

Repetition of Self-Poisoning and Subsequent Death in Adolescents who take Overdoses

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Summary: Hospital Activity Analysis data and record linkage were used to investigate repetition of self-poisoning, and deaths, among 2,492 people, aged 12 to 20 years, who took overdoses between 1974 and 1978. Repetition occurred most frequently during the first few months after an initial admission; 9.5% of patients repeated within the study period (mean follow-up of 2.8 years). Ten of the 2,492 subjects died during the study period, and the average annual death rate in the cohort was approximately four times higher than the national average annual death rate in this age-group as a whole. Six of the deaths were probably suicides. Repetition and suicide rates were highest among males aged 16 to 20 years.

An important feature of self-poisoning is that it is often repeated. The patterns of repetition of this behaviour by adults are well recognised (Bancroft & Marsack, 1977), and some of the characteristics of those adults most likely to repeat it are known (Buglass & Horton, 1974), but little information is available about the repetition of this behaviour by adolescents. Repetition rates of the order of 10% within one to five years have been quoted, but these findings were based on relatively small samples (Haldane & Haider, 1967; Hawton *et al.*, 1982).

We used routine abstracts of hospital admission records for 'adverse effects of medicinal agents' to study self-poisoning among adolescents in the Oxford Region over several years during the 1970s (Hawton & Goldacre, 1982). By record linkage, we have now been able to investigate repeat admissions, the extent and timing of repetition, differences in repetition rates between boys and girls, and subsequent deaths.

Method

In our previous study (Hawton & Goldacre, 1982), data on self-poisoning by adolescents were obtained from statistics recorded in Hospital Activity Analysis (HAA). HAA has included all admissions in the Oxford Region, except those in Aylesbury, since 1974; and the total population covered is about 1.9 million people. Deliberate self-poisoning has not been coded as such in hospital statistics, but classified in one of the International Classification of Diseases (ICD) categories covering 'adverse effects of medicinal agents', according to the nature of the main substance used in self-poisoning. Although episodes other than deliberate self-poisoning (e.g. allergic reactions to drugs) are covered by the same codes, we demonstrated, on the basis of cross-checking the HAA data with those of a monitoring service for self-poisoning in the city of Oxford, that almost all cases

(97.5%) in the age group 12 to 20 years recorded in HAA as 'adverse effects of medicinal agents' were overdoses. Therefore, use of HAA statistics appeared a reasonable means of carrying out a large-scale study of deliberate self-poisoning, including repetition, in this age-group.

We have now linked the records of individuals aged 12 to 20 years who were admitted to hospital in the Oxford Region for self-poisoning between 1974 and 1977, and studied their patterns of repetition and death between 1974 and 1978. The first recorded admission for each patient between 1974 and 1977 is termed the 'index' admission. The minimum period of coverage after each index admission was one year, the mean for the whole group of subjects 2.8 years, and the range was one to five years. Because of the variability in follow-up time between individuals, most of our attention is concentrated on the repeats which occurred within one year of an index admission.

As the study is based on admissions of subjects in a fixed age-group (12 to 20 years) during a particular time period (1974–1978) in a defined area (the Oxford Region), information was not available on their hospital admissions before that time period, before entering that age-group, or outside the Region. Thus an 'index' admission is not necessarily a first-ever admission for self-poisoning; an individual may have taken an overdose prior to the study period, or at a younger age (although self-poisoning is rare under the age of 12), or elsewhere. Similarly, repeats occurring outside the Region have not been identified. However, we have information on repeats which occurred in subjects whose index admission occurred while aged 20 years or under, but who also had admissions within the Region and time period of the study after the age of 20 years.

Results

Overall pattern of repetition

A total of 2,493 individuals aged 12 to 20 years were admitted to hospital between 1974 and 1977 with a diagnosis in the relevant ICD categories. One patient, a

TABLE I

Number of individuals, number who first repeated within one year and number who first repeated after one year from index admission, by sex and age group

	Age group	No of index admissions	No. first repeated within one year (%)	No. first repeated after one year (%)	Total no. who repeated (%) ^a
Males:	12-15	96	4 (4.2)	4 (4.2)	8 (8.3)
	16-20	545	45 (8.3)	21 (3.8)	66 (12.1)
Subtotal:		641	49 (7.6)	25 (3.9)	74 (11.5)
Females:	12-15	503	35 (7.0)	16 (3.2)	51 (10.1)
	16-20	1348	73 (5.4)	39 (2.9)	112 (8.3)
Subtotal:		1851	108 (5.8)	55 (3.0)	163 (8.8)
Total		2492	157 (6.3)	80 (3.2)	237 (9.5)

^aMean follow-up period of 2.8 years.

male aged 20 years, died in hospital as result of the index episode and is excluded from this paper. The population reported here therefore included 2,492 individuals who were discharged alive following an index admission. Altogether, 237 individuals (9.5%) repeated before the end of 1978 and there were 594 repeat episodes in all; 157 individuals (6.3%) repeated within one year of their index admission.

Sex, age, and year of admission

Patterns of repetition are shown by age-group and sex in Table I. The highest repetition rates for each sex were seen at the ages at which admission rates for self-poisoning itself showed the sharpest rise, namely in the early teenage years for girls and in the older teenage years for boys (Hawton & Goldacre, 1982). Total repetition rates were a little higher among girls than boys in the 12 to 15 year age-group, and they were significantly higher among boys than girls in the 16 to 20 year age group (χ^2 (df1) = 6.1, $P < 0.02$).

The timing of the first repeat after the index admission is shown in Table II. Data on follow-up of the subjects covered a variable time period, and cumulative percentages are given for each group of subjects whose follow-up period extended up to each of the interval points. For example, the maximum period of follow-up for people admitted at the end of 1974 was four years: by this time, 12.4% of males and 10.7% of females admitted in 1974 had had at least one re-admission. The table indicates that there was a slight decrease in repetition rates during the

period 1974-1977, although this was not statistically significant. The table also shows that repeats were much commoner in the first year after the index admission than during subsequent years.

The pattern of first repeats during the 12 months after the index admission are shown for the two sexes in Fig. 1. More of the boys' first repeats during the year occurred during the first three months (69%) than did those of the girls (41%; χ^2 (df1) = 9.9, $P < 0.01$).

Number of episodes per individual

A relatively small percentage of individuals became multiple repeaters. Of the 2,492 individuals, 164 (6.6%) had two recorded episodes, 43 (1.7%) had three, 22 (0.9%) had four, and eight (0.3%) had five or more episodes. These figures represent repeats over a variable follow-up period of one to five years, and are no doubt an under-estimate of the number of repeats which would have occurred during a full five-year follow-up.

Deaths

Six of the 1,851 females and four of the 641 males died during the study period. The average annual death rates were 1.2 and 2.2 respectively per 1,000 females and males in the study group. Though these rates are based on small numbers, they are about four times higher than the average annual death rates found nationally in the population as a whole in this age-group (Office of Population Censuses and Surveys). According to the death certificates, five of the deaths were due to 'adverse

TABLE II

Number of individuals (N) and number who repeated by time interval to first repeat, by sex and year of index admission (cumulative percentage of repeaters in parentheses)

Sex	Year	Number of months to first repeat			
		0-11	12-23	24-35	36 or more
Males:	1974 (n = 145)	10 (6.9)	2 (8.3)	3 (10.3)	3 (12.4)
	1975 (n = 133)	19 (14.3)	2 (15.8)	3 (18.0)	2 (19.5)
	1976 (n = 174)	10 (5.7)	2 (6.9)	3 (8.6)	—
	1977 (n = 189)	10 (5.3)	5 (7.9)	—	—
Females:	1974 (n = 356)	25 (7.0)	10 (9.8)	3 (10.7)	0 (10.7)
	1975 (n = 423)	24 (5.7)	13 (8.7)	7 (10.4)	1 (10.6)
	1976 (n = 517)	30 (5.8)	11 (7.9)	3 (8.5)	—
	1977 (n = 555)	29 (5.2)	7 (6.5)	—	—

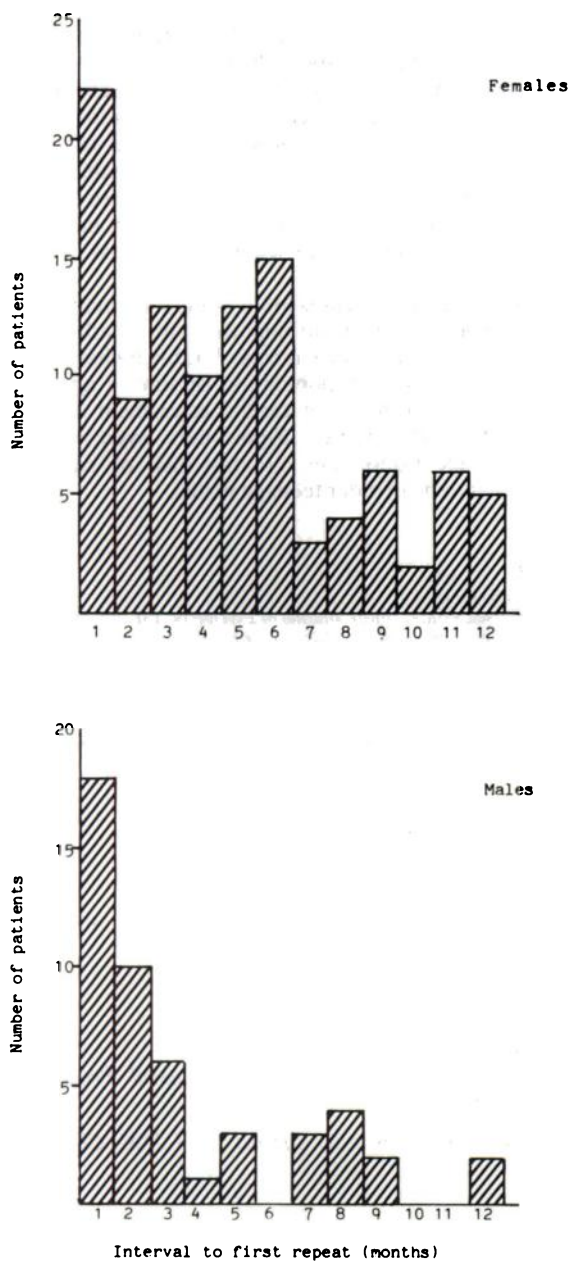


FIG. 1 Number of patients who repeated self-poisoning within one year of index admission, by time-interval in months to first repeat

effects of medicinal agents', four to injuries, and one female died from anorexia nervosa. All but one of the ten died outside hospital.

As far as we could tell from the death certificates, there was only one coroner's verdict of suicide among the ten deaths; the majority were classified as accidental deaths, misadventure, or open verdicts. However, using accepted criteria for obtaining a more accurate estimate of the actual suicide rate, by combining cases in the coroners' verdicts categories of suicide, open verdict, and accidental poisoning (Adelstein & Mardon, 1975), six of these deaths were likely to have resulted from suicide. These included four males, all aged 19 or 20 years at the time of the index admission, and two females who were both aged 18 years at the time of the index admission. Thus, focusing on the 16 to 20 year age-group, 0.7% of males and 0.1% of females died from probable suicide during the period of the study. This appears to represent a considerably higher suicide rate than that estimated in the general population in this age-group (Adelstein & Mardon, 1975). Of the probable suicides, one had four previous recorded admissions, and each of the other five had one admission for self-poisoning recorded in the study period prior to the fatal episode. The intervals between the index non-fatal admission and the fatal episode were variable and fairly long (5, 8, 17, 19, 22 and 30 months).

Discussion

The advantage of studying routine hospital statistics is that it enables profiles of hospitalisation to be constructed in a large population; in Oxford, there is the further advantage that medical events related to an individual can be linked. As far as we are aware, this is the first large-scale study in the UK of repetition of self-poisoning among adolescents. There are, however, some limitations of the method. Firstly, deliberate self-poisoning is not identified separately from 'other adverse effects of medicinal agents' in the poisoning section of the main ICD, and whilst there is provision to use additional codes to denote self-poisoning in the supplementary classification, this has tended not to be used consistently in routine hospital statistics. Secondly, HAA only includes admissions, and therefore does not identify episodes in which individuals are referred to hospital following self-poisoning but not admitted. Thirdly, as the data only cover a limited area (in this case the Oxford Region), subsequent admissions which occurred outside the area will not have been identified. However, on the basis of the 1971 Census, we know that the percentage of individuals who moved from inside to outside the Oxford Region during the course of one year was 2.5% for those aged 10 to 14, 5.3% for those aged 15 to 19, and 3.8% for all those aged 10 to 19 years. The rates of mobility in individuals who take overdoses may be a little higher than among other people; but on the basis of the Census data for mobility in this age-group, our estimate of (for example) the number

who repeated within one year of an index admission is only a slight under-estimate. Thus, uplifting the figures by 3.8%, the adjusted number of individuals who repeated within a year (Table I) would be about 163 (6.6%) compared with 157 (6.3%).

The overall repetition rate within one year in this study is similar to that found in smaller studies of adolescent self-poisoners (Haldane & Haider, 1967; Hawton *et al.*, 1982). Slightly higher figures, of the order of 14 to 17%, have been reported for adults (Horton & Buglass, 1974; Bancroft & Marsack, 1977), although these studies included self-injuries and were based on hospital referrals rather than hospital admissions alone.

Adolescent self-poisoners are at highest risk of repetition during the first few months after an overdose. This is similar to the picture found in adults (Bancroft & Marsack, 1977) and probably reflects persistence, or early recurrence, of the

crisis which precipitated the index admission.

Repetition rates appear to be somewhat higher for boys than girls, especially for those in the 16 to 20 age-group. Similarly, the interval between index admission and repeats tended to be shorter for boys than for girls, with a higher proportion of first repeats occurring during the first three months after an index admission. Repeats by girls were fairly evenly distributed throughout the first six months after index admissions, except for an excess in the first month.

The number of deaths in the study was small, but it is nonetheless disturbing that the death rate among self-poisoners was considerably higher than that in the general population of similar age. It underlines the need for careful assessment of the risk of suicide among self-poisoners, even in this young age-group. The greatest risk of suicide appears to be in older teenage males.

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