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Suicide Immediately After Discharge From Psychiatric Inpatient Care: A Cohort Study of Nearly 2.9 Million Discharges

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ABSTRACT

Objective: The risk of suicide is elevated after discharge from a psychiatric hospital. This study aimed to investigate how recent suicidal behavior affects the risk of suicide in patients with different psychiatric diagnoses immediately after discharge.

Methods: Registers with national coverage were linked to create a study cohort including all individuals discharged from psychiatric hospitals in Sweden from 1973 through 2009. Hazard ratios for discharge diagnoses were calculated. The risk of suicide within 30 days after discharge in each diagnostic category when suicidal behavior had been registered within 30 days before admission was estimated.

Results: A total of 3,695 suicides occurred after 2,883,088 discharges. If recent suicidal behavior was registered, the risk of completed suicide increased prominently in all diagnostic categories, but particularly for schizophrenia (hazard ratio [HR]=8.9; 95% CI, 6.4–12.4) and other nonorganic psychosis (HR=6.8; 95% CI, 5.1–9.0). Patients suffering from depression had the highest overall risk of suicide postdischarge (HR=3.0; 95% CI, 2.7–3.3). This finding applied especially to male patients with depression (HR=4.5; 95% CI, 4.0–5.0) or with reaction to crisis (HR=3.6; 95% CI 3.0–4.4).

Conclusions: A distinct elevation of the risk of suicide was seen in all diagnostic groups if a recent self-harm event had occurred, particularly among patients with psychotic disorders. Overall, the immediate risk of suicide after discharge was high regardless of recent suicidal behavior. The findings in this study have relevance for clinical decisions about immediate after-care and treatment in connection with discharge from psychiatric inpatient care.

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Approximately every second suicide is committed by a person who at some earlier point has been admitted to psychiatric inpatient care.¹ The risk is more than 100 times elevated during the first 3 months after discharge compared with the global suicide rate.² Efforts have been made to identify people at greatest risk of suicide after psychiatric hospitalization. A meta-analysis³ of risk factors for suicide postdischarge has been conducted on the basis of 13 studies, covering 1,544 cases of suicide, with follow-up intervals between 2 and 12 months. The factors associated with suicide after discharge were prior suicide attempt and depressive symptoms irrespective of an affective syndrome.³ However, how the co-occurrence of suicidal behavior affected the risk of subsequent suicide in various psychiatric disorders was not studied.

From a clinical perspective, the risk during the first few weeks postdischarge is of particular importance.⁴ The largest previous study¹ informing on immediate risk of suicide postdischarge in relation to discharge diagnosis was not included in the aforementioned meta-analysis. It was performed in Denmark in 2005 and covered 1,319 cases of suicide within 30 days of discharge. The authors found that affective disorder was the psychiatric diagnosis associated with the highest risk. Further, the Danish study showed that the steepest elevation of risk was during the first 30 days after discharge. However, it did not include any data on prior self-harm, the most robust risk factor involved in suicide.⁵ A study⁶ based on selected register data on Medicaid patients in the United States included information on recent deliberate self-harm but, surprisingly, found little or no significant contribution to suicide risk within the first 90 days after discharge. The authors speculated that underreporting in administrative data might have attenuated the association. The study contained no diagnosis-specific analyses of the importance of self-harm. Hence, no well-powered study has investigated how important previous deliberate self-harm is for risk of suicide in different diagnostic groups after discharge from a psychiatric hospital.

After a nonfatal act of deliberate self-harm, the risk of subsequent suicide is elevated most prominently immediately after the act.⁷ Deliberate self-harm within a month of hospitalization was found to be associated with an especially high rate of suicide within a year after discharge in another Danish cohort study.⁸ To our knowledge, the short-term risk of suicide within a time span of 1 month after discharge among patients who recently engaged in deliberate self-harm has not previously been studied on a large scale.

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Clinical Points

- Risk of suicide immediately after discharge from psychiatric inpatient care is elevated regardless of diagnosis.
- Male patients who suffer from depression and reaction to crisis have an increased risk of suicide postdischarge compared with other diagnostic groups.
- The immediate risk of suicide after discharge from psychiatric hospitalization is particularly high in psychotic patients if recent suicidal behavior has occurred.

For a clinician who decides if there is a need for immediate follow-up after discharge of a psychiatric patient, information about recent self-harm and the main diagnosis is available, and evaluation of the short-term risk of suicide plays an important role in making that decision.

Our main aim was to investigate how recent suicidal behavior in close proximity with hospitalization affects the risk of suicide immediately after discharge in patients with different psychiatric diagnoses. We used a nationwide cohort that included all individuals who completed suicide within 1 month of discharge from psychiatric hospitals in Sweden from 1973 through 2009.

METHODS

Study Setting

Ethical approval for this study was obtained from Stockholm's Regional Ethics Committee (protocol 2009/5:10). We used a cohort design with data from Swedish national registers. The unique personal identification number, given to individuals at birth or on immigration to Sweden,⁹ enabled linking of the registers. All patients discharged alive from psychiatric inpatient care in Sweden from January 1, 1973, to December 31, 2009, and who had received a psychiatric diagnosis were considered at risk and included in the cohort. Individuals whose date of death was the same as date of discharge were regarded as having died during their inpatient stay and were not included in the cohort. Patients were considered at risk from the first day after discharge until 30 days postdischarge. Those who died of causes other than suicide, emigrated, or were readmitted to psychiatric inpatient care before 30 days had passed were considered as cases of "non-suicide after discharge." Naturally, they contributed less time under risk. Since each time period after discharge was registered, the same patient could appear several times in the study. If a patient was discharged and readmitted and then discharged again with a subsequent suicide, all within 30 days, only the last discharge was considered regarding "suicide after discharge."

Exposure

Principal diagnosis at discharge was extracted from the National Patient Register¹⁰ (NPR, held by the Swedish National Board of Health and Welfare). The NPR includes information on all individuals admitted to any hospital

for assessment or treatment in Sweden (including private hospitals). Data from the NPR were extracted after formal application and approval by an ethical committee. At discharge, all patients in Sweden are given a principal clinical diagnosis according to the *International Classification of Diseases (ICD)*. The principal diagnosis specifies the main reason for the patient's need for hospitalization. The register is of high quality, and only 1% of hospital discharges lack personal identification numbers. Diagnoses in the register have been found to have high validity with regard to bipolar and psychotic disorders.^{11,12} We included the following diagnoses: schizophrenia (defined as *ICD-8/ICD-9*: 295, *ICD-10*: F20), other nonorganic psychosis (*ICD-8*: 296.9, 297–299; *ICD-9*: 296X, 297, 298; *ICD-10*: F21–F25, F28–F29), bipolar disorder (including manic and mixed state: *ICD-8*: 296.1, 296.3–296.8; *ICD-9*: 296A, 296C, 296E, 296W; *ICD-10*: F30, F31.0–F31.2, F31.6–F31.9), depression (depressive disorders including bipolar depression: *ICD-8*: 296.0, 296.2, 300.4; *ICD-9*: 296B, 296D, 300E, 311; *ICD-10*: F31.3–F31.5, F32–F34, F38–F39), alcohol use disorder (*ICD-8*: 291, 303; *ICD-9*: 291, 303, 305A; *ICD-10*: F10), substance use disorder (excluding alcohol use disorder: *ICD-8*: 304; *ICD-9*: 292, 304, 305X; *ICD-10*: F11–F19), personality disorders (*ICD-8/ICD-9*: 301; *ICD-10*: F60–F62), reaction to crisis (reaction to severe stress and adjustment disorders: *ICD-8*: 307; *ICD-9*: 308–309; *ICD-10*: F43), and anxiety disorder (*ICD-8*: 300 except 300.4; *ICD-9*: 300 except 300E; *ICD-10*: F40–F42, F44–F48). Psychiatric diagnoses other than those specified above (but within the codes *ICD-8/ICD-9*: 290–319; *ICD-10*: F00–F99) were merged into a category called "other psychiatric diagnosis." Nonpsychiatric diagnoses were not included.

We extracted information about previous deliberate self-harm from the NPR. Any self-harm event registered within 30 days of hospital admission was regarded as an exposure. The NPR is based on the *ICD* and includes all episodes of self-harm leading to hospital admission, ie, events both with and without suicidal intention. Hence, both suicide attempts and nonsuicidal self-injuries are included in the term *deliberate self-harm* as used in this study. In line with other studies, deliberate self-harm also includes both certain and uncertain events to avoid underestimation: *ICD-8/9*: E950–E959, E980–E989; *ICD-10*: X60–X84, Y10–Y34.^{13–15}

Outcome

The outcome we assessed was certain and uncertain completed suicide in the first month following inpatient care (*ICD-8/9*: E950–E959, E980–E989; *ICD-10*: X60–X84, Y10–Y34). Data were extracted from the Cause of Death Register. The register contains information on all deaths of persons registered as Swedish residents. The estimated coverage rate of the register has exceeded 99% since 1961,¹⁶ and data on suicides in the register have been validated.¹⁷

Statistics

We calculated the suicide rates of the different diagnostic groups on the basis of the number of suicides and the

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Table 1. Data on Suicides Within 30 Days of Discharge Presented as Suicides per 10,000 Person-Years According to Principal Diagnosis at Discharge From Psychiatric Inpatient Care in Sweden From 1973 Through 2009

Principal Diagnosis at Discharge	No. of Discharges ^a			No. of Suicides ≤ 30 Days After Discharge			Suicide Rate ^d (95% CI)
	No.	% ^b	Median Length of Inpatient Stay, d	No.	% ^c	Median Length of Inpatient Stay, d	
Alcohol use disorder	980,216	34.0	5	713	19.3	4	101 (94–109)
Substance use disorder ^e	142,591	5.0	5	215	5.8	5	214 (187–244)
Anxiety disorder	174,688	6.1	12	261	7.1	8	211 (186–238)
Bipolar disorder ^f	119,948	4.2	21	147	4.0	20	174 (147–204)
Depression ^g	447,254	15.5	18	1,177	31.8	14	360 (339–380)
Reaction to crisis	101,828	3.5	5	217	5.9	4	285 (249–324)
Personality disorder	122,314	4.2	10	186	5.0	11	237 (205–273)
Schizophrenia	285,139	9.9	21	284	7.7	21	147 (131–165)
Other nonorganic psychosis	267,736	9.3	19	370	10.0	20	194 (176–215)
Other psychiatric diagnosis	241,374	8.4	19	125	3.4	9	76 (63–90)
Total	2,883,088	100	9	3,695	100	10	181 (175–186)

^aTotal number of patients discharged was 690,937. Some patients had more than 1 discharge and could have had different principal diagnoses at different discharges.

^bPercentage of the total number of discharges.

^cPercentage of the total number of suicides within 30 days after discharge.

^dNumber of suicides per 10,000 person-years, with 95% CIs calculated using mid-*P* exact test.

^eDoes not include alcohol use disorder.

^fBipolar disorder includes only manic and mixed states, not bipolar depression.

^gDepression includes bipolar depression.

collective time at risk of each group. Our regression analyses were performed in SAS 9.4 (SAS Institute, Inc, Cary, NC). In the first regression model (corresponding to Table 2), we calculated the hazard ratios for suicide that was given a specified diagnosis using the largest diagnostic group, alcohol use disorder, as reference. In the second regression model (corresponding to Table 3), we calculated hazard ratios for suicide if self-harm had been recorded less than 30 days preadmission. Separate Cox regressions were made for each diagnostic group using absence of recent self-harm as reference. Both regression models were adjusted for year of discharge and age at discharge and stratified by sex. Since the same individual might have several episodes, we used a robust sandwich estimator in all regression models to take dependence between episodes into account.

RESULTS

In Sweden, between 1973 and 2009, there were nearly 2.9 million (2,883,088) discharges from psychiatric inpatient care. In total, 690,937 individuals were discharged once or more during the study period. The most common number of discharges (the mode) was 1, the median 2, and the mean 4.2, with a wide range extending from 1 to 293 discharges. More men than women (57.6% vs 42.4%) were discharged, and men more often had more than 1 episode of inpatient care (mean = 4.7 vs 3.7, $P < .0001$). During the entire follow-up, 3,695 suicides occurred within 30 days after discharge. The suicide rate of the whole cohort was 181 per 10,000 person-years (Table 1).

In our cohort, the most common discharge diagnoses were alcohol use disorder, seen in 34.0%; depression including bipolar depression (15.5%); and schizophrenia (9.9%) (Table 1). The most frequent diagnosis for people who died by suicide was depression, which was the principal

diagnosis in 31.8% of the suicide cases. The second most common was alcohol use disorder, which was a discharge diagnosis in 19.3% of all deaths by suicide. The median time of admission differed between the diagnostic groups (Table 1). Of all the discharges, 4.3% had had a registered deliberate self-harm event less than 30 days before admission, while the percentage of self-harm among the patients who subsequently died by suicide was significantly higher at 16.5% ($P < .001$; not shown in Table 1).

Suicide Risk According to Discharge Diagnosis

Depression was the diagnosis associated with the highest risk of suicide after discharge (HR = 2.97; 95% CI, 2.70–3.26). A stronger association was observed in men (HR = 4.48; 95% CI, 4.00–5.03) than in women (HR = 2.40; 95% CI, 1.93–2.97) (Table 2). The second strongest risk estimate was for reaction to crisis (HR = 2.29; 95% CI, 1.96–2.29), with a particularly strong association in men (HR = 3.60; 95% CI, 2.97–4.37) (Table 2). All diagnostic groups, except for other psychiatric diagnosis, were associated with an increased risk of suicide compared with the reference group, alcohol use disorder (Table 2).

Suicide Risk After Recent Suicidal Behavior

Overall, deliberate self-harm less than 30 days before admission was found to be associated with an increased risk of suicide, with a hazard ratio of 4.75 (95% CI, 4.34–5.20) (Table 2). We then studied the difference in risk within a diagnostic group if recent self-harm had occurred. A recent self-harm event significantly raised the risk in all diagnostic groups (Table 3). The largest differences in risk by category were observed in schizophrenia (HR = 8.94; 95% CI, 6.45–12.39), other nonorganic psychosis (HR = 6.82; 95% CI, 5.14–9.04), and other psychiatric disorder (HR = 9.56; 95% CI, 5.89–15.54).

Table 2. Hazard Ratios (HRs) for Suicide Within the First 30 Days After Discharge According to Discharge Diagnosis (Using Alcohol Use Disorder as Reference) and if Self-Harm Had Been Registered Within 30 Days Prior to Admission

Variable	Total, HR ^a (95% CI)	Men, HR ^a (95% CI)	Women, HR ^a (95% CI)
Principal diagnosis at discharge			
Alcohol use disorder	Reference	Reference	Reference
Substance use disorder ^b	2.15 (1.84–2.52)	2.29 (1.90–2.74)	2.11 (1.53–2.92)
Anxiety disorder	1.99 (1.72–2.30)	2.84 (2.34–3.43)	1.76 (1.36–2.29)
Bipolar disorder ^c	1.67 (1.40–2.00)	2.19 (1.72–2.79)	1.55 (1.15–2.11)
Depression ^d	2.97 (2.70–3.26)	4.48 (4.00–5.03)	2.40 (1.93–2.97)
Reaction to crisis	2.29 (1.96–2.69)	3.60 (2.97–4.37)	1.58 (1.16–2.14)
Personality disorder	2.01 (1.70–2.37)	2.70 (2.18–3.36)	1.85 (1.39–2.48)
Schizophrenia	1.48 (1.28–1.69)	1.66 (1.41–1.96)	1.38 (1.04–1.82)
Other nonorganic psychosis	1.89 (1.67–2.15)	2.48 (2.11–2.91)	1.71 (1.34–2.20)
Other psychiatric disorder	0.68 (0.56–0.83)	0.80 (0.63–1.03)	0.65 (0.46–0.90)
Self-harm <30 days previous to admission	4.75 (4.34–5.20) ^e	5.52 (4.89–6.22) ^e	4.58 (3.99–5.26) ^e

^aAll hazard ratios are adjusted for year of discharge and age at discharge.

^bDoes not include alcohol use disorder.

^cBipolar disorder includes only manic and mixed states, not bipolar depression.

^dDepression includes bipolar depression.

^eHazard ratio calculated for registered self-harm within 30 days before admission compared with no registered self-harm within 30 days before admission and adjusted for year of discharge and age at discharge.

Table 3. Hazard Ratios (HRs) for Suicide Within the First 30 Days After Discharge When a Recent Self-Harm Event Was Registered Within 30 Days Before Admission and According to Discharge Diagnosis^a

Principal Diagnosis at Discharge	Total, HR ^b (95% CI)	Men, HR ^b (95% CI)	Women, HR ^b (95% CI)
Alcohol use disorder	3.89 (2.92–5.19)	4.64 (3.40–6.32)	2.08 (0.96–4.49)
Substance use disorder ^c	3.95 (2.72–5.73)	5.28 (3.46–8.05)	2.14 (0.96–4.75)
Anxiety disorder	2.77 (1.88–4.07)	3.97 (2.39–6.58)	2.13 (1.18–3.83)
Bipolar disorder ^d	4.70 (2.69–8.21)	4.51 (1.96–10.38)	5.38 (2.54–11.42)
Depression ^e	3.03 (2.61–3.52)	2.40 (1.94–2.98)	4.04 (3.28–4.98)
Reaction to crisis	2.16 (1.58–2.95)	2.28 (1.54–3.37)	2.24 (1.33–3.78)
Personality disorder	4.25 (3.04–5.92)	6.66 (4.27–10.37)	3.48 (2.17–5.58)
Schizophrenia	8.94 (6.45–12.39)	9.28 (6.01–14.32)	9.04 (5.47–14.97)
Other nonorganic psychosis	6.82 (5.14–9.04)	5.48 (3.54–8.48)	8.50 (5.84–12.37)
Other psychiatric disorder	9.56 (5.89–15.54)	14.36 (7.60–27.15)	6.70 (3.32–13.53)

^aRecent self-harm is defined as having a registered event of deliberate self-harm within 30 days from admission. The risk with the same diagnosis but without a recent self-harm event was used as the reference in each diagnostic group.

^bAll hazard ratios are adjusted for year of discharge and age at discharge.

^cDoes not include alcohol use disorder.

^dBipolar disorder includes only manic and mixed states, not bipolar depression.

^eDepression includes bipolar depression.

DISCUSSION

The primary aim of the study was to estimate how the risk of suicide immediately after discharge from psychiatric inpatient care differs between diagnostic groups if recent suicidal behavior has occurred. We used a nationwide cohort of discharged patients and observed the first 30 days after discharge. Overall, high suicide rates were noted regardless of type of diagnosis and recent suicidal behavior, but clinically important differences in risk were still detected.

We believe that the findings that add most to existing knowledge are those concerning psychotic disorders. Schizophrenia was associated with a relatively lower risk of suicide immediately after discharge than several other diagnoses, but we found a remarkably large elevation in risk if a recent self-harm event had been registered. Similarly,

other nonorganic psychoses also showed a major risk elevation if recent suicidal behavior was apparent. We believe that this is a clinically relevant finding. In individuals with psychotic disorders, even if generally not assessed as high risk, recent suicidal behavior needs to be given adequate weight when discharge is being planned. Previous suicide attempt in patients with schizophrenia has been found to be a strong risk factor for suicide,^{7,18,19} but, to our knowledge, this study is the first to illustrate how recent suicidal behavior adds to the immediacy of suicide risk after discharge.

“Other psychiatric disorder” is a heterogeneous category that includes, for instance, eating disorders, impulse-control disorders, and intellectual disabilities and autism. This makes interpretation of the significant results for this category difficult. Compared with the overall risk estimate, the depression, reaction to crisis, and anxiety disorder diagnostic groups showed a significantly lower elevation of

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risk if recent self-harm was apparent. One interpretation of these results is that patients with these conditions are more often treated in inpatient care because of a perceived risk of suicide whether or not self-harm has occurred, which attenuates the effect of a recent self-harm episode. A current diagnosis of depression, including bipolar depression, gave the highest suicide risk in the time period immediately after discharge in comparison with the reference group, regardless of recent suicidal behavior. Even though we used the narrow time span of 1 month, our results are similar to those of previous studies^{1,3,20,21} with longer follow-up periods, which also show depression as the discharge diagnosis with the highest risk. The recurring finding that depressive disorder constitutes the highest postdischarge risk is not surprising given that suicidal ideation is a common component of this disorder as well as a criterion contributing to the diagnosis.²² However, if recent suicidal behavior has occurred, the risk of suicide in patients with depression is not affected as much as it is for patients suffering from a psychotic disorder.

Principal diagnosis at discharge can be regarded as giving the best available information on the underlying reason for admission, since the actual disorder is the focus of observation and treatment. Because the risk is based on discharge diagnosis, the underlying understanding is that the patient has been treated and is now regarded as being in a more stable mental state, sufficient to be discharged, and also less suicidal. In cases of depression, recovery sometimes takes months, with inhibitory symptoms (psychomotor retardation) usually declining long before the depressed mental content and the suicidal thoughts disappear.²³ This may explain why patients in remission from depression and recently discharged still may have an elevated risk of suicide. However, there is, as yet, no strong scientific evidence that there is an elevated risk of suicide specifically during recovery from depression compared with other phases of the illness.²⁴

Another contribution of the study to existing knowledge is that men with the diagnosis of reaction to crisis were at particular risk directly after discharge regardless of recent suicidal behavior. Reaction to crisis includes acute stress reactions, adjustment disorders, and reactions to severe stress as well as posttraumatic stress disorder (*ICD-10*: F43). The common denominator is that at least 1 negative life event has been causally linked to the condition. These diagnoses are generally expected to offer a good prognosis.²⁵ However, an elevated risk of suicide has been reported before, but not in connection with discharge.^{26–28} Previous psychological-autopsy studies often included a small proportion of subjects with adjustment disorder, particularly young individuals who die by suicide.²⁹ The acute nature of the diagnosis, and often a concurrent predicament of some kind, is likely to increase the risk of suicide most during the immediate time span after discharge. Moreover, the relatively short duration of the inpatient episode may make evaluation of the patient and of the risk of suicide especially difficult.

The high overall suicide rate in our study is in line with the rates reported in a Danish study¹ that also showed a

decrease in suicide rates after the first month postdischarge. Our suicide rates are significantly higher than those found in a recent study in the United States.³⁰ However, the US cohort included only first-time admissions.

Strengths and Limitations

A major advantage of the present study is its sample size, with a sufficient number of suicides to give reliable results. The data were collected prospectively and hence are not liable to recall bias. The national coverage of the high-quality registers, which enhances the generalizability of the results, is another strength. Our decision to focus on recent suicidal behavior and the risk immediately after discharge has the obvious advantage of informing clinical assessment.

Even though this study is the largest yet on suicide immediately after discharge and includes valid data on both psychiatric diagnosis and recent self-harm events, some limitations need to be mentioned. First, only exposures that ended up in the registries are included. Some factors, eg, undetected self-harm, were beyond our horizon. Further, information on possible triggers of suicidal behavior, in the form of social and economic stressors³¹ or other possible confounders, is missing in this study. Second, although we had a national sample of considerable size, we were not able to distinguish between the risks related to the specific methods used in the recent self-harm episodes. Third, the “other psychiatric disorder” diagnostic group included in the study is heterogeneous, and the results in this group are difficult to interpret clinically. The disorders included in this diagnostic group need to be studied separately in larger samples or in samples with longer follow-up to enhance statistical power. Fourth, the choice of alcohol use disorder as reference to the other diagnostic entities should not be interpreted to mean that alcohol use is a protective factor against suicide after discharge. Alcohol use disorder is certainly a risk factor, but to a somewhat less pronounced degree than, for example, schizophrenia and depressive disorder during the first month after discharge from inpatient care. Fifth, we restricted the diagnostic entities in this study to principal diagnoses and coexisting suicidal behavior. Comorbid psychiatric or somatic diagnoses, although not uncommon, were not investigated in this study.

CONCLUSION

In this comprehensive study of the immediate risk of suicide after discharge from psychiatric hospitalization, we found a large risk increase among patients with a psychotic disorder if a recent act of self-harm had occurred. Overall, the immediate risk of suicide after discharge was high regardless of recent suicidal behavior, particularly in male patients with depression and reaction to crisis. The findings of this study may have clinical implications for suicide risk assessments and decisions about aftercare on the discharge of psychiatric patients.

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Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at pcourtet@psychiatrist.com.

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