A Retrospective Study of General Hospital Patients Who Commit Suicide Shortly After Being Discharged From the Hospital

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Objective: To assess the scope of diagnostic screening for suicide prevention in general hospital patients.

Methods: Retrospective medical record review of general hospital patients who committed suicide and matched-control subjects who did not commit suicide shortly after being discharged from the hospital.

Results: The suicide rate was 32 per 100,000 patient-years. Eight (73%) of 11 patients who committed suicide were diagnosed with depression, substance use disorder, or both at their last hospital admission compared with 11 (33%) of the controls (P < .05). Only 1 of 44 patients (both cases and controls) was referred for psychiatric consultation.

Conclusions: The suicide rate in general hospital patients was almost 3-fold higher than in the general population. Depression and/or substance use disorders were risk factors for suicide. Screening for those disorders may be beneficial for suicide prevention in the general hospital population, but will likely benefit more patients who will not commit suicide.

Arch Intern Med. 2001;161:991-994

Previous studies have suggested that many suicides have medical and psychiatric contacts shortly before committing suicide.1-3 Physicians may be in a unique situation to assess suicidal behavior in patients. More studies to identify patients at risk for suicide in different medical settings, including the general hospital, are warranted.

An increased suicide risk has been reported in some medical conditions.4,5 Suicide in medically ill people may be linked with comorbid psychiatric disorders, mainly depression and substance use disorder. These disorders are important risk factors for suicide.6,7

In this retrospective medical record study, the feasibility of suicide prevention through diagnostic screening for depression and/or substance use disorders was examined. In agreement with previous studies, we expected to find a higher suicide rate in general hospital patients compared with the general population, higher rates of depression and/or substance use disorders in patients who committed suicide than in control subjects, and underuse of psychiatric consultation.8,9

The suicide rate was 32 per 100,000 patient-years. In the Table, demographic, clinical, and toxicologic information of suicides are listed. Mean age (at the time of the hospital admission) of the patients who committed suicide was 45 (SD, 15; range 20-72). Five younger than 45 years of age, 6 were 45 and older. There were 6 men and 5 women, 7 white and 4 black. Seven patients committed suicide within 6 months after being in the hospital. Among suicides, 8 (73%) of 11 were diagnosed with depression, substance use disorder, or both. Other diagnoses were schizophrenia (n = 1), atypical psychosis (n = 1), and bipolar disorder (n = 1). These were comorbid with depression or substance use disorder. No disorders were found in 3 cases. Four suicides were positive for alcohol, cocaine, and/or cannabis. All 4 were diagnosed with substance use disorder in the chart review at the last hospital admission. Diagnostic rates of depression and substance use disorders were compared between patients who committed suicide and controls (data not shown). Depression and/or substance use disorders were found in 8 (73%) of 11 cases vs 11 (33%) of 33 controls (P < .05, Fisher exact test). Substance use disorders were the most frequent diagnosis in suicides (6 [54%] of 11 suicides). Depression was detected in 4 (36%) of 11 suicides. Two patients were diagnosed with both disorders. Findings were similar across age, sex, and race, except that depression was found more of-
SUBJECTS AND METHODS

DESIGN

The study population consisted of patients admitted to 3 university hospitals in Mobile, Ala. Two are for adults and 1 is for children and women. None have psychiatric beds. Patients are mostly indigenous and come from Mobile County with a population of about 400,000. Some patients come from surrounding counties for admission to specialized units (eg, the burn or transplantation unit).

A matched case-control study was done. Cases were adult (aged ≥15 years) general hospital patients who were admitted to 1 of the 3 university hospitals in Mobile, Ala, between October 31, 1995, and September 30, 1998; and who subsequently committed suicide (in the same period). Only residents of Mobile County were included. Persons admitted following suicide attempts were excluded from the study as suicide attempters were considered a special group with a higher risk of suicide than other patients. Patients who died in the hospital following a suicide attempt were also excluded.

Controls were general hospital patients who were admitted during the same period (October 31, 1995-September 30, 1998) and for similar reasons but who did not commit suicide (in the same period). Three controls were selected for each suicide case. Matching was done on age, sex, race, primary medical diagnosis, admission period, and admission service in each university hospital. Information was obtained through review of hospital records of the last admission. The study was approved by the institutional review board of the University of South Alabama, Mobile.

SUBJECTS

A complete list of suicides and uncertain deaths among Mobile County residents was obtained from the Alabama Department of Forensic Sciences Mobile Regional Laboratory. Cause of death was determined by the Office of the Medical Examiner, Mobile. Admission data were obtained from the hospital administration. Twelve cases were identified by cross-referencing databases of all suicides (n=134) and undetermined deaths (n=14) and by admissions (N=25,181) to the university hospitals in Mobile between October 31, 1995, and September 30, 1998. Five suicides occurred in consensus meetings.

The presence and recognition of depression and/or substance use disorders were assessed retrospectively. Three criteria were required for a diagnosis of depression: (1) nurses’ or physicians’ entries of depressed mood, (2) a medical record diagnosis of depression, and (3) the patient’s use of antidepressant medication. Substance use disorders were diagnosed if there was a medical record diagnosis, and/or if entries documented recent substance abuse, and/or if toxicologic results showed recent alcohol, cocaine, or cannabis use. Requests for psychiatric consultation in cases and controls were recorded. Death certificates of subjects who committed suicide were reviewed. Toxicologic data were recorded from medical records at the University of South Alabama Mobile Regional Laboratory.

STATISTICAL ANALYSES

The suicide rate in general hospital patients between October 31, 1995, and September 30, 1998, was calculated as the probability of suicide using the following formula: \[
\frac{(12/25,181) \times (100,000/\text{average time at risk})}{10} \]
(ie, 1.5 years). \(P \leq .05\) was considered statistically significant.

MAIN OUTCOME MEASURES

The suicide rate in general hospital patients of 32 per 100,000 was almost 3-fold higher than in the general populations (12 per 100,000). Most persons who committed suicide after being discharged from the hospital had diagnosable psychiatric disorders, particularly depression and substance use disorders, in agreement with previous suicide studies. \(^6,11\) Rates of these disorders were higher in cases compared with controls (73% vs 33%; \(P < .05\), Fisher exact test). Only 1 of 44 patients (both cases and controls) was referred for psychiatric consultation.

LIMITATIONS

Only admissions to the 3 university hospitals in Mobile were considered. No comparative data on patient populations in other hospitals in Mobile were available. This limitation should be addressed in future studies by comparing data from different hospital settings with (ie, those in which house staff are usually primary care providers) and without university affiliation.
It is possible that some admissions were not recorded in the computerized hospital databases owing to errors. Chances that a patient who later committed suicide was omitted from the database is very small, however, owing to the rarity of suicide. Another potential problem is the underrecording of suicides. All verdicts of suicide and undetermined death were made following investigations by the Alabama Department of Forensic Sciences Mobile Regional Laboratory. Our previous and ongoing studies have this with department suggest to us that the number of suicides that are misclassified as accidental or natural deaths is miniscule. In addition, none of the suicides in this study came from the group of undetermined deaths.

The small number of suicides precluded detailed analyses. Also, the suicide rate of 32 per 100000 patient-years is probably an underestimate. Some patients may have moved out of Mobile County before committing suicide and the average follow-up time of 1.5 years is short. Results are therefore tentative and need replication in larger and longer studies.

Another set of limitations is inherent to retrospective medical record reviews. Rates of psychiatric disorders from a medical record review may be underestimates owing to the varying quality of information in the medical record entries. There is no a priori reason for more or less underreporting in cases vs controls. This supports the higher rate of psychiatric disorders in the patients who committed suicide compared with controls, although the true rates may be higher than 77% and 33%.

Corroborating diagnostic evidence for the presence of substance use disorders in some patients came from the toxicologic data at autopsy. In a review of suicide studies, positive detection of alcohol and other substances of abuse had high specificity but low sensitivity for the diagnosis of substance use disorders. Data in this study support this as all 4 suicides with positive levels of alcohol, cocaine, and/or cannabis were previously diagnosed with substance use disorders (Table). Conversely, 2 of 6 patients with substance use disorders had a negative toxicology screen.

The fact that only 1 of 44 patients was referred for psychiatric consultation suggests underuse of this service, which agrees with the findings reported in other reports. This is congruent with the notion that psychiatric conditions are often missed in medical patients.

**IMPLICATIONS FOR SUICIDE PREVENTION**

The elevated suicide rate in general hospital patients supports the appropriateness of suicide prevention as a separate focus in this setting. Depression and/or substance use disorders were risk factors for suicide, as in other populations. A first step would be to improve early recognition and treatment of these common disorders. Findings emphasize the importance of continued efforts to educate hospital physicians about diagnoses, management, and referral of patients with depression and substance use disorders.

About one third of the controls were also diagnosed as having depression and/or substance use disorder. The matched design of this study may have elevated these rates. Controls were matched on primary medical conditions that may be linked to depression and/or substance use disorders. Previous studies, however, have also found high comorbidity rates (21%-51%) of depression and substance use disorders in medical patients. The relatively high rate of these disorders in controls reduces the possibility of accurate prediction of patients who will commit suicide greatly as large number of people at risk who will not commit suicide (ie, false-positive results) will be identified.

Some authors suggest that global improvements in mental health provisions and delivery rather than specific measures, often targeted at high-risk groups, will be necessary to reduce suicide rates further. We believe the data in this study support this view. Unfortunately, the challenge for health care in the United States and in any country may then be enormous. Alternatively, future research may uncover risk factors that are specific enough to guide targeted preventions.

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**Characteristics of 11 General Hospital Patients Admitted Between 1995 and 1998 Who Committed Suicide Shortly After Being Discharged From the Hospital**

<table>
<thead>
<tr>
<th>Patient No./Age, y/Ethnicity/Sex</th>
<th>Main Condition</th>
<th>Admitting Service</th>
<th>Interval, mo*</th>
<th>Diagnosis†</th>
<th>Toxicology Result‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 20/B/M</td>
<td>Gunshot wound§</td>
<td>Surgery</td>
<td>20</td>
<td>SA</td>
<td>+</td>
</tr>
<tr>
<td>2 32/W/F</td>
<td>Vaginal bleeding</td>
<td>Gynecology</td>
<td>6</td>
<td>None</td>
<td>−</td>
</tr>
<tr>
<td>3 33/B/F</td>
<td>Sickle cell anemia</td>
<td>Internal Medicine</td>
<td>1</td>
<td>None</td>
<td>−</td>
</tr>
<tr>
<td>4 45/W/F</td>
<td>Diabetes mellitus</td>
<td>Family Practice</td>
<td>4</td>
<td>DD</td>
<td>−</td>
</tr>
<tr>
<td>5 42/W/M</td>
<td>Eye laceration§</td>
<td>Ophthalmology</td>
<td>23</td>
<td>SA + DD</td>
<td>+</td>
</tr>
<tr>
<td>6 45/W/F</td>
<td>Cellulitis</td>
<td>Internal Medicine</td>
<td>4</td>
<td>SA</td>
<td>−</td>
</tr>
<tr>
<td>7 45/B/M</td>
<td>Chronic leukemia</td>
<td>Internal Medicine</td>
<td>29</td>
<td>SA</td>
<td>+</td>
</tr>
<tr>
<td>8 84/B/M</td>
<td>Calcaneus fracture§</td>
<td>Orthopedics</td>
<td>31</td>
<td>None</td>
<td>−</td>
</tr>
<tr>
<td>9 56/W/M</td>
<td>Chronic pancreatitis</td>
<td>Internal Medicine</td>
<td>3</td>
<td>SA</td>
<td>+</td>
</tr>
<tr>
<td>10 64/W/M</td>
<td>Chronic lung disease</td>
<td>Internal Medicine</td>
<td>2</td>
<td>SA + DD</td>
<td>−</td>
</tr>
<tr>
<td>11 72/W/F</td>
<td>Stroke</td>
<td>Internal Medicine</td>
<td>2</td>
<td>DD</td>
<td>−</td>
</tr>
</tbody>
</table>

*Interval indicates the time between the patient’s admission to the hospital and the suicide.
†SA indicates substance use disorder; DD, depressive disorder; and SA + DD, comorbid substance use disorder and depression.
‡Toxicology results for alcohol, cocaine, and/or cannabis at autopsy. Plus sign indicates positive; minus, negative.
§No evidence of self-harm or self-inflicted injury was found in these cases.
Accepted for publication September 14, 2000.

We thank Charles L. Rich, MD, of the Department of Psychiatry, University of South Alabama College of Medicine, Mobile, and Leroy Riddick, MD, of the Alabama Department of Forensic Sciences Mobile Regional Laboratory for support.

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REFERENCES