Period trends in rate of suicide in first 28 days after discharge from psychiatric hospital in Scotland, 1968-92

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Abstract

Objective—To examine period trends in the rate of suicide in the first 28 days after discharge from psychiatric hospital.

Design—Cohort study of patients discharged from psychiatric hospital.

Setting—Scotland.

Subjects—All patients aged 15-84 who were discharged from Scottish psychiatric hospitals during 1968 to 1992.

Outcome measure—The rate of suicide (classified as codes E950-9 and E980-9 according to the *International Classification of Diseases, Ninth Revision*) within 28 days of discharge per 100 000 person years at risk for five year periods during 1968 to 1992. Crude, within cohort rates and externally standardised rates were calculated.

Results—Overall, 196 male patients committed suicide in 20 520 person years at risk, and 171 female patients committed suicide in 24 114 person years at risk. A significant linear trend was seen in period effect on externally standardised mortality ratios in both sexes: a decrease in male patients ($P=0.008$) and an increase in female patients ($P=0.0001$). The adjusted standardised mortality ratio in 1988-92 compared with 1968-72 was 0.62 (95% confidence interval 0.39 to 0.98) in male patients and 2.73 (1.64 to 4.56) in female patients.

Conclusion—The increase in the rate of suicide in the 28 days after discharge in female psychiatric patients makes this an increasingly important period to target. The rise has occurred against the background of a reduction of 60% in the number of psychiatric beds for adults.

Introduction

The risk of suicide in patients in the year after discharge from psychiatric hospital is highest in the first 28 days.^{1,4} Suicide soon after discharge may be related to the nature and quality of aftercare.¹ Focusing preventive efforts on the period soon after discharge may be one way of contributing to the Health of the Nation's target of a 33% reduction in suicide among people with severe mental disorder by the year 2000, from 15% to 10%.^{3,6} Assuming that service provision affects the risk of suicide, past changes in service provision might also have done so. In particular, the mental health services in the United Kingdom have changed profoundly over the past three decades, from being a predominantly institutional form of care to being an increasingly community based form. These changes have been associated with an important reduction in the number of psychiatric beds.⁷ There has been concern that the change to community based care may be associated with a higher rate of suicide soon after discharge.^{8,9} We investigated the possibility of period trends in the rates of suicide soon after discharge by studying a cohort of patients discharged from psychiatric hospitals in Scotland during 1968 and 1992.

Patients and methods

PATIENTS

We studied all patients aged 15-84 years who were discharged from psychiatric hospitals in Scotland

during 1968 to 1992. We obtained data from the Scottish morbidity record scheme 4, maintained by the information and statistics division of the NHS in Scotland. Diagnoses on this scheme are coded according to the *International Classification of Diseases, Ninth Revision* (ICD-9)¹⁰; diagnoses made before 1980 were recoded after the introduction of this revision. We grouped the discharge diagnoses into seven categories: schizophrenia (code 295), non-psychotic depression (300.4 and 311), affective psychosis (296), non-depressive neuroses (300, except 300.4), alcohol dependence (303), personality disorder (301), and other diagnoses. We obtained the cause of death from the death register of the General Register Office for Scotland using record linkage.¹¹ Deaths coded according to ICD-9 as E950-959 (suicide and self inflicted injury) or as E980-989 (injury undetermined whether accidentally or purposely inflicted) were classed as suicide. Deaths occurring on the day of discharge were excluded because we could not accurately differentiate the patients who committed suicide on that day but while still inpatients from those who committed suicide on that day but after discharge.

COMPARISON WITH GENERAL POPULATION

Between 1968 and 1992 the suicide rates for the general female population in Scotland fell slightly. As in England and Wales and elsewhere, the rates in the male population have increased, especially in those aged under 45 years.¹²⁻¹⁴ Patients discharged from psychiatric hospital are likely to be affected by the factors responsible for these population trends as well as the increased risk associated with being a psychiatric patient. We took account of changes in the rates in the general population by deriving age specific suicide rates for the general population in Scotland for each period using the General Register Office's death records and mid-year population estimates for the appropriate year. We then calculated standardised mortality ratios (baseline 1) by the indirect method.¹⁵

CALCULATION OF PERSON YEARS AT RISK

Using the number of discharges as the denominator would create a bias if a period trend existed towards shorter but more frequent admissions. We therefore calculated person years at risk on the basis of the time at risk of suicide as the time from discharge to death, subsequent readmission, or the end of the risk period of 28 days. Individual patients were allowed to enter or exit the study at any time. For each admission, the patient was considered to contribute a separate period at risk after each discharge. We divided the 25 years of the study into five periods of five years, and each period at risk contributed by a patient was allocated to the appropriate five year period. The total observation time aggregated over all patients was then the denominator for each period. We calculated the suicide rates during the 28 days after discharge from psychiatric hospital per 100 000 person years of observation using the person years program.¹⁶ We obtained median lengths of stay from the information and statistics division of the NHS in Scotland.

STATISTICAL ANALYSIS

We used Poisson regression to estimate the mortality ratios for the effect of period on the risk of suicide after discharge, adjusting for the confounding effects of age

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BMJ 1995;311:357-60

and diagnosis.¹⁷ We used the software GLIM and EGRET.^{18,19} The regression analysis was performed twice with both the person years of observation and the expected number of suicides (calculated on the basis of national rates) as an offset. This allowed us to model the effect of period on suicide rates in the study cohort and adjust for trends in suicide rates in the general population. To test for a trend in the estimated period

TABLE I—Suicide rates within cohort during 28 days after discharge and standardised mortality ratios in Scotland, 1968-92, by age, sex, and five year period

Age (years)	Observed No of suicides	Person years	Rate/100 000 person years	Standardised mortality ratio* (95% confidence interval)
Male patients:				
15-24:				
1968-72	2	462.8	432.2	79 (10 to 284)
1973-7	6	432.8	1386.4	148 (54 to 322)
1978-82	2	394.5	507.0	35 (4 to 126)
1983-7	2	437.4	457.3	28 (3 to 100)
1988-92	9	529.6	1699.3	74 (34 to 141)
25-44:				
1968-72	15	1607.0	933.4	93 (52 to 153)
1973-7	20	1670.3	1197.4	72 (44 to 110)
1978-82	14	1594.2	878.2	36 (20 to 60)
1983-7	19	1584.0	1199.5	45 (27 to 70)
1988-92	12	1853.3	647.5	21 (11 to 36)
45-64:				
1968-72	10	1386.9	721.0	45 (22 to 83)
1973-7	13	1390.7	934.8	48 (26 to 83)
1978-82	21	1234.0	1701.8	58 (36 to 88)
1983-7	14	1171.2	1195.3	40 (22 to 67)
1988-92	18	1158.1	1554.3	56 (33 to 88)
65-84:				
1968-72	5	510.7	979.1	55 (18 to 129)
1973-7	3	537.7	558.2	31 (6 to 91)
1978-82	2	664.4	301.0	11 (1 to 40)
1983-7	5	865.4	577.8	23 (7 to 54)
1988-92	4	1035.9	386.13	16 (4 to 42)
Female patients:				
15-24:				
1968-72	1	520.9	192.0	63 (2 to 348)
1973-7	1	502.5	199.0	37 (1 to 208)
1978-82	0	415.1	0	NA
1983-7	2	400.8	499.0	124 (15 to 450)
1988-92	3	420.1	714.1	119 (25 to 348)
25-44:				
1968-72	12	1686.6	711.5	57 (29 to 99)
1973-7	14	1604.5	872.5	91 (50 to 152)
1978-82	11	1492.7	736.9	64 (32 to 115)
1983-7	14	1462.9	957.0	114 (63 to 192)
1988-92	16	1579.1	1013.2	107 (61 to 175)
45-64:				
1968-72	11	1618.4	679.7	31 (16 to 56)
1973-7	10	1496.1	668.4	45 (22 to 83)
1978-82	30	1461.5	2052.6	96 (65 to 137)
1983-7	12	1403.6	854.9	61 (31 to 106)
1988-92	9	1218.4	738.7	72 (33 to 136)
65-84:				
1968-72	2	970.4	206.1	14 (2 to 50)
1973-7	3	1068.0	280.9	23 (5 to 66)
1978-82	3	1335.2	224.7	18 (4 to 52)
1983-7	9	1664.7	540.7	50 (23 to 95)
1988-92	8	1792.8	446.2	51 (22 to 101)

NA=Not applicable.
*Relative to 1.

TABLE II—Suicide rates within cohort during 28 days after discharge and standardised mortality ratios in Scotland, 1968-92, by sex and diagnosis

Diagnosis (ICD-9 code)	Observed No of suicides	Person years	Rate/100 000 person years	Standardised mortality ratio* (95% confidence interval)
Male patients:				
Schizophrenia (295)	26	3148.8	825.7	38 (25 to 56)
Non-psychotic depression (300.4, 311)	48	1942.1	2471.5	114 (84 to 152)
Affective psychoses (296)	22	2338.5	940.8	41 (25 to 61)
Non-depressive neuroses (300, except 300.4)	7	624.4	1121.1	57 (23 to 117)
Alcohol dependence (303)	45	5475.6	821.8	36 (26 to 49)
Personality disorder (301)	20	1464.9	1365.2	75 (46 to 116)
Other	28	5526.2	506.7	22 (15 to 32)
Female patients:				
Schizophrenia (295)	11	2578.1	426.7	35 (18 to 63)
Non-psychotic depression (300.4, 311)	51	4604.4	1107.6	89 (67 to 117)
Affective psychoses (296)	32	5365.9	596.4	45 (31 to 63)
Non-depressive neuroses (300, except 300.4)	16	1197.1	1336.6	111 (64 to 181)
Alcohol dependence (303)	7	1765.4	396.5	30 (12 to 63)
Personality disorder (301)	19	1585.2	1198.6	123 (74 to 193)
Other	35	7018.0	498.7	46 (32 to 64)

*Relative to 1.

FIG 1—Suicide rates in male population in Scotland, 1968-92 (9974 suicides)

effect, a linear term in period was fitted to a baseline log-linear model containing terms for age and diagnosis, and the resulting likelihood ratio statistic was compared with the χ^2 distribution with one degree of freedom. The presence of first order interactions between the main effects was also investigated. Percentage average annual changes in the number of admissions were estimated by fitting regression lines to the logarithm of the number (five year moving average) of admissions for each year.

Results

In all, 159 742 male patients and 178 271 female patients were discharged from Scottish psychiatric hospitals at least once during 1968 to 1992. There were 196 suicides within 28 days of discharge in 20 520 person years at risk in male patients and 171 suicides in 24 114 person years at risk in female patients. The crude suicide rate per 100 000 person years at risk was 955 (95% confidence interval 831 to 1099) in male patients and 709 (611 to 823) in female patients. The crude standardised mortality ratio was 43 (37 to 50) in male patients and 59 (51 to 69) in female patients. Tables I and II show the observed number of suicides, person years at risk, suicide rate per 100 000 person years at risk, and standardised mortality ratio by sex, age group, and period and by diagnosis and sex respectively. The standardised mortality ratios in the first 28 days were highest in patients with discharge diagnoses of non-psychotic depression and personality disorder and in female patients with non-depressive neuroses.

During 1968 to 1992 the age specific suicide rates in the Scottish population per 100 000 population steadily increased in male patients, especially in those aged under 45 years (fig 1). In female patients the age specific rates have converged somewhat, with the most pronounced change being a fall in the rates in older age groups (fig 2). Table III shows the standardised mortality ratio for each period, adjusted for diagnosis and age, estimated from the regression models. The deviances of the models were close to the degrees of freedom in both sexes, suggesting a reasonable fit of the model to the data (table III).

The linear trend in period effect on externally standardised mortality ratios was significant in both sexes: in male patients there was a decrease in the mortality ratio ($P=0.008$) and in female patients an increase ($P=0.0001$). The standardised mortality ratio in male patients was 38% lower in the last five years than in the first five (standardised mortality ratio 0.62 (0.39 to 0.98)) while that in female patients discharged in the last five years was almost three times that in the first five (2.73 (1.64 to 4.56)).

In female patients the trend in period effect was also evident in the study cohort ($P=0.013$), and so the

effect is probably not accounted for by the reduction in suicide rates in the female general population. In contrast, no trend in period effect was evident in the male cohort ($P=0.17$). This implies that suicide rates within 28 days of discharge remained relatively stable despite a substantial increase in the suicide rates in the male general population. As figure 3 shows, the numbers of readmissions increased steadily between 1970 and 1990, while the numbers of first admissions declined, with an increase in the total number of admissions. The number of available, staffed, non-geriatric psychiatric beds in Scotland decreased from 16 589 in 1976 to 6456 in 1992 (61%; figures are not available for before 1976). The median length of stay for voluntary patients in 1968 was five weeks for male patients and six weeks for female patients and in 1992 was two weeks and three weeks respectively. This shows that a shift has occurred towards shorter stays and more readmissions.

Discussion

We have identified period trends in the rate of suicide soon after discharge in patients aged 15-84 discharged from psychiatric hospital in Scotland during 1968 to 1992, with unexpected sex differences. In female patients the suicide rate increased progressively in the cohort, and, after the suicide rates in the general Scottish population were adjusted for, the rate almost trebled between the first and last five year periods. In male patients no period trend occurred in

FIG 2—Suicide rates in female population in Scotland, 1968-92 (6015 suicides)

TABLE III—Mortality ratios within cohort and externally standardised mortality ratios for effect of period on suicide after discharge from psychiatric hospital, Scotland, 1968-92. Values in parentheses are 95% confidence intervals unless stated otherwise

Five year period	Within cohort mortality ratio*†	Externally standardised mortality ratio*‡
Male patients:		
1968-72	1	1
1973-7	1.39 (0.88 to 2.21)	1.02 (0.64 to 1.62)
1978-82	1.40 (0.88 to 2.24)	0.68 (0.43 to 1.09)
1983-7	1.44 (0.90 to 2.29)	0.67 (0.42 to 1.08)
1988-92	1.42 (0.90 to 2.26)	0.62 (0.39 to 0.98)
Deviance (df)	194.4 (228)	198.5 (224)
Likelihood ratio statistic (df)	1.882 (1)	6.933 (1)
P value	0.170	0.008
Female patients:		
1968-72	1	1
1973-7	1.16 (0.68 to 1.99)	1.51 (0.88 to 2.58)
1978-82	1.94 (1.19 to 3.16)	2.02 (1.24 to 3.28)
1983-7	1.67 (1.01 to 2.77)	2.44 (1.47 to 4.04)
1988-92	1.72 (1.03 to 2.85)	2.73 (1.64 to 4.56)
Deviance (df)	225.7 (228)	222.2 (217)
Likelihood ratio statistic (df)	6.228 (1)	19.31 (1)
P value	0.013	<0.001

*Adjusted for confounding effects of age and diagnosis.

†Within cohort comparison, with person years at risk as offset.

‡With expected number of suicides derived from national rates as offset.

FIG 3—Five year moving average of admissions of patients aged 15-84 to psychiatric hospital in Scotland, 1969-92. Estimated average annual change (95% confidence interval) in (a) first admissions: 1.3% (-1.6% to -1.0%) (male patients), -1.7% (-1.9% to -1.5%) (female patients); (b) readmissions: 2.2% (1.7% to 2.7%) (male patients), 2.5% (2.1% to 2.8%) (female patients); (c) total admissions: 0.8% (0.5% to 1.1%) (male patients), 0.8% (0.7% to 1.0%) (female patients)

the cohort, and after adjustment the suicide rates fell by approximately 40%.

The study's design does not allow direct inferences about the causation of the observed trends, and interpretation must therefore be cautious. Furthermore, misclassification of discharge diagnosis and the distinction between first admission and readmission have been reported in the routinely collected dataset used in this study.^{20 21} The definition of suicide used may have introduced misclassification, although we followed recognised practice by using codes E950-9 and E980-9.¹² The advantage of using national data is that they provided sufficient power to use a rare event as the outcome.

The increase in the rate of suicide soon after discharge in female patients may be related to the change in service provision over the period. Discharge at an earlier stage of recovery may exacerbate feelings of loneliness and hopelessness and increase the risk of suicide.^{19 10} Previous studies have found that patients who commit suicide have had shorter stays, more commonly have non-psychotic diagnoses, and have communicated more feelings of loneliness.^{9 22-24} Female schizophrenic patients who commit suicide are more likely to be single and live alone.²³ Although we could not directly examine the effect of shorter inpatient stays on the risk of suicide soon after discharge, our findings would be consistent with a relation between an increase in the rate of suicide in females and the move to fewer beds, more readmissions, and shorter stays. The lack of a trend in the male cohort implies that male patients were affected to a lesser extent by the changes in service provision. The fall in male standardised mortality ratios, with relatively stable cohort rates, may reflect the fact that younger males, whose suicide rate in the general population is increasing, are less likely than females to be in contact with health services before suicide.²⁵

Alternatively, as numbers of beds have fallen, the admission criteria for female patients may have become more stringent. This could have led to the selective admission of severely disturbed patients, who may be more likely to commit suicide on discharge, and the decrease in the person years at risk in some diagnoses over the period supports this. A similar decrease in the same diagnostic categories, however, was observed in male patients, in whom the risk of suicide remained stable in the study cohort and fell relative to the general population. Furthermore, the effect of period was constant in all diagnostic categories, including diagnoses such as schizophrenia in which the person

Key messages

- The rate of suicide in patients discharged from psychiatric hospital has been reported to be highest in the first 28 days after discharge
- In Scotland during 1968 to 1992 the standardised rate of suicide in the first 28 days after discharge almost trebled in female patients and decreased by 40% in male patients
- These period trends have occurred against a background of important changes in mental health service provision, with a 60% reduction in the number of psychiatric beds for adults between 1976 and 1992 and a trend towards shorter stays
- The increase in the suicide rate soon after discharge in female patients highlights the increasing importance of targeting services at recently discharged patients

years at risk did not decline. Therefore, although we cannot dismiss this explanation, it is not well supported by the data.

Whatever the reason for the increase in the rates in female patients, the main finding is that their risk of suicide in the first 28 days after discharge is increasing. Some of these deaths might be avoidable if community services are targeted at this high risk period. In Scotland, although the number of beds has been reduced, no comprehensive and integrated community service is yet in place.²⁶ If the increase is due to earlier discharge with inadequate community support, community services and planning procedures for discharge need to be developed before numbers of beds are reduced further.

We particularly acknowledge the contribution of James Boyd and Fiona O'Brien of the information and statistics division of the NHS in Scotland for their help with programming. We also thank Gary Donaldson, Scott Fleming, Joan Forrest, Philip Johnston, and Steve Kendrick (of the same division) for their help with this study. We are indebted to Alison Douglas for advising on the use of the person years program, Roger Black for his advice throughout the study, and Stephen Lawrie for his comments on the paper.

Funding: Chief Scientist Office of the Scottish Home and Health Department.

Conflict of interest: None.

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(Accepted 12 June 1995)

A survey of acute pain services in the United Kingdom

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The report of a joint working party of the Royal College of Surgeons of England and the College of Anaesthetists to consider pain after surgery called for the development of an acute pain service in every hospital performing surgery.¹ Despite this firm recommendation, it is perceived that such services are not as prevalent as might be expected. We undertook a survey of the current status of acute pain management in the United Kingdom.

Subjects, methods, and results

We sent a questionnaire to each of the tutors of the Royal College of Anaesthetists. The questionnaire sought details of the existence, staffing, and funding of any form of acute pain service in each hospital. An outline of the hospital's current methods of pain management after major surgery was also requested.

A total of 281 questionnaires was distributed and 221 replies (79%) were received. Of the responding hospitals, 97 (44%) reported having some form of acute pain service. Of these, 62 (28%) employed a specific

pain nurse and 36 (16%) had specific "fixed" consultant sessions allocated to acute pain. Only 18 hospitals reported that additional funds had been provided for the purpose. In units where there was no acute pain service, the main reason (66/124; 53%) was financial. There was a regional variation in the availability of acute pain services (table).

Virtually every responding hospital used the newer analgesic techniques such as patient controlled analgesia or epidural opioid infusion to some extent, but in 42% of units (93) these techniques were used in less than 10% of patients after major surgery. Inter-mittent intramuscular injection of opioid remains the most commonly used technique in most hospitals, with 47% of units (104) using it in more than 50% of their patients.

Comment

More than four years after the publication of the report of the joint working party of the Royal College of Surgeons of England and the College of Anaesthetists on pain after surgery¹ and despite reports of acute pain services in the United Kingdom,^{2,3} it is disappointing that less than half of the hospitals that responded in this survey had an acute pain service. However, the authors are aware that several hospitals have since developed such a service. Specific funding allocated to enable the establishment of an acute pain service was reported by

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BMJ 1995;311:360-1