

## Modelling suicide risk in affective disorders

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(Received 1 March 2001; revised 15 August 2001; accepted 31 August 2001)

**Summary – Background.** The lifetime risk of suicide in affective disorders is commonly quoted as 15%. This stems from hospital populations of affective disorders. **Aims.** To model the lifetime prevalence of suicide using data on completed suicides from one English Health District and community-based rates of prevalence of affective disorders. **Methods.** A secondary analysis of a primary data set based on 212 suicides in North Staffordshire was undertaken. The population rates of psychiatric morbidity were obtained from the National Comorbidity Survey. **Results.** The model suggests a lifetime prevalence rate of suicide for any affective disorder at 2.4%, with a rate for those uncomplicated by substance abuse, personality disorder or non-affective psychosis at 2.4%, and a rate for uncomplicated cases who had no mental health service contact at 1.1%. **Conclusions.** Lifetime prevalence rates of suicide in subgroups of affective disorders may be lower than the traditional rates cited for hospital depression. This has implications for primary care projects designed to investigate the occurrence of and the prevention of suicide. © 2001 Éditions scientifiques et médicales Elsevier SAS

**mood disorders / primary care / substance misuse / suicide**

### INTRODUCTION

It is generally accepted that the vast majority of persons who commit suicide are suffering from psychiatric disorders and that affective disorders make up the single commonest group [1, 2, 12, 25]. A figure of 15% as the lifetime risk of suicide for mood disorders is one of the most commonly cited figures in psychiatry. This figure, which was based on a review of 17 follow-up studies reported between 1937 and 1958 [10], remained almost unchallenged for a quarter of a century. In recent years, Goodwin and Jamison [9], reviewing a larger sample of studies, suggested a lifetime prevalence of up to 19%. In contrast, surveying an even larger group of studies and using a number of methodological refinements,

Inskip et al. [14] proposed a reduced estimate of 6% lifetime prevalence. These estimates, however, are based almost exclusively on hospitalised samples of depressed individuals.

The confounding of hospitalisation and suicide-associated factors leads to problems interpreting these lifetime estimates. If lifetime prevalence estimates for suicide of between 6% and 19% apply to all individuals in the community diagnosed as depressed, or meeting operational criteria for depression, then national suicide rates should be many times higher than are currently observed. Taking community prevalence rates for depression into account, Blair-West et al. [4] modelled the risk for all mood disorders and proposed lifetime suicide risks between 2 and 3.5% for depressive

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disorders. Factoring sex and age determinants into their model gave even lower risks for women [5].

This estimate, however, may also be misleading. It is likely that uncomplicated depressives and unipolars are at lower risk of suicide as, for example, the occurrence of alcohol abuse along with depression in completed suicides has been frequently reported [27, 28, 30]. Henriksson et al. [13] noted that overall only 15% of suicides with major depression were without any co-morbidity: 31% of those with major depression had a personality disorder, 24% had alcohol dependence and 49% had physical disorders. Isometsä et al. [18, 19] noted that 90% of their sample of suicides with non-major depressive disorders and 47% of the major depressives had secondary depression.

Primary uncomplicated affective disorders appear to have a very low risk of suicide even in patients in contact with the mental health services. In a 6–12 year follow-up of 500 psychiatric outpatients, Martin et al. [23] found no suicides among primary affective disorders but those with secondary affective disorders had eight times the expected rate of unnatural death. Akiskal et al. [3] found similar differences in suicide rates between primary and secondary affective disorders.

### **Suicide and affective disorder in primary care**

Watts' [33] study was the only primary care study quoted in the Guze and Robins 1970 review. This study reported on 529 patients diagnosed by one general practitioner (GP) as having depression over a period of 10 years. During this period six patients committed suicide, three were known depressives, and three had not seen their doctor, of whom two were retrospectively thought to have depression. These five suicides gave a rate of suicides in known depressives of 0.95% per year. However, it is likely that this is an overestimate as many depressives were probably not known to the GP. Morrison [26] found a 1.7% lifetime prevalence rate of suicide in unipolar depression, a rate of 42/100,000 subjects, higher than the surrounding rate for San Diego county of 25/100,000. In Holland, Weel-Baumgarten et al. [34], in a 10-year follow-up study of depressed patients diagnosed in primary care, which included subjects referred on to secondary care, found only two suicides in 386 patients, a rate of 31/100,000 depressed patient-years. Hagnell et al. [11], in a long-term epidemiological study in Lundby, found no suicides among non-hospitalised depressive disorders where rates of

suicide among hospitalised moderately severe and psychotic depressions were in line with traditional expectations.

To establish definitive rates of suicide among a range of affective disorders would require a prospective community-based epidemiological study. This would allow for differential rates to be calculated in, for example, untreated disorders, depressive disorders treated only in primary care, or uncomplicated cases without significant co-morbidity. In the absence of such a study, we examined these rates using a secondary analysis of a primary data set of suicides in one health authority district in an attempt to model likely rates. This exercise at the very least would have the merit of outlining the scale of the epidemiological study involved in establishing the true lifetime risk of suicide.

## **METHODS**

### **Primary data set**

The data set was for suicides and undetermined injuries recorded in North Staffordshire (population 470,971) over a 5-year period (1991–1995). These data have previously been reported [6]. Two hundred and twelve cases of suicide and undetermined injury were recorded during the study period and data on each were collected from coroners' records, general practice and hospital records. The data set was thought to be suitable for the present analysis as the suicide rate for the North Staffordshire area (11.5 per 100,000 per annum) is similar to that for England and Wales and the factors associated with suicide in the case-control analysis were in line with other studies [6]. Secondary analysis of the data set was feasible for the present purposes as multiple psychiatric diagnoses were recorded on each case, as was contact with psychiatric and general practice services.

### **Population estimates**

Using the above data we derived a range of estimates for lifetime suicide rates in moderate to severe depressive disorders and mild to moderate depressive disorders, as well as those seen only in primary care versus those receiving hospital care. Estimates of the prevalence rates for psychiatric disorders were based on those cited in the National Comorbidity Study (NCS) [21]. The databases used in the NCS are available on the Inter-university Consortium For Political and Social Research (ICPSR) website at the University of Michigan. A

**Table I.** Prevalence of suicide among psychiatric disorders.

	<i>Any disorder</i>	<i>Any affective disorder</i>	<i>Primary affective disorder (no co-morbidity)</i>	<i>Primary care affective disorder (no co-morbidity &amp; no mental health service contact)</i>	<i>All other disorders (not affective)</i>
No. suicides in North Staffs*	<i>N</i> = 212	<i>N</i> = 180	<i>N</i> = 115	<i>N</i> = 41	<i>N</i> = 97
Rates of suicide for each disorder in North Staffs per annum	9/100,000	7.6/100,000	4.9/100,000	1.7/100,000	4.1/100,000
Annual prevalence of psychiatric disorder (NCS)	29.5%	11.3%	10.2%	6.2%	18.2%
Annual prevalence of suicide in each disorder in N Staffs	30.2/100,000	67.6/100,000	47.9/100,000	27.4/100,000	22.8/100,000
Lifetime rate of disorder (NCS)	48.0%	19.3%	12.0%	9.4%	28.7%
Annual number of suicides in each disorder (England and Wales)	<i>N</i> = 4900	<i>N</i> = 4201	<i>N</i> = 2687	<i>N</i> = 934	<i>N</i> = 2282
Lifetime prevalence of suicide in each disorder (England and Wales)	1.1%	2.4%	2.4%	1.1%	0.86%

NCS = National Comorbidity Survey. \*Based on Boardman et al. (1999) [6].

figure of 55 million was taken as the population of England and Wales and national estimates and projections were based on this.

### Rates of psychiatric morbidity

The annual and lifetime prevalence rates of psychiatric disorder used to calculate the denominators for the suicide rates are shown in *table I*. Five categories were chosen:

- 1) Any psychiatric disorder (total rates of psychiatric morbidity);
- 2) Any affective disorder (major depressive episode, bipolar disorder, manic episode, dysthymia – with or without co-morbidity);
- 3) Primary affective disorder (any affective disorder without a substance misuse disorder, antisocial personality or non-affective psychosis);
- 4) Primary care affective disorder (as 3, but with no history of contact with Mental Health Services); and
- 5) Any non-affective disorder.

These categories were chosen as the data to construct them were available in the North Staffordshire and NCS data sets and reflected possible levels of severity of affective disorders and levels of risk of suicide.

The 212 cases of suicide and undetermined injury in North Staffordshire over the 5-year study period can be conveniently divided into three diagnostic groups: primary affective disorder (depression and bipolar disorder

with no recognised psychiatric co-morbidity) (*N* = 82), other diagnoses (*N* = 69) and individuals for which no psychiatric disorder could be determined (*N* = 61). This final group posed a problem for this analysis, as it could not be assumed that they had no psychiatric disorder, only that insufficient evidence was available with which to confirm their disorder due to, for example, the absence of case records or recent contact with services. Of these 61 suicide cases, 59 had previous psychiatric contact, thus suggesting the presence of a psychiatric disorder at some stage. To omit these cases from the analysis may underestimate the prevalence of suicide in the affective disorders. In view of this we have assumed that the frequency of primary affective disorder in those with no confirmed psychiatric diagnosis is the same as in the remainder of the sample, 82/151 (54%), thus giving a total of 115 (33 + 82) suicides with primary affective disorders. Ninety-seven (28 + 69) individuals who committed suicide thus had other psychiatric disorders.

## RESULTS

### Suicide prevalence rates – 12 months

#### *All affective disorders*

There were 180 suicides with affective disorders over a 5-year period in a population of 470,971. Thus, the annual rate of suicide for all affective disorders in North Staffordshire was 7.6 per 100,000 population per year.

If all affective disorders have a 12-month prevalence rate of 11.3% [21], then the rate of suicide in those with primary affective disorders in the community is 67.6 per 100,000 primary affective disordered subjects. If there are 6,215,000 individuals with any affective disorders in England and Wales annually, this translates nationally into 4,201 suicides in all affective disorders per year (*table I*).

#### ***Suicide rate in primary affective disorders***

There were 115 suicides with primary affective disorders over a 5-year period in a population of 470,971. Thus, the rate of suicide for primary affective disorders in North Staffordshire was 4.9 per 100,000 population per year. If all affective disorders without co-morbidity have a 12-month prevalence rate of 10.2% [21], then the rate of suicide in those with primary affective disorders in the community is 47.9 per 100,000 primary affective disordered subjects. If there are 5,610,000 individuals with primary affective disorders without co-morbidity in England and Wales annually, this translates nationally into 2,687 suicides in detected primary affective disorders per year (*table I*).

#### ***Suicide rate in primary care affective disorders***

Among these 115 suicides, 41 were primary affective disorders (all depressives) who had never been known to have contact with psychiatric services (inpatient or outpatient) and thus can be assumed to have been seen only in primary care. This gives a rate of suicide in this group of depressives of 1.7 per 100,000 population per year. This figure translates into a rate of 27.4/100,000 of the depressed population if affective disorders occur at a 6.2% prevalence rate, and by extrapolation would give a national figure of 934 suicides per annum in detected uncomplicated primary affective disorders treated only in primary care (*table I*).

#### ***Suicide rate in other diagnostic groups***

There were a further 97 suicides from individuals who had a primary psychiatric diagnosis other than depression. This gives a rate of suicide in this group of 4.1 per 100,000 population. Given the National Comorbidity Survey estimates that 18.2% of the population have a psychiatric diagnosis other than depression then the rate for suicide in this group is 22.8 per 100,000 other diagnoses per year. This translates to a national figure of 2,282 suicides in people with diagnoses other than depression each year (*table I*). When this figure is added to those for primary affective disorders ( $N = 2687$ ), they yield a total of 4969 suicides, which closely approxi-

mates to the 5000 suicides that occur annually in England and Wales.

#### **Lifetime prevalence rates**

These have been calculated for each of the diagnostic groups (*table I*). For example, assuming a lifetime prevalence for primary affective disorders of 12% [21], the estimated total lifetime population of primary affective disorders in England and Wales is 5.6 million. If there are 2,687 primary affective disorder suicides per annum then, assuming a 60 year risk period, this would yield a 2.4% lifetime prevalence rate for primary affective disorders. If 934 primary affective disorder cases commit suicide without mental health service contact, then the lifetime prevalence for suicide in primary care primary affective disorders is 1.1%.

In contrast to these estimates of lifetime prevalence based on community samples and hence using a population denominator, the suicide rate for those primary affective disorders in contact with secondary care rises to up to 24.4% lifetime prevalence rates, if it is assumed that one in ten patients are referred. This figure falls to 12.2% if one in 20 cases is referred. These figures are in line with traditional estimates.

## **DISCUSSION**

The model we have constructed here derived from a representative study of suicides in one health authority district and from population-based estimates of psychiatric morbidity. It yields a series of estimates of lifetime suicide rates for affective disorders. The rates for all affective disorders are higher than those for all psychiatric disorders and for all other disorders combined. For affective disorders, the annual prevalence rates are lowest in primary care affective disorders, in line with our predictions. The lifetime risk of suicide in those without significant co-morbidity and who never had contact with psychiatric services was less than half that of those who had histories of mental health service contact. This may reflect the fact that those individuals with affective disorders who are at higher risk of suicide (e.g., substance abusers, those with history of self-harm) are more likely to be referred to secondary care than those without [7].

The more commonly cited figures for lifetime risk based on hospital samples [9, 10, 14] are consistent with our estimates when the denominator is the proportion of persons with affective disorders who are

referred to psychiatric services. The figures that we have estimated are of the same order as more recent estimates published by Blair-West et al. [4], who quote a lifetime risk of suicide in major depressive disorders of 3.5%. Our figures and the Blair-West figures both use population-based denominators and take advantage of the current array of epidemiological data on affective disorders that were not available at the time of Guze and Robins' paper. Unlike the Blair-West study we have attempted to give estimates for subdivisions of affective disorders. Our typology of affective disorders is pragmatic and limited by the existing data but does have face validity and is consistent with clinical experience. The absence of a clear diagnosis in 61 of the cases of suicide may result in some inaccuracy in the calculation of risk as we dealt with this problem by assuming that the proportion of cases with primary affective disorder was the same as in the rest of the sample. As 59 of these 61 cases had contact with psychiatric services this is not likely to cause an underestimation of risk in the primary care group but it may result in some inaccuracy in the estimation of risk in other groups.

The present estimates have the disadvantage of using figures from two different countries and have used period prevalences, which may reduce their accuracy and not allow for cohort effects. Until blood tests to establish caseness are available, this is a methodological problem that already existing estimates also suffer from. However, the advantage to this model is that we have been able to employ a substantial empirical database to take into consideration the effects of co-morbidity and contact with services. The NCS figures were used in the absence of equivalent UK figures, which did not provide the rates and category distinctions. Nonetheless, there is no reason to suppose that the rates would be vastly different from UK rates; the weak prevalence rate for all neurotic disorders in the OPCS Survey of Psychiatric Morbidity in Great Britain was 160 per 1000 [24]. The use of European data from the DEPRESS study would have given even lower lifetime suicide rates than those modelled here, especially if rates for depressive symptoms were included in the model [22].

This model has a number of implications for both research and clinical practice. As regards research, the model may enable more accurate power calculations on the numbers of subjects needed in any epidemiological study of suicide risk in non-hospitalised affective and other psychiatric disorders. It suggests other factors that such studies might take into account, such as age. From these figures we are not able for instance to rule out the

possibility that differences in suicide risk between primary care and hospital samples might have stemmed from differences in age. Another is the number and specificity of depressive symptoms. Does the difference between hospitalised and non-hospitalised patients lie in the quantity of depressive symptoms between these states or does suicide risk correlate better with the presence of particular depressive symptoms?

For clinical and service planning purposes, even a lifetime risk of suicide of 1.1% provides a justification for efforts to detect depressive disorders and ensure that individuals get adequate treatment. There is also empirical support for encouraging such efforts. Studies from Gotland and Hungary suggested that detection and treatment might be of some benefit in reducing the prevalence of suicide [29, 31]. There is also some evidence that suicide rates in Sweden generally fell during the 1980s with rising detection rates of depression [17, 32].

While detection of mild depressions may have improved, there are still indicators that if 50% of those who commit suicide are depressed, less than half of those would appear to be on an antidepressant when they die [15, 16]. There is even some evidence that some secondary care depressions may be detected but nevertheless may remain untreated [8].

It appears from these data that while individuals with milder mood disorders in primary care, uncomplicated by secondary factors, are at a lower risk of suicide, there are some patient factors that primary care practitioners should be keenly aware of. One is those patients whose affective disorders are compromised by or secondary to substance abuse, criminality or personality disorder, as these patients appear to have greatly elevated rates of suicide. A further group are those who have made previous self-harm attempts. Jick and colleagues [20], in a study of 172,000 antidepressant prescriptions in UK general practice, found that previous deliberate self-harm episodes were associated with a 19-fold higher risk of suicide than found in uncomplicated cases. This is in line with findings from North Staffordshire that half of those who commit suicide have had a past history of deliberate self-harm [6].

A further group are individuals in the process of change or in crisis. The North Staffordshire study [6] found that half of those who commit suicide have current relationship problems, while a quarter are in legal difficulties of one sort or another. Linking these factors in with the evidence that patients who have recently started an antidepressant are more likely to

commit suicide [20], it can be proposed that patients in the process of change or in crisis, whether brought about by life events, by drug-induced changes or by exploratory therapies, may be at much greater risk.

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