Trends in Suicide Risk Associated With Hospitalized Psychiatric Illness: A Case-Control Study Based on Danish Longitudinal Registers

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Objective: In light of the consistent reduction in suicide rate during the past 20 years in Denmark, this study aims to investigate trends in suicide risk associated with hospitalized psychiatric illness and to explore differences in the changes with regard to clinical phases of illness, sex, age, and diagnosis.

Method: This population-based study includes all of 21,169 suicides in Denmark during the years 1981 through 1997 and 423,128 controls matched for sex, age, and time (using a nested case-control design). Personal data on psychiatric history and socioeconomic status were retrieved from Danish longitudinal registers. Data were analyzed using conditional logistic regression.

Results: This study shows that the reduction in suicide rate is generally faster among individuals with a history of psychiatric admission than among individuals without such a history. However, this substantial reduction is mainly accounted for by the reduction among patients who had been discharged from psychiatric hospitals for more than 1 year. For patients who had been discharged from hospitals within 1 year, the reduction is similar to that of the general population; while for patients hospitalized for treatment at the time of suicide or the index date, the reduction in suicide rate is relatively slower. Such trends hold for all diagnostic groups. Further analyses stratified by age indicate that the faster reduction in suicide rate associated with history of hospitalized psychiatric illness is more pronounced among patients aged 36 years and older.

Conclusion: The reduction in suicide rate is substantial for patients who have been discharged from psychiatric hospitals for more than 1 year and for middle-aged and older patients. Recent improvement in psychiatric care and treatment and promotion of new generation antidepressants may contribute to these changes.

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The suicide rate in Denmark has been declining uninterruptedly during the past 2 decades. The rate was 31.6 suicides per 100,000 inhabitants in 1980[1] and decreased to 15.4 suicides per 100,000 inhabitants in the year 1997,[2] a 51% reduction of the overall suicide rate during this 18-year period. In line with reports from many countries in the world, psychiatric illness is the strongest risk factor for suicide in Denmark. Our previous studies have shown that 44% of all persons who died from suicide in Denmark had a history of admission to psychiatric hospitals prior to suicide and 25% had actually been admitted within the last year.[3,4] Yet many factors shown to be relevant or contributory to psychiatric illness or suicide have changed during the past 2 decades. For instance, people's lifestyles and life quality have, to some degree, improved along with recent development of socioeconomic status and modern technology; some restrictions or reductions have been made for means of suicide[5]; reformation in psychiatric organization has resulted in a marked reduction in the number of psychiatric beds in hospitals but a substantial increase in psychiatric nursing homes in communities[6]; and more effective medications for psychiatric disorders have been developed. These changes may have had different effects in persons with and without psychiatric illnesses. In the present study, we aim to investigate

trends in the suicide rate in patients with a history of hospitalized psychiatric illness from 1981 through 1997 in Denmark compared with those in the general population. We also want to explore differences of the trends with regard to sex, age, clinical phase of illness, and diagnosis.

METHOD

Setting, Design, and Participants

This study was based on the entire population of 5.2 million people in Denmark. All data were derived from Danish longitudinal registers, which include the Danish Civil Registration System,[7] the Cause-of-Death Register,[8] the Danish Psychiatric Central Register,[9] and the Integrated Database for Labour Market Research (the IDA Database).[10] We have described these registers in detail in our previous study.[4] We used the personal identifier, assigned to all newborns and new residents in Denmark, as the key to retrieve and merge individual data from different register databases.

We obtained data on all definite suicides (codes E950–E959 in ICD-8 and codes X60–X84 in ICD-10) during the years 1981 through 1997 from the Cause-of-Death Register. We restricted the cases to those residing in Denmark on December 31 of the year before the year of suicide, thus having access to complete socioeconomic information in the IDA Database. The final number of cases comprised 21,169 suicides, which accounted for 99.64% of the total suicides during this 17-year period in Denmark.

We employed a nested case-control design[11] to recruit up to 20 live controls per suicide case. Controls were matched for birth year, sex, and calendar time of suicide and were randomly drawn from a 5% random sample of the national population in the IDA Database. With this procedure, we enrolled 423,128 population controls into the study. For a few cases older than 93 years we used fewer controls because we could not find 20 eligible controls.

Data Assessment

We retrieved personal data on history of psychiatric admission from the Danish Psychiatric Central Register from 1969 up to the time of suicide or to the index date for controls. Based on the length of time since last psychiatric hospitalization, we grouped this variable into 4 mutually exclusive categories indicating if the subject was hospitalized at the time of suicide or the index date, had been discharged within 1 year, had been discharged for more than 1 year, or had never been admitted to a psychiatric hospital. The main diagnosis of the last admission was categorized into 4 major groups, i.e., schizophrenia spectrum disorders (ICD-8: 295, 297, 298.29, 298.39, 298.89, 298.99, 299.05, 299.09, 301.09, 301.29, 301.83 and ICD-10: F20, F21, F22, F23, F24, F25, F28, F29, F60.0, F60.1), affective disorders (ICD-8: 296, 298.09, 298.19, 300.49, 301.19 and ICD-10: F30, F31, F32, F33, F34, F38, F39), substance abuse disorders (ICD-8: 303, 304 and ICD-10: F10.2, F10.3, F10.4, F1x.2), and other psychiatric disorders.

We obtained personal information on marital status, income level, and place of residence and data indicating if the person had a sickness absence from job for more than 3 consecutive weeks from the IDA Database based on data 1 year before the year of suicide. These factors were adjusted for because they were highly associated with both suicide and mental illness in Denmark.[3,4,12,13]

Statistical Analysis

We analyzed the data with conditional logistic regression using the proportional hazard regression (PHREG) procedure in SAS version 8.[14] Because of the method of sampling controls from individuals at risk at the time, i.e., risk set sampling, the estimated conditional odds ratio can be interpreted as a risk ratio or incidence rate ratio. Of particular interest was the change in suicide risk associated with history of hospital treatment over calendar time. Calendar year was introduced as an annual indicator to investigate whether the rate of change with calendar year could be described as a linear trend, and if so, what was the trend direction relative to the reference group. The Danish Data Protection Agency approved the present study.

RESULTS

Of all 21,169 suicides during the period of 1981 through 1997, 9316 (44%) had a history of admission to a psychiatric hospital, comprising 1461 suicides who were currently hospitalized at the time of suicide, 3875 suicides who had recently been discharged from psychiatric hospitals within 1 year of the time of suicide, and 3980 suicides who had been discharged for more than 1 year at the time of suicide (Table 1). From the year 1981 to 1997, the absolute number of suicide deaths, both among persons with and without a history of hospitalized psychiatric illness, was declining continuously (Figure 1). Results from the conditional logistic regression analysis indicated that, compared with the decline of suicide rate in persons without a psychiatric history, the decline in persons with such a history was faster, with a slope of 0.97 (95% CI = 0.96 to 0.98) even though the general suicide incidence rate in this group of people was 21.5 (95% CI = 20.2 to 22.8) times higher (goodness of fit test for linearizing the trend: $\chi^2 = 9.25$, $p = .864$).

The elevated risk for suicide associated with psychiatric history varied significantly ($p < .0001$) according to clinical phase of illness as shown in Figure 2. When adjusting data for personal marital status, income, place of residence, and sickness absence from job and fitting a regression line expressing the change from 1981 to 1997,

Table 1. Risk of Suicide Among Persons With History of Psychiatric Admission and Trend of Suicide Risk From the Year 1981 to 1997, Adjusted for Socioeconomic Factors

Time Since Recent Admission to Psychiatric Hospital	Cases, N (%)	Controls, N (%)	Main Effect of Psychiatric History on Risk for Suicide: Odds Ratio[a]	95% Confidence Interval	Trends From 1981 to 1997, Relative to the General Population: Odds Ratio[a]	95% Confidence Interval	p Value
Total subjects	(N = 21,169)	(N = 423,128)					
Hospitalized at the time	1,461 (6.9)	895 (0.2)	33.63	28.72 to 39.38	1.04	1.03 to 1.07	< .001
Discharged for 0–12 months	3,875 (18.3)	2,242 (0.5)	55.94	50.23 to 62.30	0.99	0.98 to 1.00	.065
Discharged for more than 1 year	3,980 (18.8)	16,853 (4.0)	8.17	7.55 to 8.83	0.97	0.96 to 0.98	< .001
No admission history	11,853 (56.0)	403,138 (95.3)	1				
Subjects ≤ 35 years old	(N = 4,142)	(N = 82,840)					
Hospitalized at the time	373 (9.0)	174 (0.2)	52.49	36.79 to 74.90	1.00	0.96 to 1.04	1.000
Discharged for 0–12 months	835 (20.2)	437 (0.6)	49.35	38.79 to 62.77	1.01	0.98 to 1.04	.551
Discharged for more than 1 year	578 (14.0)	1,924 (2.3)	8.85	7.26 to 10.79	0.98	0.95 to 1.00	.064
No admission history	2,356 (56.8)	80,305 (96.9)	1				
Subjects 36–60 years old	(N = 9,923)	(N = 198,460)					
Hospitalized at the time	744 (7.5)	387 (0.2)	58.91	46.31 to 74.94	1.01	0.98 to 1.04	.507
Discharged for 0–12 months	2,072 (20.9)	1,261 (0.7)	63.95	55.04 to 74.29	0.98	0.96 to 0.99	.006
Discharged for more than 1 year	2,271 (22.9)	9,590 (4.8)	8.28	7.43 to 9.22	0.98	0.97 to 0.99	.004
No admission history	4,836 (48.7)	187,222 (94.3)	1				
Subjects above 60 years old	(N = 7,104)	(N = 141,828)					
Hospitalized at the time	344 (4.9)	334 (0.2)	12.40	9.43 to 16.32	1.12	1.08 to 1.16	< .001
Discharged for 0–12 months	968 (13.6)	544 (0.4)	49.44	40.16 to 60.87	1.00	0.98 to 1.02	.943
Discharged for more than 1 year	1,131 (15.9)	5,339 (3.8)	7.66	6.66 to 8.81	0.96	0.95 to 0.98	< .001
No admission history	4,661 (65.6)	135,611 (95.6)	1				

[a]Odds ratios were adjusted for marital status, income level, place of residence, and sickness absence, as well as sex, age, and time through matching.

Figure 1. Suicides in Denmark According to Psychiatric History From 1981 Through 1997

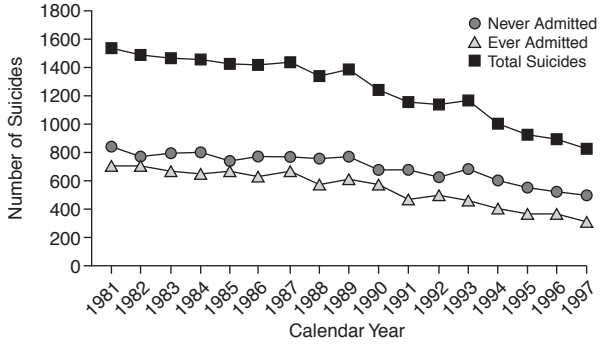
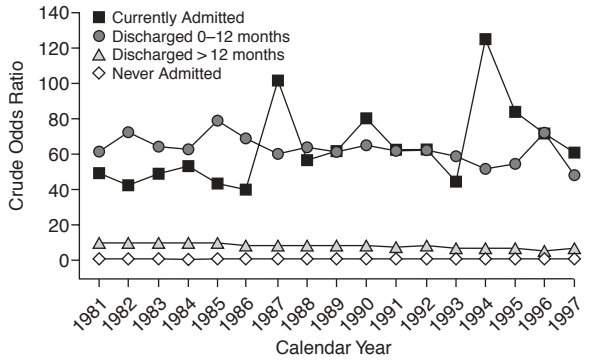


Figure 2. Crude Odds Ratio of Suicide Among Persons in Denmark With History of Admission to Psychiatric Hospitals From 1981 Through 1997[a]



[a]Test of differences in odds ratios according to clinical phase of illness: $\chi^2 = 4846.1$, $p < .0001$.

the results showed that, compared with persons without a hospitalized psychiatric history, suicide rate was 33.63 times higher for persons admitted at the time of suicide or index date, and the rate was increasing with a slope of 1.04 (95% CI = 1.03 to 1.07) from 1981 to 1997 (Table 1). For persons discharged from hospitals within 1 year, the rate was 55.94 times higher and the rate was almost constant with a slope of 0.99 (95% CI = 0.98 to 1.00). While for persons discharged from hospitals for more than 1 year, the rate of suicide was 8.17 times higher, but the rate was declining with a slope of 0.97 (95% CI = 0.96 to 0.98) from 1981 to 1997. These results indicated that the general decline of suicide rate was slower among patients who were hospitalized at the time and was similar among patients who had been discharged within 1 year, whereas it was faster among patients who had been discharged from hospitals for more than 1 year, compared with the decline in the general population.

These trends remained in the analyses stratified by sex. However, the analyses stratified by age indicated great variations and might provide more insight. As shown in Table 1, the faster decline of suicide rate in patients discharged for more than 1 year was present in all age groups, but it was more prominent in older patients; the slower decline of suicide rate in patients admitted at the

Table 2. Risk of Suicide Associated With Various Diagnoses of Psychiatric Illness and Trend of Suicide Risk From the Year 1981 to 1997, Adjusted for Socioeconomic Factors

			Main Effect of Psychiatric History on Risk for Suicide		Trends From 1981 to 1997, Relative to the General Population		
Time Since Recent Admission to Psychiatric Hospital, by Diagnosis	Cases, N	Controls, N	Odds ratio[a]	95% Confidence Interval	Odds ratio[a]	95% Confidence Interval	p Value
Schizophrenia and schizophrenia-like psychoses							
Hospitalized at the time	436	406	20.29	15.58 to 26.43	1.02	0.99 to 1.05	.202
Discharged for 0–12 months	757	472	52.10	41.15 to 65.96	0.97	0.95 to 1.00	.033
Discharged for more than 1 year	465	2,064	6.23	5.05 to 7.68	0.99	0.97 to 1.01	.311
Affective disorders							
Hospitalized at the time	630	139	141.62	101.42 to 197.75	1.01	0.97 to 1.06	.511
Discharged for 0–12 months	1,115	452	93.65	75.81 to 115.70	0.98	0.96 to 1.01	.170
Discharged for more than 1 year	991	3,891	9.25	8.06 to 10.62	0.98	0.96 to 1.00	.015
Substance abuse disorders							
Hospitalized at the time	51	51	22.49	10.82 to 46.74	1.02	0.93 to 1.13	.643
Discharged for 0–12 months	584	474	35.91	28.38 to 45.44	0.98	0.95 to 1.01	.252
Discharged for more than 1 year	757	2,458	9.92	8.36 to 11.76	0.96	0.95 to 0.98	< .001
Other psychiatric disorders							
Hospitalized at the time	344	299	16.02	12.10 to 21.20	1.12	1.07 to 1.16	< .001
Discharged for 0–12 months	1,419	844	50.88	43.35 to 59.72	1.00	0.98 to 1.02	.979
Discharged for more than 1 year	1,767	8,440	7.39	6.63 to 8.24	0.97	0.96 to 0.98	< .001
No admission history	11,853	403,138	1				

[a]Odds ratios were adjusted for marital status, income level, place of residence, and sickness absence, as well as sex, age, and time through matching.

time of suicide or index date was mainly confined to patients more than 60 years old. At the same time, the suicide rate declined faster (with a slope of 0.98, 95% CI = 0.96 to 0.99) among adults aged 36 through 60 years who were discharged from psychiatric hospitals within the last year compared with the decline among the other categories within this same age range.

Further examination by diagnosis demonstrated similar patterns of change in suicide rates among patients diagnosed with various disorders, categorized as schizophrenia-like psychoses, affective disorders, substance abuse disorders, or other psychiatric illnesses, although, to some extent, the main effect of these disorders differed (Table 2).

DISCUSSION

This large population-based study demonstrates that, during the period 1981 to 1997 when the suicide rate in Denmark was continuously declining, the reduction of the suicide rate was generally faster among individuals with a history of psychiatric admission than among individuals without such a history. However, this substantial reduction was mainly accounted for by a faster reduction in the rate among patients who had been discharged from psychiatric hospitals for more than 1 year; for those who had been discharged from hospitals within 1 year, the reduction was similar to that of the general population, whereas for patients who were hospitalized for treatment at the time of suicide or the index date, the reduction was slower. Such trends held for both sexes and all diagnostic groups. Further analyses stratified by age indicated that the faster decline of suicide rate associated with a distant history of hospitalized psychiatric illness was present for patients in all age groups, but it was more pronounced for patients at middle-age or older; while the slower decline of suicide rate among patients hospitalized at the time of suicide or index date was mainly confined to older patients.

The possibility of linking personal information from Danish longitudinal registers, to our knowledge, makes this study the first to have assessed, on a total population level, the trend in suicide risk associated with hospitalized psychiatric illness over a nearly 20-year period. In Denmark, all residents have equal access to psychiatric hospitals, and all treatment is free of charge. The decision on hospitalization of a patient is completely based upon the psychiatric evaluation from psychiatrists. Individual data on each admission have been recorded and computerized since 1969. These advantages enable us to obtain precise and cumulative information about psychiatric hospitalization, and our data are not subject to differences in access to psychiatric care by socioeconomic status. On the other hand, with focus on psychiatric admission, our data may represent a severe spectrum of psychiatric disorders. Furthermore, failure to control for the effect of psychiatric illness, e.g., those illnesses that did not lead to hospitalization or admission for hospital treatment before the year 1969, might bias our estimates. However, we believe, such bias would be limited because we used the method of risk set sampling to draw controls from the population.

The significant decline of suicide rate in Denmark, as well as in the United Kingdom and Norway, during the past 2 decades has recently attracted research atten-

tion.[15–18] Using the same data sources as the present study, we recently examined the overall change in suicide rate among patients with schizophrenia and found that the reduction in suicide rate among patients with schizophrenia and schizophrenia spectrum disorder was similar to that seen in the general population.[17] In the present study, we have extended our focus to all psychiatric illnesses, and in more detail, investigated the changes in suicide rate among patients according to clinical phase of illness. We have also strengthened our analyses by exploring the changes according to age of patients and to diagnosis of disorders. We believe that the results from this study can provide more insight into the current knowledge and may be informative for strategy making in the psychiatric service system.

The generally faster decline in suicide rate among patients with psychiatric illness in Denmark has occurred simultaneously with substantial changes in mental health services. The number of psychiatric beds in hospitals was reduced by 60.5% from 1980 (2.00 beds per 1000 inhabitants) to 1997 (0.79 beds per 1000 inhabitants).[6] On the other hand, there has been a steady increase in the number of psychiatric nursing homes with staff support in communities, providing facilities where recently discharged or chronically ill patients can get aftercare and treatment. At the same time, there has been an increase in the number of persons employed in psychiatric services. Staff employed in community mental health centers was doubled between 1993 and 1997, while staff working in psychiatric wards in hospitals was increased by 30%.[6] Moreover, staff members could be employed for the purpose of supporting people with severe mental illness in their own homes.[6] Therefore, treatment and social support facilities actually available for patients with psychiatric illnesses improved during the study period in Denmark, providing possibilities for closer follow-up during outpatient periods and closer observation and support during inpatient stay.

The changes we found in the suicide rate among patients with hospitalized psychiatric history seem to coincide well with the changes in psychiatric services in Denmark. For instance, the reduction in the number of psychiatric beds in hospitals might have resulted in a selection of more severely ill patients admitted for hospital treatment and a trend toward shorter stays in hospitals, which may, to a large extent, explain the slower decline of suicide rate among patients currently admitted at hospitals, and particularly, among those in the higher age group. At the same time, closer follow-up and support from community-based psychiatric services seem to be efficient complements that have benefited outpatients, making the rate of suicide among patients recently discharged from hospital decline as fast as that of the general population, and even faster among patients discharged for a longer time (more than 1 year).

We also believe that improved treatment of psychiatric illness, both for inpatients and outpatients, contributes to our findings. For example, the new generation antidepressants, such as the selective serotonin reuptake inhibitors (SSRIs), have been increasingly used instead of classic tricyclic antidepressants. In Denmark, the consumption of SSRIs has increased from zero (not invented at the time) defined daily dose (DDD) per 1000 inhabitants in 1981, to 17.1 in 1997 and to 31.4 DDD per 1000 inhabitants in the year 2002.[19] Although it has been argued that increasing consumption of SSRIs in a population could reduce the rate of suicide,[20–22] the effect, if any, may be mainly confined to patients with psychiatric illness, and especially to patients in the clinical phases of treatment continuation and maintenance.

In addition, patients with psychiatric illness, like the general population, have experienced positive changes over the past 20 years, such as reduced availability of lethal suicide means, better somatic and psychiatric treatment of suicide attempts, increased social and cultural stability in society, more general focus on prevention, and increased access to telephone counseling and psychiatric emergency services.[17,23] These factors might have contributed to the decline of suicide rate in the general population as well as in patients with hospitalized psychiatric illness.

Our findings regarding the age differences are particularly interesting. They may suggest that the improvements in psychiatric services and treatment are likely to have benefited patients in different age bands differently. However, it is unclear to us if such difference is due to a selection effect or any other reasons. Due to the limited number of psychiatric beds, there might be more young new patients admitted for hospital treatment, leaving beds available only for older patients who are extremely ill. There might also be age differences in, for example, efforts to seek psychiatric counseling and attitudes toward antidepressants, as well as preferences regarding choosing new generation antidepressants. However, these hypotheses warrant more research.

Author contributions: Dr. Qin initiated this study and participated in all processes of the study design, data analysis, and result interpretation; drafted the report; and finalized the manuscript. Dr. Nordentoft, Dr. Høyer, Mr. Agerbo, Mr. Laursen, and Dr. Mortensen took part in the discussions about design, analysis, and interpretation of the data and have seen and approved the final version of the manuscript. Dr. Qin had full access to all the data in the study and had final responsibility for the decision to submit for publication.

REFERENCES

1. Sundhedsstyrelsen [The Danish National Board of Health]. Dodsarsagerne 1980 [Cause of Death in Denmark 1980]. Copenhagen, Denmark: JH Schultz A/S; 1982
2. Sundhedsstyrelsen [The Danish National Board of Health]. Dodsarsagerne 1997 [Cause of Death in Denmark 1997]. Copenhagen, Denmark: Stougaard Jensen; 1999
3. Mortensen PB, Agerbo E, Erikson T, et al. Psychiatric illness and risk

factors for suicide in Denmark. Lancet 2000;355:9–12
4. Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to socio-economic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981–1997. Am J Psychiatry 2003;160:765–772
5. Sundhedsstyrelsen. Bilagsdel til Forslag til Handlingsplan til Forebyggelse af Selvmordsforsøg og Selvmord i Danmark. Copenhagen, Denmark: Aabenraa Bogtrykkeri; 1998
6. Ministry of Social Affairs and Ministry of Health. Government Report on Services for the Mentally ill 2000. Copenhagen, Denmark: Denmark Statens Information; 2002
7. Malig C. The civil registration system in Denmark. Tech Pap Int Inst Vital Registr Stat 1996;1–6
8. Juel K, Helweg-Larsen K. The Danish registers of causes of death. Dan Med Bull 1999;46:354–357
9. Munk-Jorgensen P, Mortensen PB. The Danish Psychiatric Central Register. Dan Med Bull 1997;44:82–84
10. Danmarks Statistik. IDA—en integreret database for arbejdsmarkedsforskning. Copenhagen, Denmark: Danmarks Statistiks trykkeri; 1991
11. Clayton D, Hills M. Statistical Models in Epidemiology. Oxford, United Kingdom: Oxford University Press; 1993
12. Agerbo E, Byrne M, Eaton WW, et al. Marital and labor market status in the long run in schizophrenia. Arch Gen Psychiatry 2004;61:28–33
13. 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
14. SAS Institute Inc. The PHREG Procedure. SAS/STAT User's Guide, Version 8. Cary, NC: SAS Institute Inc; 1999:2569–2657
15. Geddes JR, Juszczak E. Period trends in rate of suicide in first 28 days after discharge from psychiatric hospital in Scotland, 1968–1992. BMJ 1995;311:357–360
16. Gunnell D, Middleton N. National suicide rates as an indicator of the effect of suicide on premature mortality. Lancet 2003;362:961–962
17. Nordentoft M, Laursen TM, Agerbo E, et al. Change in suicide rates for patients with schizophrenia in Denmark, 1981–97: nested case-control study. BMJ 2004;329:261
18. Mehlum L, Hytten K, Gjertsen F. Epidemiological trends of youth suicide in Norway. Arch Suicide Res 1999;5:193–205
19. Danish Medicines Agency. Medicinal Products Statistics 1998–2002. Albertslund, Denmark: Schultz Information; 2003
20. Isacsson G, Holmgren P, Ahlner J. Selective serotonin reuptake inhibitor antidepressants and the risk of suicide: a controlled forensic database study of 14,857 suicides. Acta Psychiatr Scand 2005;111: 286–290
21. Gunnell D, Saperia J, Ashby D. Selective serotonin reuptake inhibitors (SSRIs) and suicide in adults: meta-analysis of drug company data from placebo controlled, randomised controlled trials submitted to the MHRA's safety review. BMJ 2005;19;330:385
22. Simon GE, Savarino J, Operskalski B, et al. Suicide risk during antidepressant treatment. Am J Psychiatry 2006;163:41–47
23. Appleby L, Dennehy JA, Thomas CS, et al. Aftercare and clinical characteristics of people with mental illness who commit suicide: a case-control study. Lancet 1999;353:1397–1400

