

# The suicide mortality of working physicians and dentists

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<b>Background</b>	Some studies have shown that physicians and dentists have elevated risks of suicide, while other studies have not.
<b>Aims</b>	Using all deaths and corresponding census data in 26 US states, we examine the suicide risk for working physicians and dentists.
<b>Methods</b>	Death and census data for working people were obtained from 1984 through 1992. Directly age-standardized suicide rate ratios (SRRs) were calculated for white male and white female physicians and white male dentists.
<b>Results</b>	For white female physicians, the suicide rate was elevated compared to the working US population (SRR = 2.39, 95% CI = 1.52–3.77). For white male physicians and dentists, the overall suicide rates were reduced (SRR = 0.80, 95% CI = 0.53–1.20 and 0.68, 95% CI = 0.52–0.89, respectively). For older white male physicians and dentists, however, observed suicide rates were elevated.
<b>Conclusions</b>	White female physicians have an elevated suicide rate. Only older white male physicians and dentists have elevated suicide rates, which partially explains the varied conclusions in the literature.
<b>Key words</b>	Dentists; mortality; physicians; suicide.

## Introduction

Health professionals have high performance expectations in the minds of both the public and themselves. Jobs in these fields are necessarily stressful, which can lead to adverse health effects. In fact, some studies have shown elevated death rates for physicians due to suicide [1,2]. Boxer *et al.* [2], in a literature review, reported a mixture of results for dentists. Whether the suicide rate was elevated or not depended on the study and on the comparison group (e.g. general population, academics, etc.). Similar results were found for physicians. Their overall conclusion from the literature review was that both male and female physicians had elevated rates of suicide.

Another literature review by Lindeman *et al.* [3] found that female physicians had a highly elevated death rate from suicide compared to the general population. The authors felt, although with less confidence, that male physicians had a suicide rate which was similar to that of female physicians.

In a meta-analysis, Schernhammer and Colditz [4] examined 25 studies from various countries and con-

cluded that male physicians had moderately elevated suicide rates and that female physicians had highly elevated suicide rates, compared to the general population.

von Brauchitsch [5], on the other hand, reviewed the literature on physician suicides and concluded that (up to 1976) there was little evidence that suicide rates were higher in physicians than in the general population. He mentioned three problems with previous studies: (i) the examination of successful suicides rather than attempted suicides, (ii) small sample sizes, under which he includes studies of proportionate deaths and (iii) insufficient standardization.

Burnett *et al.* [6] examined all death certificates for 24 states between 1984 and 1988 and found elevated proportional mortality ratios (PMRs) for white male physicians (PMR = 222) and dentists (PMR = 165) and for white female physicians (PMR = 241).

In this study, we extend the physician and dentist portion of Burnett *et al.* [6] to 26 states between 1984 and 1992, we use census data to examine death rates instead of proportions of death and we compare these to the rates for the working populations in those states.

## Methods

Data on cause-specific deaths were obtained from the National Occupational Mortality Surveillance (NOMS)

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system which has been used and described elsewhere [6–8]. Briefly, data for all deaths were obtained for 1984 through 1992 from 26 states (AK, CO, GA, ID, IN, KS, KY, ME, MO, NE, NV, NH, NJ, NM, NC, OH, OK, PA, RI, SC, TN, UT, VT, WA, WV and WI), which required occupational information, as reported by the next of kin, to be coded on the death certificate file. The deaths were restricted to include only people who also resided in the 26 states at the time of their death. Occupation was coded using the 1980 Bureau of the Census classification [9], and underlying cause of death was coded according to the Ninth Revision of the International Classification of Disease [10]. Census data from 1984 through 1992 for working people living in those states were based on the 1990 Census and other annual data provided by the Census Bureau (Carolyn Carbaugh, US Census, Housing and Household Economic Statistics Division, personal communication). Because both sets of data contain occupation, race, sex and age, race–sex–age-specific death rates could be calculated for various occupations. For purposes of this analysis, the data were restricted to white males and females aged 20–64, and adjustment was made for nine 5-year age groups.

Mortality rates due to suicide were examined separately for white male physicians, white male dentists and white female physicians. There were insufficient numbers of non-white physicians, non-white dentists and white female dentists for analysis. For each gender, a ratio of the directly age-standardized suicide rate for the occupation of interest to that for the standard (census) working population (all occupations) of the same gender was calculated for whites. This age-standardized rate ratio is denoted as SRR. The SRR is similar to the standardized mortality ratio (SMR) except that it uses direct instead of indirect standardization. Direct standardization allows the ratios (e.g. for physicians and dentists) to be compared to each other. SMRs are generally used when the study population is too small for accurate estimates of rates, which is not the case here. The formulas used in this study are given in the Appendix. Estimates of the SRRs were also obtained when the reference population was restricted to working professionals (Census oc-

cupational codes between 3 and 199, inclusive) [6,8,9]. In addition, we examined all cause SRRs. Poisson regression was used to examine trends with age.

Confidence intervals for the SRR were based on the normal approximation to Poisson distribution. All analyses were performed using SAS [11].

## Results

Table 1 contains the crude suicide rates, as well as crude rate ratios and age-adjusted rate ratios relative to the population of US workers (in 26 states). The rates for white male physicians and dentists are ~80% as large as those in the standard working population. Although the suicide rate for white female physicians was only about half as large as that for their male counterparts, the rate was about twice as large as that in the standard working population. The elevation of their rates relative to the standard population is due to males in the standard population having a suicide rate about five times that of females.

Table 1 also contains the age-adjusted rate ratios (SRRs) by gender and occupation. The adjusted SRRs change little from the crude ratios. Thus, the pattern of elevated overall suicides for females and decreased suicides for males relative to the standard working population cannot be explained by confounding due to age.

In addition, examining deaths due to all causes, we found that the SRR was 0.87 for female physicians, 0.46 for male physicians and 0.47 for white male dentists (data not shown). Although all three indicate lower overall death rates than the working population, only the males have a much lower rate.

If we restrict our reference population to working professionals (data not shown), then white male physicians have an SRR = 1.21 and white male dentists have an SRR = 1.14, but neither are statistically significant. Our white female physicians had an SRR = 2.10 relative to working professionals, which was still statistically elevated.

For white males, the suicide rates were examined by 5-year age groups and are shown in Table 2. Although the

**Table 1.** Crude suicide rates, crude suicide rate ratios and age-adjusted suicide rate ratios by gender and occupation for white males and females, 26 US states, 1984–92

Gender	Occupation group	Deaths	Person-years	Group rate <sup>a</sup>	Population rate <sup>a</sup>	Rate ratio <sup>b</sup>	SRR <sup>c</sup> (95% CI)
Male	Physicians	181	851 058	21.3	27.2	0.78	0.80 (0.53–1.20)
Male	Dentists	61	282 399	21.6	27.2	0.79	0.68 (0.52–0.89)
Female	Physicians	22	186 185	11.8	5.7	2.06	2.39 (1.52–3.77)

<sup>a</sup>Per 100 000 person-years.

<sup>b</sup>Group rate divided by population rate.

<sup>c</sup>SRR = directly standardized death rate ratio.

**Table 2.** Suicide rates by age category for white male physicians and dentists, 26 US states, 1984–92

Age group	Physician rate <sup>a</sup> (95% CI) <sup>b</sup>	Dentist rate <sup>a</sup> (95% CI) <sup>b</sup>	Population rate <sup>a</sup>
20–24	35.0 <sup>c</sup> (0.9–194.9)	0.0 <sup>c</sup> (0.0–1276.4)	27.4
25–29	5.5 (1.5–14.0)	15.8 (3.3–46.3)	26.8
30–34	5.7 (2.5–11.3)	13.2 (4.9–28.8)	26.2
35–39	13.0 (8.1–19.6)	15.8 (7.2–29.9)	25.7
40–44	19.9 (13.3–28.6)	21.0 (10.5–37.5)	23.8
45–49	25.0 (16.3–36.6)	21.6 (9.3–42.7)	24.5
50–54	29.0 (18.7–42.7)	24.7 (9.9–50.8)	26.1
55–59	43.3 (29.4–61.5)	33.4 (14.4–65.8)	32.0
60–64	59.8 (41.7–83.2)	47.5 (21.7–90.1)	42.6

<sup>a</sup>Per 100 000 person-years.<sup>b</sup>Exact 95% Poisson confidence interval.<sup>c</sup>Estimates are unreliable due to small sample size.

overall rates are reduced for white male physicians and dentists (shown in Table 1), physicians and, to a lesser extent, dentists have lower rates of suicide in the younger age groups, but elevated rates of suicide in the older age groups relative to the population rates. Although none of the elevations for individual age groups was statistically significant, the observed trend is strong. In fact, using Poisson regression to examine the effect of age on the age-specific rate ratios, the increase is highly significant for physicians ( $P < 0.001$ ) and nearly significant for dentists ( $P = 0.053$ ). The high death rate among physicians in the 20–24 age group is based on one death, and thus can be ignored. Female physicians had higher suicide rates than the standard population for nearly all age groups (data not shown), and in some cases, the elevations were statistically significant. The excess suicide rate for female physicians also increased with age ( $P = 0.015$ ).

## Discussion

Our study found that the suicide rate for white male physicians and dentists, although about twice as high as that for white female physicians, was actually less than that for the working US white male population (assuming the 26 states are representative of the entire population). The suicide rate for white female physicians was higher than the suicide rate for the working US white female population. After standardizing for age, the overall results were basically unchanged. However, there was a very strong trend for increasing suicide rate ratios for male physicians with increasing age.

The study was based on a complete enumeration of deaths in the USA for the years and states studied. The measures used in our study were based on pooling 9 years of data, and, thus, they estimate average values over those years. Because our study was restricted to working pop-

ulations, this trend would not be expected to raise the overall rate for male physicians as much as it would in studies which look at older cohorts.

The present study was large enough for white males (181 physician suicides and 61 dentist suicides) that the estimates are fairly accurate. In addition, we used the population of working physicians and dentists for estimating rates and the entire working population as the comparison population. This was done so that any elevations or decrements for physicians or dentists could not be simply due to the fact that they were employed.

However, the data do not allow separate calculations for various physician specialties, and we could not examine attempted suicides. We also had too few non-whites and female dentists for analysis, and our 22 deaths among white female physicians is a fairly small number. However, because the latter was over twice as many as expected, it was statistically significant. Another limitation of our data is that the death certificate data include usual occupation, while the census data include current occupation. There might be a small effect on our population rates, but it is not clear in which direction the bias would be. Also, a more in-depth analysis would require data on psychosocial and other suicide risk factors, which we do not have.

For white female physicians, the conclusion of overall elevation of suicide risk based on standardized rate ratios agrees with that of Burnett *et al.* [6], who had used PMRs (deaths only). However, for white male physicians and dentists, the SRRs in our study indicated a reduced rate of suicide, whereas the PMRs in the Burnett *et al.* [6] analysis were elevated. Death rates are generally of more interest than proportions of deaths. The latter are often used to approximate the former when census data are not available. However, the approximation is only good when the death rate ratio for all causes combined is  $\sim 1.00$  [12,13]. This was only the case for white female physicians; the white male physicians and dentists had rates about half of those for the standard population. Thus, the elevated suicide PMRs of Burnett *et al.* [6] do not imply elevated suicide rates.

Some studies [14,15] have examined death rates using American Medical Association records from 1967 to 1972, which one might expect to be inferior to our census and NOMS data. However, they have concluded that female physicians have an elevated suicide rate, which is in agreement with our study. They also concluded that psychiatrists had a higher probability of suicide than other specialties. Other studies [2,16] have not found an excess suicide rate among psychiatrists, or they have found that general surgeons were most at risk. As mentioned earlier, our data cannot be divided into specialties.

The location of the physicians may also affect suicide rates. Studies in California [17], England and Wales [18] and Denmark [19] have found elevated suicide rates for

male physicians, which is in contrast with our results. On the other hand, in a small study, Revicki and May [20] found no overall excess suicides among white male physicians in a study in North Carolina. A study in Sweden [16] concluded that female physicians had higher suicide rates than the general population, but that males did not. This is in agreement with our results for the general working population in the USA.

The comparison population (high education, general population, working population, etc.) is important because it determines the question being answered. Arnetz *et al.* [16] compared physicians in Sweden from 1961 to 1970 to people with  $\geq 3$  years of post-high school education and found a suicide SMR of 4.5 for female physicians and 1.9 for male physicians. When we restricted our reference population to working professionals, white female physicians still had significantly elevated SRRs, and white male physicians and dentists had SRRs  $> 1$ , but they were not statistically significant. Thus white male physicians and dentists have a lower overall risk of suicide compared to the working population, but they have a similar risk compared to working professionals.

In a prospective study of physicians who graduated from Johns Hopkins between 1948 and 1964, Torre *et al.* [21] found elevated suicide SMRs for male physicians, but non-significant elevated SMRs were found for females. This is different from our results, and the differences may be attributed to their study being small with low power and to their studying a restricted population.

Our results indicate that white male physicians and dentists have a lower overall suicide rate than other working white males in the USA, if one defines 'overall' to mean over all ages between 20 and 64. This is important because our data indicate that white male physicians  $> 45$  years old do have elevated rates of suicide, while those aged 45 and under have reduced rates of suicide. Other studies have noted, as we did, that suicide rates increase with age for male physicians [17,19,20], but the increase is much smaller for female physicians [19]. This is likely to be an important reason for different conclusions among studies and specifically explains why our results show an overall reduced suicide rate for white male physicians and dentists. White female physicians have a higher suicide rate than other working white females in the USA regardless of age. Most of the previous studies involve physicians, but not necessarily dentists. We have shown that white male dentists have a suicide rate which is similar to that of white male physicians.

The question of why or which subgroups of physicians and dentists commit or attempt to commit suicide could not be addressed by our study. Further attempts to study this could focus on older male physicians and dentists and female physicians of any age. Results for subgroups based on physician specialty have been inconsistent, so future research may need a different subgrouping variable.

### Key points

- Rate ratios for suicide in physicians and dentists cannot be approximated by ratios of proportional deaths.
- White female physicians have an elevated suicide rate, but only older white male physicians and dentists have elevated suicide rates.
- White male dentists have a suicide rate which is similar to that for white male physicians.

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### Conflicts of interest

None declared.

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## Appendix

The formulas used are given below.

$$\text{Crude rate ratio} = \frac{\sum_i \frac{d_i}{n}}{\sum_i \frac{D_i}{N}} \text{ and } \text{SRR} = \frac{\sum_i \frac{N_i}{N} r_i}{\sum_i \frac{D_i}{N}},$$

where  $d_i$  = the number of deaths for the exposed (e.g. white male physicians) in the  $i$ th age group,  $n$  = the total number of person-years in the exposed,  $r_i = \frac{d_i}{n}$  = the death rate for the exposed in the  $i$ th age group,  $D_i$  = the number of deaths for the standard population (e.g. all working white males in the 26 states) in the  $i$ th age group,  $N$  = the total number of person-years in the standard population and  $N_i$  = the number of person-years for the standard population in the  $i$ th age group.