more severe mental or substance-use disorders may be under-represented in an insured sample. During the period of this study, however, the GHC population did include approximately 35,000 members (representing. approximately 9 percent of total enrollment) covered through Medicaid or the Washington Basic Health Plan (a subsidized program for low-income residents). Second, our restriction to members still enrolled in the health plan may exclude some high-risk patients. For example, job loss and marital separation/divorce may lead to both loss of health insurance coverage and an increased likelihood of later death by suicide. When

we included all deaths prior to January 1, 1995 recorded in Washington state (regardless of disenrollment from the health plan), we identified only two additional suicide deaths. Because disenrollment from GHC may be due to moving away from Washington state, we cannot accurately determine the period of observation for deaths that occurred after disenrollment. Consequently, we are not able to calculate a suicide mortality rate including suicides after disenrollment. Finally, we included patients who received antidepressant prescriptions with visit diagnoses of adjustment reaction. Our previous research (24) suggests that these patients do not differ clinically from those who received visit diagnoses of depressive disorder. While we cannot completely exclude the possibility of an unusually low suicide risk in this sample, the overall risk in the GHC population during this period was similar to the national average.

Because our sample was drawn from physicians' recorded diagnoses, it may exclude many patients with depressive illness. First, use of recorded diagnoses may exclude a significant number of patients who are actually treated for depression. Treating physicians may be reluctant to record a diagnosis of depression because of concerns about stigma and future insurability (25). While we cannot assess the magnitude of any possible under-coding in this sample, we can examine suicide mortality among those who received antidepressant prescriptions with no diagnosis of depression. Inclusion of this group would yield an additional nine suicide deaths in 28,155 person-years of observation (mortality rate = 32 per 100,000 person-years). The lower suicide mortality in this group (antidepressants without depression diagnosis) is consistent with data that show that antidepressants are frequently prescribed by primary care physicians for nonpsychiatric indications (26, 27). Second, our sample excludes patients with unrecognized and/or untreated depression. Community surveys (28) and primary care surveys (29, 30) estimate that half or more of patients with major depression may go unrecognized or untreated. Because unrecognized or untreated depression is typically less severe (29, 30), we would expect a lower suicide risk in the unrecognized group.

These findings suggest a strong relation between treatment history and suicide mortality. Risk was only half as great among patients treated exclusively in primary care as among patients who received any mental health specialty treatment. The relation between level of treatment and suicide risk almost certainly reflects the association between level of treatment and severity of illness. Previous epidemiologic research in the GHC population has demonstrated a strong association between depression severity and use

of either antidepressant medications (29) or specialty mental health services (31).

As discussed above, the proportion of total mortality due to suicide observed in this sample (4.2 percent) probably overestimates what would be observed with longer follow-up. Long-term follow-up studies typically find that non-suicide mortality increases with age while risk of suicide decreases with time since starting treatment (5). Both of these phenomena were also seen in this sample. As seen in table 1, mortality due to other causes increased dramatically with age. Risk of suicide declined with increasing time since the last treatment event, a finding also reported in two other follow-up studies (18, 19). Consequently, longer follow-up of this sample would probably show increasing rates of non-suicide mortality, a decreasing suicide risk, and a smaller proportion of overall mortality attributable to suicide. Stated otherwise, we observed this sample during a time when suicide should account for the highest proportion of deaths. Most patients had been recently treated and the large group of young and middle-aged patients were at low risk for death due to medical illness. Consequently, the percents in table 1 provide an upper bound estimate for the proportion of total mortality accounted for by suicide.

Given the limitations discussed above, these data suggest that the proportion of all deaths due to suicide in the total population of patients treated for depression is considerably lower than estimates drawn from inpatient samples. Among patients in this sample who were hospitalized for depression treatment, suicide accounted for 20 percent of observed deaths. Suicide accounted for a much smaller proportion of total mortality among patients who received only outpatient treatment and an even smaller proportion among those treated exclusively in primary care. Our findings argue that risk estimates from more severely ill specialty samples should not be generalized to primary care practice. Estimation of suicide risk from inpatient samples is especially problematic because suicide risk is frequently an indication for hospitalization.

Our findings in this sample of patients who were treated for depression confirm some of the sociodemographic predictors of completed suicide found in general population samples (20, 21). While the population treated for depression was 72 percent female, risk of completed suicide in the treated population was nearly four times as high among men. Consequently, men accounted for slightly more than half of completed suicides in our treated sample. While we find no significant relation between age and suicide risk, most population samples show increasing suicide mortality with age, especially among men (20, 21). This appar-

ent discrepancy may reflect the higher proportion of suicides among older men not associated with depression diagnosis or treatment. The curvilinear (but nonsignificant) relation between age and suicide risk did suggest a pattern seen in more recent data: higher risk in early adulthood and old age than in midlife (21, 22). Our data do not allow us to examine the contribution of other important demographic and clinical factors to suicide risk. GHC's computerized data systems contain no information on race, income, or marital status. Without detailed clinical information, we cannot examine the relation of suicide risk to severity or duration of depression. We also lack data on alcohol consumption or use of other substances in this population.

We conclude that, overall, suicide risk among patients in this large group health plan who were treated for depression was considerably lower than previous estimates based on inpatient or specialty samples. Among the more severely depressed patients who were treated in inpatient and specialty settings, the risk of death by suicide was substantial. Among patients with less severe illness—often managed in primary care—the burden of depressive illness was expressed more through functional impairment and personal suffering.

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