

Changes in classification of suicide in England and Wales: time trends and associations with coroners' professional backgrounds

JAN NEELEMAN¹ AND SIMON WESSELY

From the Institute of Psychiatry, London

ABSTRACT

Background. The legal definition of suicide in England and Wales (E & W) gives rise to a high proportion of open verdicts and an underestimated suicide rate. We examined whether the ratio between open and suicide verdicts in E & W has changed between 1974 and 1991 and whether it varies according to coroners' qualifications.

Methods. Temporal changes of the ratio of open and suicide verdicts were examined using logistic regression adjusting for confounders such as changing age and gender distributions of suicide victims and the methods they use.

Results. Adjusted for age at death and suicide method, the ratio between open and suicide verdicts had, over successive 3-year time periods, increased with a factor 1.21 (95% CI 1.20–1.23) for male and 1.15 (95% CI 1.14–1.17) for female deaths. Medical coroners were 1.25 (1.08–1.44) times more likely than non-medical coroners to return open rather than suicide verdicts.

Conclusions. As a likely result of factors in the death registration system, the ratio between open and suicide verdicts has increased substantially in E & W since the early 70s. In 1990 it was higher than in any other comparable country. This has important implications for comparisons of time trends in suicide between E & W and other countries.

INTRODUCTION

Comparison of suicide rates between countries and time periods informs suicide research and prevention (Sainsbury & Jenkins, 1982). However, it is unclear whether aggregate suicide data are sufficiently accurate to justify such comparisons (Rockett & Smith, 1995).

The handbook for coroners in E & W states that 'suicide should never be presumed but must always be based upon some evidence that the deceased intended to take his own life' (Matthews & Foreman, 1986). This stringent legal definition leads to an underestimate of the true suicide figure and to registration of many suicides as 'open verdicts' or even accidental deaths (O'Donnell & Farmer, 1995). In many other countries a likely suicide may be registered

as such on the balance of probabilities (Atkinson *et al.* 1975; Neeleman, 1996).

A higher ratio between open and suicide verdicts (henceforth the open–suicide ratio) indicates more underreporting of suicides (Rockett & Smith, 1995). Temporal and regional influences on suicide classification may be studied by comparing this ratio between time periods or registration districts. Using this approach Walsh *et al.* (1990) demonstrated that underreporting of suicide in Ireland declined substantially between 1968 and 1987.

We examined whether between 1974 and 1991 the open–suicide ratio for men and women older than 14 years has continued to decline in E & W as it did between 1901 and 1968 (Barraclough, 1972). In studying the period effect, temporal shifts in the distribution of suicide victims' ages and methods were taken into account as confounders as these variables may affect the probability that an open rather than a suicide

¹ Address for correspondence: Dr Jan Neeleman, Institute of Psychiatry, 103 Denmark Hill, London SE5 8AZ.

verdict will be given (Rockett & Smith, 1995). We also examined whether the open-suicide ratio varies by reporting coroners' professional qualifications. The open-suicide ratio in 1990 was compared between E & W and a number of other developed countries.

METHOD

Effects of period, age and method of death on the open-suicide ratio

Undetermined (i.e. open verdicts) and suicide deaths (1974–1991; > 14 years old; $N = 104396$) (OPCS, 1975–92) by gender were tabulated according to period of death (six successive 3-year periods), age group (15–39, 40 and over) and method of death (hanging, gas-poisoning, drug-poisoning, drowning, jumping from heights, other violent methods). The ratio between open-suicide ratios was used as main measure of effect and is reported as a proportional mortality ratio (PMR) with 95% confidence intervals (CI). A similar approach was used to examine the ratio between open and accidental verdicts for death through drowning and drug-poisoning between 1974 and 1991.

Period effects adjusted for changes in method of death and age

Period effects on the gender-specific open-suicide ratio were adjusted for changes over time in age of victims and their methods by means of logistic regression. The possibility that period effects differed by age at death or method of death was assessed by means of the likelihood ratio (LR) test for interaction (Statacorp, 1995).

Variation by coroners' district and qualification

Coroners' verdicts for 1994 by coroners' district and professional qualifications of the senior coroner (medical and legal *v.* legal only) were obtained from the Home Office (1995). Variation of open-suicide ratios by district was assessed with the LR test for heterogeneity (Statacorp, 1995). Open-suicide ratios were compared according to background (medically *v.* non-medically trained) of senior coroners. The coroners' annual caseload was adjusted for.

International comparison

The open-suicide ratio for 1990 (or the last year prior to 1990 with complete data (WHO, 1992)) was contrasted between E & W and 15 other

countries whose suicide rates are frequently compared (Scotland, Sweden, Eire, France, Finland, (West-)Germany, Belgium, USA, Canada, New Zealand, Spain, Australia, Netherlands, Norway, Hong Kong). For eight of these (E & W, Scotland, Eire, France, Belgium, USA, New Zealand and Australia) open-suicide ratios for the year 1968 were available (Barraclough, 1973) and compared with those for 1990.

Results

Effects of period, age and method of death on the open-suicide ratio

Period

The open-suicide ratio rose from 0.26 in 1974–76 to 0.46 in 1989–91 for men and from 0.41 in 1974–76 to 0.75 in 1989–91 for women. Summary PMRs for the period effect per 3-year time span were 1.10 (95% CI 1.09–1.11) for men and 1.12 (95% CI 1.11–1.14) for women (Table 1) indicating a steady increase of the open-suicide ratio over time.

In each time period the open-suicide ratio was higher for women than men (Table 1). Overall between 1974 and 1991 women were 1.35 (95% CI 1.31–1.39) times more likely than men to receive open than suicide verdicts.

For accidental and undetermined deaths through self-poisoning and drowning the ratio

Table 1. *Open-suicide (OS) ratio; period effect*

	Men ($N = 67408$)		Women ($N = 36988$)	
	OS ratio	PMR (95% CI)	OS ratio	PMR (95% CI)
1974–6	2103/8271 (0.25)	(1)	1840/4615 (0.40)	(1)
1977–9	2370/7350 (0.32)	1.27 (1.19–1.36)	1990/4784 (0.42)	1.04 (0.97–1.12)
1980–2	2839/8047 (0.35)	1.39 (1.30–1.48)	2062/4747 (0.43)	1.09 (1.01–1.17)
1983–5	2867/7667 (0.37)	1.47 (1.38–1.57)	1953/4438 (0.44)	1.10 (1.02–1.19)
1986–8	3728/9664 (0.39)	1.52 (1.43–1.61)	2190/3563 (0.61)	1.54 (1.43–1.66)
1989–91	3846/8656 (0.44)	1.75 (1.64–1.86)	2015/2791 (0.72)	1.81 (1.67–1.96)
Summary PMR for period effect, i.e. PMR associated with moving up 3 years in time				
1974–91	1.10 (1.09–1.11)		1.12 (1.11–1.14)	

Table 2. *Open-suicide (OS) ratio; effect of method of death*

	Men (<i>N</i> = 67 408)		Women (<i>N</i> = 36 988)	
	OS ratio	PMR 95% CI	OS ratio	PMR 95% CI
Hanging	1239/14453 (0.09)	(1)	303/4941 (0.06)	(1)
Gas-poisoning	855/11415 (0.07)	0.87 0.80–0.96	154/1425 (0.11)	1.76 1.44–2.16
Drug-overdose	4592/11 929 (0.38)	4.49 4.20–4.80	5685/13 193 (0.43)	7.03 6.23–7.92
Drowning	3834/2026 (1.90)	22.07 20.40–23.89	2544/2116 (1.20)	19.61 17.22–22.32
Jumping (height)	1527/1848 (0.83)	9.64 8.82–10.54	663/1134 (0.58)	9.53 8.20–11.08
Other	5706/7984 (0.71)	8.34 7.79–8.92	2701/2129 (1.27)	20.69 18.18–23.54

Table 3. *Period effect, expressed as summary PMR per 3-year period, adjusted for differences in age and suicide method over time*

	Men (<i>N</i> = 67 408)	Women (<i>N</i> = 36 988)
Crude period effect	1.10 (1.09–1.11)	1.12 (1.11–1.14)
Adjusted for age	1.09 (1.08–1.10) LR-test $\chi^2 = 124.2$ df = 1; <i>P</i> < 0.001	1.12 (1.11–1.14) LR-test $\chi^2 = 90.9$ df = 1; <i>P</i> < 0.001
Further adjusted for suicide method	1.21*† (1.20–1.23) LR-test $\chi^2 = 13 627.5$ df = 5; <i>P</i> < 0.001	1.15‡§ (1.14–1.17) LR-test $\chi^2 = 4947.0$ df = 5; <i>P</i> < 0.001

* The period effect differed according to suicide method used; LR-test for interaction $\chi^2 = 72.9$; df = 5; *P* < 0.001. See text.

† The period effect was similar across the age groups; LR-test for interaction $\chi^2 = 2.3$; df = 1; *P* = 0.128.

‡ The period effect differed according to suicide method used; LR-test for interaction $\chi^2 = 59.8$; df = 5; *P* < 0.001. See text.

§ The period effect differed according to age group; LR-test for interaction $\chi^2 = 33.0$; df = 1; *P* < 0.001. See text.

between open and accidental verdicts (male and female combined) increased by a factor 1.07 (95% CI 1.06–1.08) per 3-year period between 1974 and 1991.

Age

Compared with deaths of people aged 40 years and over, the open-suicide ratio was 1.25 (95% CI 1.20–1.30) times higher for men and 1.30 (95% CI 1.23–1.37) times higher for women younger than 40.

Method of death

Compared with deaths by hanging, the open-suicide ratio was higher in cases of drug overdose, jumping from heights, other violent methods and especially drowning. This pattern applied to male and female deaths but the open-suicide ratio for female deaths through other violent means was substantially higher than it was for male deaths. Male deaths involving gas-

poisoning were less likely than male hanging deaths to receive an open verdict while the reverse applied to female deaths (Table 2).

Period effects adjusted for changes in method of death and age

Adjustment for age differences did not result in substantial changes of the summary PMRs for the period effect. However, further correction for shifts over time in suicide methods resulted in a final summary PMR for the period effect of 1.21 (95% CI 1.20–1.23) per 3-year period for men and 1.15 (95% CI 1.15–1.17) per 3-year period for women (Table 3).

Period effect by gender, age-group and method of death

Men

There was evidence that the period effect differed according to suicide method (effect modification) (Table 3). Method-specific age-adjusted sum-

mary PMRs for the period effect ranged from 1.07 (95% CI 1.03–1.12) for gas-poisoning to 1.25 (95% CI 1.22–1.27) for other violent methods.

Women

The period effect for female deaths differed by suicide method and also by age group. Method specific age-adjusted summary PMRs for the period effect ranged from 0.93 (95% CI 0.84–1.03) for gas-poisoning to 1.38 (95% CI 1.27–1.49) for hanging. The method-adjusted summary PMR for the period effect was 1.24 (95% CI for female deaths between 15–39 years and 1.12 (95% CI 1.10–1.14) for death of women of 40 years and over.

Variation by coroners' district and qualifications

The 5982 open and suicide verdicts (male and female combined) for 1994 were tabulated for each of the 147 coroners' districts in England & Wales. The Likelihood Ratio test (LR-test) for heterogeneity by district gave $\chi^2 = 903$; $df = 144$; $P < 0.001$, indicating geographical diversity of open–suicide ratios.

The open–suicide ratio (male and female deaths combined) among deaths reported by the 19 medically qualified coroners in 1994 was 704/768 (0.92) compared with 1499/3011 (0.50) for the 128 non-medically qualified coroners suggesting that the former were 1.84 (95% CI 1.63–2.08) times more inclined to return open instead of suicide verdicts than the latter. The mean annual caseload of medical coroners was larger than of non-medical coroners (doctor-lawyers: mean 244 verdicts annually; non-doctor-lawyers: mean 117 verdicts annually). After adjustment for differences in caseload the relation between medical training and preference for open rather than suicide verdicts persisted (1.25; 95% CI 1.08–1.44).

International comparison

Among the 16 countries examined (see Method section), the open–suicide ratio in 1990 was highest in E & W (0.56) and lowest in Norway (0.04). Of the eight countries for which 1968 data were available (see Methods section; Barraclough, 1973), the open–suicide ratio had risen only in E & W (from 0.27 in 1968 to 0.55 in 1990), Belgium (from 0 in 1968 to 0.11 in 1987) and New Zealand (from 0.03 in 1968 to 0.08 in

1989). Between 1968 and 1990 the Scottish open–suicide ratio had declined from 0.65 to 0.44 and the Irish from 1.25 to 0.22.

DISCUSSION

The ratio between open and suicide verdicts in E & W has risen substantially between 1974 and 1991 reversing the trend which occurred between 1901 and 1968 (Barraclough, 1972). Unless rates are reformulated to include undetermined deaths, it is unsafe to compare temporal trends of suicide in England & Wales with those in other countries where the ratio between undetermined deaths and suicide has mostly decreased.

The analyses described compared dead cases (open verdicts) with dead controls (suicide verdicts), analogous to a proportional mortality design (Charlton, 1995). An assumption underlying the study is that increases in the number of open verdicts result from increased classification of suicides in that category. However, the number of open verdicts could also rise if increased proportions of accidental deaths were recorded as open. This is most likely to occur in cases of drowning and poisoning in which classification may be ambiguous (Rockett & Smith, 1995). Although there was some increase in the ratio between open and accidental deaths for these methods over time, this was numerically much less important than the overall increase in the open–suicide ratio. It is, therefore, appropriate to focus on the open–suicide ratio. It is commonly felt that the majority of open verdicts concern suicides (Barraclough, 1972) and this has been accepted by the Department of Health which has included undetermined deaths in its suicide targets (Secretary of State for Health, 1992).

The open–suicide ratio was higher amongst unnatural deaths of young people, women and those involving methods such as drowning and jumping from heights. This is in line with reports suggesting that the accuracy of suicide certification varies with characteristics of the deceased and the suicide method used. Methods of death such as drowning ('soft methods') are less easily classified as definitely suicidal than others such as hanging ('hard methods') (Rockett & Smith, 1995). The association between younger age and an increased open–suicide ratio has not been

reported before (Rockett & Smith, 1995); coroners may be more reluctant to classify deaths amongst the young as suicides.

The increase of the open–suicide ratio over time could have arisen if ‘soft methods’ had become more popular. However, adjustment of the crude period effect for differences over time in age and suicide method, led to an increase rather than a decrease of the period-effect (negative confounding). This can be understood as follows; the contribution of hanging and suicide by gas poisoning to total numbers of open and suicide deaths has increased between 1974 and 1991 (1974–76; 28% for male and 13% for female deaths from 1989 to 1991; 51% for male and 25% for female deaths) (OPCS, 1975–92); the increased popularity of these suicide methods which are associated with a low open–suicide ratio, obscures the real extent to which open verdicts have become more popular. Discounting from the equation differences in suicide methods and age of suicide victims between 1974 and 1991 indicates that the open–suicide ratio has increased by 21% for men and by 15% for women over each subsequent 3-year period between 1974 and 1992.

If the high and increasing open–suicide ratio cannot be attributed to changing characteristics of suicide and its victims, the source of this phenomenon may lie in the registration system. There is evidence of heterogeneity of open–suicide ratio across coroners’ districts (Atkinson *et al.* 1975; O’Donnell & Farmer, 1995). Atkinson *et al.* (1975) believed that medical certifiers, used to dealing with probabilities, may be more prepared to return a suicide verdict in dubious cases than coroners without medical qualification. The present results suggest the reverse; a higher open–suicide ratio was apparent for coroners with a dual (medical–legal) qualification than for those with a law degree alone. An explanation is not immediately apparent but it may be that doctors, when they function in a judicial capacity, adhere, paradoxically, more strictly to the ‘letter of the law’ than those without medical degrees. The difference persisted after adjustment for the courts’ annual caseloads. This suggests that it is not solely attributable to different levels of experience between medical and non-medical coroners or differences in time available to ponder evidence in individual cases.

The main message of this paper is that gradual changes have taken place since 1974 in the registration of suicides in E & W. Open verdicts have become more popular predominantly at the expense of suicide verdicts. This upward trend is relatively unique and the open–suicide ratio in E & W is presently higher than in any other comparable country. This has important implications for the conduct of comparisons of suicide rates between countries over time. The explanation for the described time trend is not immediately obvious. It is not attributable to epidemiological differences between suicides in 1991 and 1974 and no changes in the legal definition of definition of suicide have taken place since its decriminalization in 1961 (Neeleman, 1996). However, coroners vary in their interpretation of what constitutes evidence of intent (O’Donnell & Farmer, 1995). This is suggested by the finding that the open–suicide ratio differs according to the coroners’ qualifications. Factors in the suicide registration system may have contributed to the changing classification of suicide in England & Wales. Verdicts of suicide may be contested in the High Court (Jennings & Barraclough, 1980) and it may be that coroners are becoming less prepared to run this risk. Further investigations of changes in coroners’ practice and attitudes over time are necessary to explain fully the period effect reported here.

J. N. is supported by a Wellcome Training Fellowship in Epidemiology. We thank Dr M. Hotopf, Institute of Psychiatry for statistical advice.

REFERENCES

- Atkinson, M. W., Kessel, W. I. N. & Dalgaard, J. B. (1975). The comparability of suicide rates. *British Journal of Psychiatry* **126**, 247–256.
- Barraclough, B. M. (1972). Are the Scottish and the English suicide rates really different? *British Journal of Psychiatry* **120**, 267–273.
- Barraclough, B. M. (1973). Differences between national suicide rates. *British Journal of Psychiatry* **122**, 95–96.
- Charlton, J. (1995). Trends and patterns in suicide in England & Wales. *International Journal of Epidemiology* **24**, s45–s52.
- Home Office (1995). *Deaths Reported to Coroners; Returns 1994*. Home Office: London.
- Jennings, C. & Barraclough, B. (1980). Legal and administrative influences on the English suicide rate since 1900. *Psychological Medicine* **10**, 407–418.
- Matthews, P. & Foreman, J. C. (1986). *Jervis on the Office and Duties of Coroners*, p. 194. Sweet & Maxwell: London.

- Neeleman, J. (1996). Suicide as a crime in England & Wales; legal history, international comparisons and present implications. *Acta Psychiatrica Scandinavica* **94**, 252–257.
- Office of Population Censuses and Surveys (1975–1992). *Mortality Statistics (Injuries and Violence) series DH4*. Government Statistical Service: London.
- O'Donnell, I. & Farmer, R. (1995). The limitations of official suicide statistics. *British Journal of Psychiatry* **166**, 458–461.
- Rockett, I. R. H. & Smith, G. S. (1995). Suicide misclassification in an international context. In *Proceedings of the International Collaborative Effort on Injury Statistics, vol. 1*, pp. 26.1–26.18. CDC: Atlanta.
- Sainsbury, P. & Jenkins, J. S. (1982). The accuracy of officially reported suicide statistics for purposes of epidemiological research. *Journal of Epidemiology and Community Health* **36**, 43–48.
- Statacorp (1995). *Stata Statistical Software; Release 4.0*. Statacorp: College Station Texas.
- Secretary of State for Health (1992). *The Health of the Nation: A Strategy for Health in England*. HMSO: London.
- Walsh, D., Cullen, A., Cullivan, R. & O'Donnell, B. (1990) Do statistics lie? Suicide in Kildare – and Ireland. *Psychological Medicine* **20**, 867–891.
- World Health Organization (1992). *Health Statistical Data Collections (Mortality File)*. WHO: Geneva.