ORIGINAL ARTICLE

Suicide Risk in Relation to Psychiatric Hospitalization

Evidence Based on Longitudinal Registers

Ping Qin, MD, PhD; Merete Nordentoft, MD, PhD

Background: Persons with a history of admission to a psychiatric hospital are at high risk for suicide, but little is known about how this is influenced by factors related to psychiatric hospitalization.

Objective: To explore suicide risk according to time since admission, diagnosis, length of hospital treatment, and number of prior hospitalizations.

Design: Nested case-control design.

Setting: Individual data are drawn from various Danish longitudinal registers.

Participants: All 13 681 male and 7488 female suicides committed in Denmark from January 1, 1981, to December 31, 1997, and 423 128 population control subjects matched for sex, age, and calendar time of suicide.

Main Outcome Measure: Risk of suicide is estimated by conditional logistic regression. Data are adjusted for socioeconomic factors.

Results: This study demonstrates that there are 2 sharp peaks of risk for suicide around psychiatric hospitalization, one in the first week after admission and another in the first week after discharge; suicide risk is significantly higher in patients who received less than the median duration of hospital treatment; affective disorders have the strongest impact on suicide risk in terms of its effect size and population attributable risk; and suicide risk associated with affective and schizophrenia spectrum disorders declines quickly after treatment and recovery, while the risk associated with substance abuse disorders declines relatively slower. This study also indicates that an admission history increases suicide risk relatively more in women than in men; and suicide risk is substantial for substance disorders and for multiple admissions in women but not in men.

Conclusions: Suicide risk peaks in periods immediately after admission and discharge. The risk is particularly high in persons with affective disorders and in persons with short hospital treatment. These findings should lead to systematic evaluation of suicide risk among inpatients before discharge and corresponding outpatient treatment, and family support should be initiated immediately after the discharge.

Arch Gen Psychiatry. 2005;62:427-432

Many classic retrospective and psychological autopsy studies have consistently indicated that most, often more than 90%, of all completed suicides fulfill the criteria for a psychiatric diagnosis.[1-5] Clinical studies have also demonstrated that patients with mental disorders are at an increased risk of suicide,[6] and that the risk is particularly high soon after discharge from psychiatric care.[7-12] Previous studies, based on data from Danish population registers, have confirmed these findings,[13-15] but further indicated a significant sex difference in the risk of suicide associated with psychiatric illness that lead to admission to psychiatric hospitals.[14,15] In this study, we aim to gain further insights into suicide risk in relation to psychiatric hospitalization. We examine in detail how suicide risk varies according to time since last psychiatric admission or discharge, main diagnosis, length of inpatient treatment, and total number of psychiatric hospitalizations.

Author Affiliations: National Centre for Register-Based Research, University of Aarhus, Aarhus (Dr Qin); and Department of Psychiatry, Bispebjerg Hospital, Copenhagen (Dr Nordentoft), Denmark.

METHODS

SETTING, DESIGN, AND PARTICIPANTS

We obtained all personal data from various Danish national longitudinal registers, which included the Cause-of-Death Register,[16] the Danish Psychiatric Central Register,[17] and the

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016

Table 1. The Distribution of Study Variables Among Suicide Cases and Matched Controls, and Risk Ratios for Suicide Associated With These Variables

Psychiatric Information Until Suicide Time	Men*		Women*		Crude Analysis†‡		Adjusted Analysis†§	
	Cases (n=13 681)	Controls (n=273 371)	Cases (n=7488)	Controls (n=149 757)	Men	Women	Men	Women
Time since last admission								
No admission history‖	8622	261 939	3231	141 199	1.0	1.0	1.0	1.0
Currently admitted								
0-7 d	198	52	168	300	113.7 (83.2-155.5)	236.0 (156.7-355.3)	59.8 (42.1-85.1)	81.6 (52.1-127.7)
8-30 d	209	77	221	60	88.5 (67.4-116.1)	175.7 (128.4-240.4)	51.9 (38.2-70.7)	71.0 (49.9-101.0)
1-6 mo	272	176	290	117	47.8 (39.2-58.4)	105.7 (83.7-133.3)	30.4 (24.1-38.3)	49.8 (37.9-65.6)
7-12 mo	32	67	36	20	16.0 (10.4-24.8)	95.7 (52.8-173.4)	9.9 (6.2-15.7)	37.2 (19.8-69.9)
≥1 y	25	190	10	106	4.0 (2.6-6.0)	3.5 (1.8-6.7)	1.6 (1.1-2.6)	1.5 (0.8-3.0)
Discharged								
0-7 d	291	54	286	23	174.5 (129.3-235.5)	583.2 (373.1-911.5)	102.0 (73.2-142.1)	246.0 (152.5-396.6)
8-30 d	405	121	337	72	102.4 (83.0-126.5)	205.3 (155.9-270.3)	62.1 (48.4-79.6)	90.7 (66.0-124.6)
1-6 mo	935	613	732	391	50.8 (45.5-56.7)	86.0 (74.7-99.0)	28.4 (24.0-33.5)	35.8 (29.1-44.0)
7-12 mo	476	581	417	393	26.9 (23.6-30.6)	47.4 (40.6-55.3)	14.7 (12.3-17.7)	19.3 (15.6-23.9)
1-3 y	738	1800	681	1167	13.1 (11.9-14.3)	25.8 (23.2-28.8)	6.4 (5.5-7.4)	10.5 (8.7-12.6)
4-5 y	398	1385	312	1089	9.2 (8.2-10.4)	13.0 (11.3-14.9)	4.6 (3.9-5.5)	5.4 (4.4-6.6)
>5 y	1080	6316	767	5090	5.4 (5.0-5.8)	6.8 (6.2-7.4)	2.8 (2.5-3.3)	3.0 (2.6-3.6)
Main diagnosis¶								
Schizophrenia spectrum disorders‖	979	1768	679	1174	1.0	1.0	1.0	1.0
Affective disorders	1242	1937	1494	2545	1.1 (1.0-1.3)	1.0 (0.9-1.1)	1.9 (1.6-2.2)	1.6 (1.4-1.9)
Substance abuse disorders	1009	2433	383	550	0.8 (0.7-0.9)	1.3 (1.1-1.5)	0.9 (0.8-1.1)	1.6 (1.3-2.0)
Other disorders	1829	5294	1701	4289	0.6 (0.6-0.7)	0.7 (0.6-0.8)	1.0 (0.9-1.1)	1.2 (1.0-1.4)
Length of hospital treatment¶								
≥The median‖	2136	5413	2129	4851	1.0	1.0	1.0	1.0
<The median	2923	6019	2128	3707	1.3 (1.2-1.4)	1.3 (1.2-1.4)	1.4 (1.3-1.6)	1.5 (1.4-1.7)
No. of admissions¶								
1‖	1773	5376	1168	4229	1.0	1.0	1.0	1.0
2-3	1428	3233	1202	2434	1.3 (1.2-1.5)	1.8 (1.6-2.0)	1.0 (0.9-1.1)	1.4 (1.2-1.6)
4-5	625	1086	644	780	1.8 (1.6-2.0)	3.0 (2.6-3.4)	1.0 (0.9-1.2)	1.7 (1.5-2.0)
6-10	682	1000	682	670	2.2 (1.9-2.4)	3.7 (3.2-4.2)	1.0 (0.9-1.2)	1.6 (1.4-1.9)
>10	551	737	561	445	2.4 (2.1-2.7)	4.6 (4.0-5.3)	0.7 (0.6-0.8)	1.4 (1.1-1.7)

*Data are given as number in each group.
†Data are given as risk ratio (95% confidence interval).
‡Adjusted for age and calendar time, by matching.
§Further adjusted for all variables in the table and marital status, income, and place of residence.
‖Reference group.
¶Variables only apply to persons with a history of psychiatric admission.

Integrated Database for Labour Market Research.[18] We used the personal identifier to retrieve and merge individual data from different databases.

In Denmark, causes of all deaths are usually diagnosed by physicians, and a forensic medical examination will be called if the cause of a death is uncertain. We chose all definite suicides from January 1, 1981, to December 31, 1997, from the Cause-of-Death Register to compose the cases of this study (codes E950-E959 in the *International Classification of Diseases, Eighth Revision [ICD-8]* and codes X60-X84 in the *International Classification of Diseases, 10th Revision [ICD-10]*). We restricted study cases to those residing in Denmark on January 1 of the year of suicide so that they had complete socioeconomic information in the Integrated Database for Labour Market Research. We finally gained 13 681 male and 7488 female suicides, which accounted for 99.6% of the total suicides in this period in Denmark.

We used a nested case-control design,[19] matching for sex, age, and calendar time, to randomly select up to 20 control subjects per case from a subsample of all individuals of the same age and sex who were alive at the time of suicide of the case. To make the selection feasible and to minimize the computer burden, we used a random 5% longitudinal sample of the total national population from the Integrated Database for Labour Market Research to draw matched controls. This procedure was followed for each suicide, resulting in a sample of 273 371 male and 149 757 female controls matched for the cases. For only a few cases older than 93 years, it was not possible to find 20 eligible controls.

DATA EXTRACTION

To access personal data on history of admission to psychiatric hospitals, we linked the personal identifiers of cases to the Dan-

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016

ish Psychiatric Central Register to ascertain if they were recorded from 1969 to the time of suicide or matching. We recorded personal data on 4 specific aspects of psychiatric hospitalization. The first one was the time since recent admission or discharge, which was grouped into 12 categories reflecting the detailed time distance (**Table 1**). The second was the main diagnosis at the recent hospitalization, which was categorized into 4 major groups as schizophrenia spectrum disorders (*ICD-8* codes 295, 297, 298.29, 298.39, 298.89, 298.99, 299.05, 299.09, 301.09, 301.29, and 301.83 and *ICD-10* codes F20, F21, F22, F23, F24, F25, F28, F29, F60.0, and F60.1), affective disorders (*ICD-8* codes 296, 298.09, 298.19, 300.49, and 301.19 and *ICD-10* codes F30, F31, F32, F33, F34, F38, and F39), substance abuse disorders (*ICD-8* codes 303 and 304 and *ICD-10* codes F10.2, F10.3, F10.4, and F1x.2), and other psychiatric disorders. The third variable was the length of hospital treatment, indicating if the inpatient stay was less than the median length (in days) according to the distribution of the total psychiatric hospitalizations in the calendar year. The last variable referred to the total number of admissions to psychiatric hospitalization before the suicide or matching.

We extracted personal data on marital status, income level, and place of residence from the Integrated Database for Labour Market Research based on records 1 year before the year of suicide. We included these variables for adjustment because they were risk factors for suicide and mental illness in Denmark.[13,15,20,21]

STATISTICAL ANALYSIS

We analyzed the data with the conditional logistic regression model using the PHREG procedure in SAS statistical software, version 8,[22] which yielded a conditional odds ratio, 95% confidence intervals (CIs), and a corresponding *P* value. Because of the method of sampling controls and the rarity of suicide, the estimated odds ratio in this study can be interpreted as a risk ratio. We examined interaction between variables using the likelihood ratio test. We calculated the population attributable risk (PAR) (also called the population attributable fraction) based on the risk ratio derived from the adjusted analysis and the distribution of exposure in the cases.[23]

RESULTS

In this study, 37.0% of the men and 56.9% of the women who committed suicide had a history of admission to psychiatric hospitals. The crude risk of suicide associated with this history was 14.1 (95% CI, 13.5-14.7) for men and 22.7 (95% CI, 21.5-23.9) for women. When adjusted for individual marital status, income, and place of residence, the risk was reduced slightly to 10.4 (95% CI, 9.9-10.9) for men and 19.8 (95% CI, 18.7-20.9) for women. Moreover, the overall effect of history of psychiatric admission on suicide differed significantly by sex (χ^2=304.2, $P<.001$); it increased the risk significantly stronger in women than in men.

Table 1 shows the distribution of admission-related variables and their influence on suicide by sex. For men and women, there were 2 sharp peaks of suicide risk around psychiatric hospitalization. The risk was extremely high in the first week after admission and particularly in the first week after discharge, then decreased gradually if admitted for a longer time or longer after discharge. Relative to schizophrenia spectrum disorders, the risk exceeded slightly for affective disorders in men and women; and for substance abuse disorders, in women. Moreover, risk for suicide was significantly higher for patients with a shorter inpatient stay in hospitals, and the risk increased with increasing number of psychiatric hospitalizations.

When including these variables into analysis simultaneously and adjusting for marital status, income, and place of residence, the risks associated with these factors changed considerably because of strong interactions between these variables. Still, the 2 sharp peaks remained, and the risks of suicide in the first week after discharge and the first week after admission were 102.0 and 59.8 times in men and 246.0 and 81.6 times in women, respectively. At the same time, the excess risk associated with affective disorders, compared with schizophrenic disorders, was up to 1.9 times in men and 1.6 times in women, while the excess effect of substance abuse disorders in women was up to 1.6 times. In addition, the substantial risk associated with shorter hospital treatment increased after the adjustment, but the substantial risk associated with multiple admissions to psychiatric hospitals remained highly significant only in women.

Moreover, the magnitude of risk for suicide across phases of hospitalization and duration of hospital treatment differed significantly by diagnosis in men and women. Among the 4 diagnostic groups (**Table 2**), affective disorders increased suicide risk at the highest across all phases of hospitalization, with an extremely high risk in the first week after discharge (ie, 1976.5 times for women and 218.8 times for men). Also, affective disorders and schizophrenia spectrum disorders increased suicide risk mostly immediately after admission or discharge, then the risk declined quickly after treatment and recovery, whereas substance abuse disorders increased the risk less strongly immediately after admission or discharge, but its effect eliminated slowly after treatment and recovery.

Transformation of the distribution and the risk ratio into PAR (**Table 3**) indicates that a history of hospitalized psychiatric illness accounted for 33.2% of male suicides and 53.2% of female suicides, and about half of these attributable risks were contributed by a history of admission within 6 months. Affective disorders seem to contribute to the PAR at the largest fraction (ie, 8.5% in men and 18.9% in women). Most PAR associated with schizophrenia (about 65%) and affective disorders (near 60%) was seen in suicides among patients who were admitted or had just been discharged from the hospital within 6 months, whereas most PAR associated with substance abuse disorders was seen in suicides among persons discharged from the hospital for more than 6 months.

COMMENT

The possibility of retrieving data from Danish longitudinal registers, to our knowledge, makes this study the first to have assessed, on the general population level, the effect of several factors related to psychiatric hospitalization on the risk of suicide. In Denmark, all residents have equal access to psychiatric hospitals and all treatments are free of charge. The decision on hospital-

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016

Table 2. Adjusted Risk Ratio for Suicide Across Phases of Time Since Psychiatric Hospitalization and by Diagnosis*

Time Since Psychiatric Admission	Schizophrenia Spectrum Disorders	Affective Disorders	Substance Abuse Disorders	Other Disorders
		Men		
No admission history†	1.0	1.0	1.0	1.0
Currently admitted				
0-7 d	79.1 (39.3-159.4)	208.4 (102.7-423.3)	30.2 (12.9-70.7)	39.8 (22.4-70.9)
8-30 d	37.8 (23.6-60.4)	170.3 (92.5-313.5)	33.2 (13.8-80.2)	69.3 (35.6-134.7)
1-6 mo	28.8 (20.9-39.7)	98.5 (63.6-152.7)	12.0 (5.4-26.7)	19.1 (12.4-29.5)
≥7 mo	3.9 (2.6-5.8)	11.5 (4.5-29.7)	‡	1.5 (0.8-3.0)
Discharged				
0-7 d	109.3 (55.7-214.5)	218.8 (110.2-434.2)	48.5 (25.4-92.8)	132.0 (75.6-230.7)
8-30 d	79.8 (49.1-129.7)	126.0 (77.9-203.8)	58.1 (36.2-93.3)	50.3 (34.3-73.9)
1-6 mo	37.4 (28.6-48.8)	56.4 (42.3-75.0)	24.0 (18.3-31.5)	24.6 (19.8-30.5)
7-12 mo	19.6 (14.3-26.7)	30.4 (22.0-42.0)	14.1 (10.4-19.1)	11.7 (9.2-14.9)
1-3 y	6.8 (5.2-8.8)	11.9 (9.5-15.0)	8.0 (6.4-10.0)	4.9 (4.1-5.9)
4-5 y	4.6 (3.3-6.4)	6.7 (4.9-9.2)	5.1 (3.9-6.7)	4.4 (3.6-5.4)
>5 y	3.1 (2.4-3.9)	4.8 (4.0-5.7)	3.8 (3.1-4.7)	2.3 (2.0-2.6)
Length of hospital treatment§				
≥The median†	1.0	1.0	1.0	1.0
<The median	1.0 (0.8-1.3)	1.4 (1.1-1.7)	1.1 (0.9-1.3)	1.9 (1.7-2.2)
		Women		
No admission history†	1.0	1.0	1.0	1.0
Currently admitted				
0-7 d	86.1 (36.8-201.5)	167.8 (79.3-355.0)	28.6 (4.5-181.1)	102.9 (49.7-213.2)
8-30 d	76.4 (37.6-155.1)	217.9 (127.8-371.5)	9.9 (2.0-47.7)	52.6 (30.1-91.9)
1-6 mo	49.4 (31.1-78.4)	140.5 (90.8-217.4)	25 (4.2-150.8)	36.1 (24.4-53.3)
≥7 mo	3.7 (2.1-6.7)	36.5 (16.8-79.0)	‡	4.9 (2.4-10.2)
Discharged				
0-7 d	115.1 (55.6-238.1)	1976.5 (463.6-8423.4)	375.6 (0.3-890.0)	260.5 (126.6-536.1)
8-30 d	73.2 (39.1-137.1)	152.3 (95.1-243.9)	72.3 (24.7-211.3)	135.8 (83.8-219.8)
1-6 mo	36.4 (25.8-51.4)	82.6 (62.5-109.1)	25.3 (15.3-41.6)	39.5 (30.9-50.4)
7-12 mo	19.4 (13.3-28.3)	28.6 (21.4-38.4)	25.6 (15.3-42.6)	24.7 (18.9-32.3)
1-3 y	13.6 (10.1-18.3)	14.7 (11.9-18.2)	19.0 (12.6-28.8)	11.8 (9.8-14.3)
4-5 y	5.9 (4.0-8.8)	8.8 (6.7-11.4)	7.6 (4.7-12.2)	6.0 (4.8-7.6)
>5 y	3.4 (2.5-4.5)	4.9 (4.2-5.9)	5.7 (3.9-8.3)	3.3 (2.8-3.9)
Length of hospital treatment§				
≥The median†	1.0	1.0	1.0	1.0
<The median	1.2 (0.9-1.6)	1.2 (1.0-1.4)	1.8 (1.3-2.6)	1.7 (1.5-2.0)

*Data are given as adjusted risk ratio (95% confidence interval). Data were adjusted for marital status, income, place of residence, and number of psychiatric admissions, as well as age and calendar time, by matching.

†Reference group.

‡Combined into the group admitted for 1 to 6 months because of few cases.

§Variable only applies to persons with a history of psychiatric admission.

ization of a patient is completely based on the psychiatric examination from psychiatrists. Individual data on each admission have been recorded and computerized in the Danish Psychiatric Central Register since 1969. These advantages enable us to obtain precise and cumulative information about personal history of psychiatric hospitalization, and our data are not subject to differences in access to psychiatric care by socioeconomic status. On the other hand, with the focus on psychiatric admission, our data may represent a severe spectrum of psychiatric disorders. Also, we are not able to control the influence of psychiatric illness not leading to hospitalization because such data were not available on the register before 1995. This limitation might lead to underestimation of our results because, for example, we put outpatients who are generally at a higher risk of suicide than people without a psychiatric history into the reference group. In addition, our data on personal psychiatric history cover a long retrospective period in which there were some changes in the organization of psychiatric treatment, but with our methods of sampling the controls and defining the variables, our results reflect the general impact of study variables on the risk of suicide. We believe this large population-based study has provided substantial knowledge about suicide risk in relation to history of admission to a psychiatric hospital, which may assist health professionals in making strategies to reduce suicides in this high-risk population.

This study pinpoints that there are 2 sharp peaks of risk for suicide around psychiatric hospitalization, one in the first week after admission and another in the first week after discharge; suicide risk is significantly higher in patients receiving a shorter than median length of hospital treatment; affective disorders impacted suicide at the strongest in terms of its effect size and PAR; and suicide risk associated with affective and schizophrenia spec-

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016

Table 3. Population Attributable Risk Associated With Psychiatric Admission by Diagnosis*

Psychiatric Diagnosis	Currently Admitted	First Week After Discharge	8 d to 6 mo Since Discharge	>6 mo Since Discharge	Ever Admitted
Men					
Schizophrenic disorders	1.76	0.41	2.14	2.21	6.52
Affective disorders	2.08	0.65	2.19	3.61	8.53
Substance abuse disorders	0.28	0.25	2.01	3.98	6.52
Other psychiatric disorders	1.04	0.81	3.22	6.57	11.64
All psychiatric diagnoses	5.16	2.12	9.56	16.37	33.21
Women					
Schizophrenic disorders	2.32	0.76	2.29	3.12	8.49
Affective disorders	4.55	1.46	5.15	7.76	18.92
Substance abuse disorders	0.14	0.16	1.16	3.39	4.85
Other psychiatric disorders	2.48	1.44	5.48	11.55	20.95
All psychiatric diagnoses	9.49	3.82	14.08	25.82	53.21

*Data are given as percentage. Population attributable risks were calculated according to the distribution in cases and the adjusted risk ratios of time since recent admission by diagnosis. Risk ratios were adjusted for marital status, income, place of residence, and number of prior psychiatric hospitalizations, as well as age and calendar time, by matching.

trum disorders declined quickly after treatment and recovery, while the risk associated with substance abuse disorders declined relatively slower. It also indicates that some of these factors affected suicide risk differently by sex; an admission history increases the risk relatively more in women than in men; suicide risk is substantial for substance disorders in women but not in men; and multiple admissions to a psychiatric hospital add an extra risk of suicide in women only.

This study confirms previous reports that suicide risk is highly associated with a history of admission to a psychiatric hospital,[6,24-26] and further demonstrates that the risk peaked not only shortly after discharge, as reported in the literature,[7-10,12] but also shortly after admission. It also shows that a history of psychiatric admission had a stronger effect on suicide in women than in men, which, however, does not necessarily mean that female patients have a higher rate for suicide than male patients because the suicide rate in the general population is higher in men than in women.

This study, to our knowledge, is the first to explore how suicide risk differs by diagnosis across the phase of psychiatric hospitalization. We find that affective disorders increased the risk for suicide the strongest across all phases of time since hospitalization compared with other diagnostic groups. We also find that affective and schizophrenia spectrum disorders tend to have a more intensive effect on the risk of suicide, whereas substance abuse disorders have a more prolonged effect on the risk of suicide.

This study, to our knowledge, is also the first with empirical data to demonstrate that suicide risk is significantly higher for patients who receive less than the median duration of hospital treatment. In Denmark, the inpatient stay in psychiatric hospitals has generally become shorter since the 1970s (eg, the median duration decreased from 25 days in 1970 to 17 days in 1996). However, our finding of the excess risk associated with short inpatient stay reflects the general effect of short inpatient treatment and should not be influenced much by this time-dependent change because we defined this variable based on the calendar year of the total national psychiatric hospitalizations. Explanations for this result could be that early discharge results in treatment uncompleted or insufficient, while it may also be possible that patients who have intended to commit suicide may pretend to show their quick recovery that confuses physicians' judgment, or that outpatient treatment starts too late or is not accepted by the patients because the outpatient treatment is usually conducted by staff who in most cases are not introduced to the patients during the inpatient stay.

Based on these findings, we think that the severity of psychiatric illness plays an important role on risk of suicide, especially during the acute illness. Reasons for the highest risk at a time of apparent recovery may include that recovery may be incomplete and mental state may deteriorate, that the abrupt withdrawal of inpatient care may enhance vulnerability, that discharge may reexpose patients to the stresses that precipitated admission, and that on leaving the hospital they may have easier access to the means of suicide. In addition, the stigma surrounding psychiatric illness may to some extent contribute to the extremely high risk in the first few days of admission and after discharge.[27,28] The awareness of being mentally ill may diminish one's self-esteem and confidence and raise concerns of being stigmatized. This discourages people from seeking and accepting help.

With regard to PAR, this study, in line with a previous report,[15] shows that hospitalized psychiatric disorders accounted for 33.2% of male and 53.2% of female attributed risk of suicide in the population. However, it provides further insight into what and how the attributable risk is composed, as to diagnosis and time since hospitalization, which is useful information for making prevention strategies in the population. For instance, about 2.1% of male and 3.8% of female PARs of suicides are accounted for by suicides among patients during the first week after discharge. This means that if substantial efforts in intensive care and supports could be made to patients in the first week after the discharge, then up to 2.1% of male and 3.8% of female suicides could be prevented.

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016

Although this sounds unrealistic to prevent all of these suicides, the estimates do suggest that prevention efforts in this short period could be efficient.

It is hard to say to what extent the findings from this study can be generalized to other countries with different health care settings, and further studies are needed to investigate factors relating to psychiatric hospitalization in more detail. Combined results from this study suggest that intensive clinical care and maintaining care beyond the point of clinical recovery are important to reduce the risk of suicide in patients with psychiatric disorders. These findings should lead to systematic evaluation of suicide risk among inpatients before discharge and corresponding outpatient treatment, and family support should be initiated immediately after the discharge. Because the stigma associated with psychiatric illness can influence the clinical course of the condition and outcomes such as social and occupational functioning, we believe that public efforts on antistigma campaigns may benefit individuals with psychiatric disorders, thus preventing them from committing suicide.

Submitted for Publication: March 30, 2004; final revision received September 3, 2004; accepted September 16, 2004.
Correspondence: Ping Qin, MD, PhD, National Centre for Register-based Research, University of Aarhus, Taasingade 1, DK-8000 Aarhus C, Denmark (pq@ncrr.dk).
Funding/Support: This study was supported by the Danish Health Insurance Foundation and the Danish Ministry of Social Affairs, both in Copenhagen. The National Centre for Register-based Research is supported by the Danish National Research Foundation, Copenhagen.
Acknowledgment: We thank Preben Bo Mortensen, MD, DrMedSc, for his suggestions.

REFERENCES

1. Rich CL, Young D, Fowler RC. San Diego suicide study, I: young vs old subjects. *Arch Gen Psychiatry*. 1986;43:577-582.
2. Isometsa E, Henriksson M, Marttunen M, Heikkinen M, Aro H, Kuoppasalmi K, Lonnqvist J. Mental disorders in young and middle aged men who commit suicide. *BMJ*. 1995;310:1366-1367.
3. Cheng AT. Mental illness and suicide: a case-control study in east Taiwan. *Arch Gen Psychiatry*. 1995;52:594-603.
4. Conwell Y, Duberstein PR, Cox C, Herrmann JH, Forbes NT, Caine ED. Relationships of age and Axis I diagnoses in victims of completed suicide: a psychological autopsy study. *Am J Psychiatry*. 1996;153:1001-1008.
5. Foster T, Gillespie K, McClelland R. Mental disorders and suicide in Northern Ireland. *Br J Psychiatry*. 1997;170:447-452.
6. Harris EC, Barraclough B. Suicide as an outcome for mental disorders: a meta-analysis. *Br J Psychiatry*. 1997;170:205-228.
7. Goldacre M, Seagroatt V, Hawton K. Suicide after discharge from psychiatric inpatient care. *Lancet*. 1993;342:283-286.
8. Lawrence DM, Holman CD, Jablensky AV, Fuller SA. Suicide rates in psychiatric in-patients: an application of record linkage to mental health research. *Aust N Z J Public Health*. 1999;23:468-470.
9. Appleby L, Shaw J, Amos T, McDonnell R, Harris C, McCann K, Kiernan K, Davies S, Bickley H, Parsons R. Suicide within 12 months of contact with mental health services: national clinical survey. *BMJ*. 1999;318:1235-1239.
10. Rossau CD, Mortensen PB. Risk factors for suicide in patients with schizophrenia: nested case-control study. *Br J Psychiatry*. 1997;171:355-359.
11. Emborg C. Mortality and causes of death in eating disorders in Denmark 1970-1993: a case register study. *Int J Eat Disord*. 1999;25:243-251.
12. Mortensen PB, Juel K. Mortality and causes of death in first admitted schizophrenic patients. *Br J Psychiatry*. 1993;163:183-189.
13. Mortensen PB, Agerbo E, Erikson T, Qin P, Westergaard-Nielsen N. Psychiatric illness and risk factors for suicide in Denmark. *Lancet*. 2000;355:9-12.
14. Qin P, Mortensen PB, Agerbo E, Westergard-Nielsen N, Eriksson T. Gender differences in risk factors for suicide in Denmark. *Br J Psychiatry*. 2000;177:546-550.
15. Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981-1997. *Am J Psychiatry*. 2003;160:765-772.
16. The Danish National Board. *Cause of Death in Denmark 1991*. Copenhagen: Munksgaard Forlag; 1993.
17. Munk-Jorgensen P, Mortensen PB. The Danish Psychiatric Central Register. *Dan Med Bull*. 1997;44:82-84.
18. Danmarks Statistik. *IDA: En Integreret Database for Arbejdsmarkedsforskning*. Copenhagen: Danmarks Statistiks Trykkeri; 1991.
19. Clayton D, Hills M. *Statistical Models in Epidemiology*. New York, NY: Oxford University Press Inc; 1993.
20. Agerbo E, Byrne M, Eaton WW, Mortensen PB. Marital and labor market status in the long run in schizophrenia. *Arch Gen Psychiatry*. 2004;61:28-33.
21. Kessing LV, Agerbo E, Mortensen PB. Does the impact of major stressful life events on the risk of developing depression change throughout life? *Psychol Med*. 2003;33:1177-1184.
22. SAS Institute Inc. The PHREG procedure. In: *SAS/STAT User's Guide, Version 8*. Cary, NC: SAS Institute Inc; 1999:2569-2657.
23. Bruzzi P, Green SB, Byar DP, Brinton LA, Schairer C. Estimating the population attributable risk for multiple risk factors using case-control data. *Am J Epidemiol*. 1985;122:904-914.
24. Dennehy JA, Appleby L, Thomas CS, Faragher EB. Case-control study of suicide by discharged psychiatric patients. *BMJ*. 1996;312:1580.
25. Heikkinen ME, Henriksson MM, Isometsa ET, Marttunen MJ, Aro HM, Lonnqvist JK. Recent life events and suicide in personality disorders. *J Nerv Ment Dis*. 1997;185:373-381.
26. Moscicki EK. Gender differences in completed and attempted suicides. *Ann Epidemiol*. 1994;4:152-158.
27. Mann CE, Himelein MJ. Factors associated with stigmatization of persons with mental illness. *Psychiatr Serv*. 2004;55:185-187.
28. Dinos S, Stevens S, Serfaty M, Weich S, King M. Stigma: the feelings and experiences of 46 people with mental illness: qualitative study. *Br J Psychiatry*. 2004;184:176-181.

©2005 American Medical Association. All rights reserved.
Downloaded From: http://archpsyc.jamanetwork.com/ on 08/31/2016