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National Incidence of Physician Suicide and Associated Features

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IMPORTANCE Previous reports regarding comparative suicide incidence among US physicians vs nonphysicians have been inconclusive.

OBJECTIVE To estimate the national incidence of male and female physician suicide and analyze associated factors, comparing findings to the general population.

DESIGN, SETTING, AND PARTICIPANTS This retrospective cohort study investigated suicides among physicians and nonphysicians aged 25 years and older in the US from January 2017 to December 2021. The analysis took place from November 2023 to September 2024. National Violent Death Reporting System data from 30 US states and Washington, DC, were used. Decedents with missing age or sex were excluded for incidence, and missing race, ethnicity, or marital status for further analyses.

EXPOSURE Physician occupation.

MAIN OUTCOME AND MEASURES Suicide incidence rate ratios (IRRs) and odds ratios (aORs) adjusted by age, sex, race, ethnicity, and marital status were used to compare preceding circumstances, primary method, and substances.

RESULTS A total of 448 physician (354 [79%] male and 94 [21%] female; mean [SD] age, 60 [16] years) and 97 467 general population (76 697 [79%] male and 20 770 [21%] female; mean [SD] age, 51 [17] years) suicides were identified. Female physicians had higher rates of suicide than female nonphysicians in 2017 (IRR, 1.88; 95% CI, 1.19-2.83) and 2019 (IRR, 1.75; 95% CI, 1.09-2.65), with overall higher 2017 to 2021 suicide risk (IRR, 1.53; 95% CI, 1.23-1.87). Male physicians had lower 2017 to 2021 suicide risk than male nonphysicians (IRR, 0.84; 95% CI, 0.75-0.93). Compared to the general population and including all available jurisdiction data, physicians had higher odds of depressed mood (aOR, 1.35; 95% CI, 1.14-1.61; $P < .001$) as well as mental health (aOR, 1.66; 95% CI, 1.39-1.97; $P < .001$), job (aOR, 2.66; 95% CI, 2.11-3.35; $P < .001$), and legal (aOR, 1.40, 95% CI, 1.06-1.84; $P = .02$) problems preceding suicide as well as use of poisoning (aOR, 1.85; 95% CI, 1.50-2.30; $P < .001$) and sharp instruments (aOR, 4.58; 95% CI, 3.47-6.06; $P < .001$). Physicians also had higher odds of positive toxicology for caffeine; poison; cardiovascular agents; benzodiazepines; anxiolytics, nonbenzodiazepines, or hypnotics; and drugs not prescribed for home use.

CONCLUSION AND RELEVANCE These findings show a higher incidence of suicide for US female physicians compared to female nonphysicians. Comprehensive and multimodal suicide prevention strategies remain warranted.

Editorial

Supplemental content

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Although the practice of medicine can be immensely rewarding, physicians are human above all, and as such, are subject to the immense stresses that accompany their profession—long work hours, the weight of regularly making life or death decisions, caring for patients in what is often the most challenging phase of their and their families' lives, onerous health care system changes, lack of autonomy, and increased time spent on computers instead of with patients.[1-3] It is not surprising that physicians experience high rates of dissatisfaction with life and career, burnout, depressive symptoms and major depressive disorder, substance use, and possibly suicide.[4-6] Further, the prevalence of depression for resident physicians is estimated to be as high as 29%, with one survey showing rates of 19.1% to 38.5% for mild to severe depression symptoms across specialties.[6-8] Adding to these longstanding occupational hazards, the COVID-19 pandemic has been associated with an increased prevalence of physician burnout.[9] Most post–COVID-19 surveys show burnout rates of 50%, rates of depression at least as high as in nonphysicians, and recent or current suicidal ideation around 10%.[10]

Even before the COVID-19 pandemic, major medical organizations and institutions recognized the vulnerability of physicians to suicide and urged actions to prioritize physician wellness and suicide prevention.[10-12] The most cited study on age-standardized physician suicide rates found elevated rates among both male and female physicians compared to gender-matched nonphysicians in the general population, but that meta-analysis included few studies from the US and a limited number of female physician suicides.[13] Subsequent international meta-analyses have not consistently confirmed these earlier findings.[14-16] The most recent of these concluded that female physicians were at greater risk of suicide than female nonphysicians, while male physicians had a risk similar to male nonphysicians. However, that study reported high heterogeneity based on time and place and did not include any US data beyond 2018.[16] In studies focused on US physicians, a 2007 to 2018 study found both male and female physicians had comparable suicide risks to the general population, and a 2012 to 2016 study also found no difference in overall suicide rates, although some of the data suggested suicide rates may be higher among female physicians.[17,18]

Thus, the rates of male and female physician suicide compared to the general population remains an open question, and most information on this issue comes from data preceding 2018. The objective of this study was to use the most current US data available to estimate the sex-specific national incidence of suicide for physicians over a 5-year period (January 2017 to December 2021), comparing trends and associated characteristics to the US general population.

Key Points

Question Do physicians in the US have a higher rate of suicide than the general population?

Findings In this cohort study including 97 915 decedents, female physicians had a significantly higher suicide incidence per 100 000 person-years than the female general population in 2017 and 2019, with overall higher 2017 to 2021 suicide incidence. Male physicians had an overall significantly lower 2017 to 2021 suicide incidence than the male general population.

Meaning Comprehensive and multimodal suicide prevention strategies remain warranted, particularly for female physicians.

Methods

From November 2023 to September 2024, this retrospective cohort study was completed using US suicide decedent data from the National Violent Death Reporting System (NVDRS), after approval by the US Centers for Disease Control and Prevention (CDC) and deemed not human subject research by the University of California San Diego Institutional Review Board. This anonymous database draws information from death certificates, coroner and medical examiner reports, and law enforcement reports.

Population Estimates

During the 2017 to 2021 study period, certain states and territories had incomplete jurisdictionwide reporting to the NVDRS; therefore, this study only used states and territories noted as available per the NVDRS guidelines.[19] Puerto Rico was excluded due to age data limitations. For the most stable comparison, we used jurisdictions consistently available during the study period (30 states and Washington, DC) to calculate sex-specific incidence and incidence rate ratios (IRRs) (eFigure and eTable 1 in Supplement 1). A sensitivity analysis was also conducted to test the effect of including all available jurisdiction data per year.

Physicians were identified by 2 independent investigators flagging appropriate free-text occupations from the decedent's death certificate, the CDC modified 2017 US census occupation codes and the 2018 standard occupation classifications (Cohen κ, 0.97) (eTable 2 in Supplement 1). Decedents without sex and age data were excluded, and a total of 448 physician and 97 467 general population (nonphysician) suicides among individuals aged 25 years and older were found from 30 states and Washington, DC (incidence analysis). A total of 621 physician and 136 689 general population suicides were found from all available jurisdictions (all other analyses).

The Association of American Medical Colleges State Physician Workforce Data Reports were used to estimate each state's physician population, using linear interpolation for missing years. For the general population, the US Census Bureau's American Community Survey Public Use Microdata Sample was used to estimate each state's population (≥25 years and <100 years). Sex-specific age-standardized mortality ratios (SMRs) were calculated using the 2021 general population (age ≥25 and <100 years; 30 states and Washington, DC) as the standard and national physician age group percentages from the Federation of State Medical Boards.

Covariates and Missing Data

To account for suicide as a rare event and minimize possible bias in maximum likelihood estimates, Firth penalized logistic regression was used to estimate adjusted odds ratios (aORs)

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and compare physician and general population suicides, including all available jurisdiction data from the NVDRS except Puerto Rico. Models were adjusted by age, sex, race, ethnicity, and marital status. Decedents missing these variables were excluded.

Preceding Crises or Circumstances to Suicide

A total of 569 physician and 119 229 general population suicides had preceding circumstance data. Fourteen different circumstances were analyzed, several created from NVDRS variables: substance problems (alcohol or other), mental health problems (mental illness treatment history or current mental health problem), legal problems (criminal or noncriminal), and death of a friend, family, or other combined with suicide of a family member or friend.

Primary Method Involved in Suicide

A total of 611 physician and 133 843 general population suicides had primary method of suicide data (weapon type most implicated in death). Using the NVDRS categories, fall; drowning; firearm; poisoning; sharp instrument; hanging, strangulation, or suffocation; and all other methods were analyzed in separate adjusted models followed by a post hoc Holm-Bonferroni correction.

Toxicology-Reported Substances

A total of 437 physician and 90 397 general population suicides had available toxicology reports. A pharmacist and investigator reorganized all toxicology-found substances into 22 categories, with the specified category not prescribed for home use constructed for likely diverted substances.[20] This category includes substances for which prescriptions for home use are not typical, appropriate, or legal. Analysis was completed for all available toxicology reports, which report on all cases where a substance was found as well as death-implicated cases where a substance was identified as contributing to death.

Statistical Analysis

Analyses were completed using STATA version 17.0 (StataCorp) and SAS version 9.4 (SAS Institute), keeping a 2-sided alpha level of .05. Continuous variables were analyzed using a 2-sided *t* test or 2-sided Wilcoxon rank sum test, while categorical variables were analyzed with a χ^2 test or Fisher exact test. Firth penalized logistic regression was used to perform multivariable modeling with physician occupation as the dependent variable and age, sex, race, ethnicity, and marital status as adjusting variables. This report was developed according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline.

Results

From 30 states and Washington, DC, we found 448 physician (354 [79%] male and 94 [21%] female; mean [SD] age, 60 [16] years) and 97 467 nonphysician (76 697 [79%] male and 20 770 [21%] female; mean [SD] age, 51 [17] years) suicides where male physicians were significantly older than general male population decedents (mean [SD] age, 62 [16] vs 51 [17] years; $P < .001$) (**Table**). Physician decedents also had up to a 5 to 1 male to female ratio, while the general population had up to 4 to 1 ratio (eTable 3 in Supplement 1). From all jurisdictions, 621 physician (500 [81%] male and 121 [20%] female) and 136 689 nonphysician (107 725 [79%] male and 28 964 [21%] female) suicides were found with physician decedents significantly older than the general population (mean [SD] age, 60 [16] vs 51 [17] years; $P < .001$), more likely to be married or in a domestic partnership (330 [53%] vs 46 938 [34%]).

Incidence of Suicide

Compared to the female general population, female physicians had significantly higher risk of suicide in 2017 (IRR, 1.88; 95% CI, 1.19-2.83) and 2019 (1.75; 95% CI, 1.09-2.65) with an overall higher suicide risk throughout the 2017 to 2021 study period (IRR, 1.53; 95% CI, 1.23-1.87) (**Figure 1**; eTable 4 in Supplement 1). Male physicians had a lower risk of suicide than male nonphysicians in 2019 and 2020, with an overall significantly lower 2017 to 2021 suicide risk (IRR, 0.84; 95% CI, 0.75-0.93).

Female physicians had a significantly higher risk of suicide than female nonphysicians before the COVID-19 pandemic (2017 to 2019; IRR, 1.65; 95% CI, 1.26-2.11) but comparable rates after (2020 to 2021; IRR, 1.34; 95% CI, 0.92-1.90). Male physicians had a comparable risk of suicide before the COVID-19 period (IRR, 0.88; 95% CI, 0.77-1.00) but lower rates after (IRR, 0.78; 95% CI, 0.65-0.93). Both male and female physicians had higher suicide incidence per 100 000 person-years before vs after COVID-19 (male, 27.71 vs 24.43; female, 13.74 vs 9.87).

The age-standardized SMR for female physicians vs nonphysicians was significantly higher in 2017 (2.00; 95% CI, 1.30-2.96) and 2019 (1.81; 95% CI, 1.16-2.69), with an overall 2017 to 2021 elevated ratio (1.54; 95% CI, 1.26-1.88) (eTable 5 in Supplement 1). For male physicians, SMR was either insignificant or significantly lower, with an overall lower ratio (0.85; 95% CI, 0.77-0.95).

When incorporating all available jurisdiction data, female physicians still had higher 2017 (IRR, 2.01; 95% CI, 1.36-2.86), 2019 (1.65; 95% CI, 1.09-2.40), and 2017 to 2021 suicide risk (1.39; 95% CI, 1.15-1.66) (eTable 4 in Supplement 1). Male physicians had lower suicide risk in 2019, 2020, 2021, and overall from 2017 to 2021 (0.83; 95% CI, 0.76-0.91).

Characteristics Prior to Suicide

Prior to suicide, physicians had higher odds of having known depressed mood (aOR, 1.35; 95% CI, 1.14-1.61; $P < .001$), criminal or noncriminal legal problems (aOR, 1.40; 95% CI, 1.06-1.84; $P = .02$), leaving a suicide note (aOR, 1.61; 95% CI, 1.37-1.91; $P < .001$), history of or current mental health problems (aOR, 1.66; 95% CI, 1.39-1.97; $P < .001$), and job problems (aOR, 2.66; 95% CI, 2.11-3.35; $P < .001$) (**Figure 2**).

Primary Method Involved in Suicide

By frequency, the most used primary method of suicide for male physicians was firearms, while for female physicians it

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Table. Demographic Characteristics of Physician and General Population Suicides From All Jurisdictions

Characteristic	Male sex, No. (%)		P value[a]	Female sex, No. (%)		P value[a]
	Physician	General population[b]		Physician	General population[b]	
30 States and Washington, DC						
Total suicides, No.	354	76 697	NA	94	20 770	NA
Suicides by year						
2017	77 (22)	15 010 (20)	.20	23 (25)	4.333 (21)	.80
2018	85 (24)	15 529 (20)		17 (18)	4442 (21)	
2019	59 (16)	15 321 (20)		22 (23)	4274 (21)	
2020	63 (18)	15 071 (20)		15 (16)	3794 (18)	
2021	70 (20)	15 766 (20)		17 (18)	3927 (19)	
Age, mean (SD), y	62 (16)	51 (17)	<.001	52 (14)	50 (15)	.30
	Physicians, No. (%)			**General population, No. (%)**		**P value[a]**
All jurisdictions						
Total suicides, No.	621			136 689		NA
Suicides by year						
2017	120 (19)			23 089 (17)		.30
2018	135 (22)			27 486 (20)		
2019	117 (19)			26 300 (19)		
2020	125 (20)			29 203 (22)		
2021	124 (20)			30 611 (22)		
Female	121 (20)			28 964 (21)		.30
Age, mean (SD), y	60 (16)			51 (17)		<.001
Race and ethnicity[c]						
Asian or Pacific Islander	58 (9)			2735 (2)		<.001
American Indian or Alaska Native	Not shown[d]			1602 (1)		
Black	18 (3)			8470 (6)		
Hispanic	18 (3)			7143 (5)		
White	514 (83)			115 205 (85)		
Other[e]	Not shown[d]			1428 (1)		
Unknown	3 (0)			106 (0)		
Marital status						
Married/domestic partnership	330 (53)			46 938 (34)		<.001
Never married or single	101 (16)			42 138 (31)		
Separated/widowed/divorced	188 (31)			46 107 (34)		
Unknown	2 (0)			1506 (1)		

Abbreviation: NA, not applicable.

[a] Categorical variables were compared using χ^2 test or Fisher exact test, continuous variables using a 2-sided *t* test or Wilcoxon rank sum test.

[b] General population consists of suicides among nonphysician aged 25 years and older.

[c] Race and ethnicity data were collected through the National Violent Death Reporting System from death certificates as well as law enforcement and coroner or medical examiner reports. These variables were reported as disparities have been shown in suicide rates.

[d] Counts suppressed per National Violent Death Reporting System agreement of concealing counts less than 10.

[e] Other includes National Violent Death Reporting System values of other and multiple races.

was poisoning. When compared to the general population, physicians were found to have higher odds of using poisoning (aOR, 1.85; 95% CI, 1.50-2.30; $P < .001$) and sharp instruments (aOR, 4.58; 95% CI, 3.47-6.06; $P < .001$) (**Figure 3**).

Toxicology Reported Substances Found in Suicide

In all suicide cases with a toxicology report, physicians had higher odds of having caffeine (aOR, 1.38; 95% CI, 1.03-1.86; $P = .03$); poison (aOR, 1.39; 95% CI, 1.00-1.93; $P = .049$); cardiovascular agents (aOR, 1.53; 95% CI, 1.05-2.23; $P = .03$); benzodiazepines (aOR, 1.74; 95% CI, 1.36-2.23; $P < .001$); anxiolytics, nonbenzodiazepines, or hypnotics (aOR, 1.78; 95% CI, 1.19-2.65; $P = .005$); and drugs not prescribed for home use (aOR, 2.80; 95% CI, 1.80-4.34; $P < .001$) present at time of death (**Figure 4**). For substances implicated in death, physicians had higher odds of using opiates/opioids (aOR, 1.32; 95% CI, 1.08-1.61; $P = .006$), cardiovascular agents (aOR, 1.77; 95% CI, 1.30-2.40; $P < .001$), antidiabetic agents (aOR, 3.09; 95% CI, 1.82-5.25; $P < .001$), and drugs not prescribed for home use (aOR, 8.62; 95% CI, 4.62-16.09; $P < .001$).

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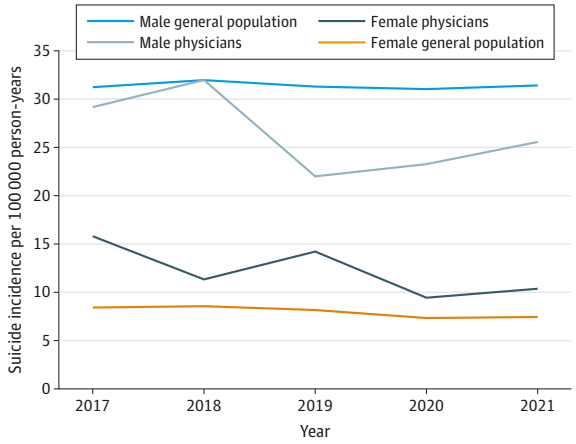
Figure 1. Unadjusted Suicide Incidence Rates for Physicians and the General Population From 2017 to 2021



Further information for year-to-year values and incidence rate ratios can be found in the **Table** and eTable 4 in Supplement 1.

Discussion

In this nationwide cohort study of physicians and nonphysicians who died by suicide in 2017 to 2021, we found female physicians had higher rates of suicide than female individuals in the general population, with a significantly elevated overall SMRs. The same was not true for male physicians relative to the general male population. Additionally, a disproportionate number of physician decedents were White (>80%) in contrast to the 2022 physician workforce (57%).[21] Compared to the general population, physicians also had higher odds of depressed mood and mental health, job, and legal problems preceding suicide as well as using poisoning and sharp instruments as primary methods. Further, physicians had higher odds of positive toxicology for cardiovascular agents; benzodiazepines; anxiolytics, nonbenzodiazepines, or hypnotics; and drugs not prescribed for home use.

It was not surprising to find the elevated rates of suicide among female physicians, as several international meta-analyses and systematic reviews have pointed toward this finding, but none had been definitive.[13-16] In the earliest of these, Schernhammer and Colditz[13] used pre-2000 international data and reported a rate among female physicians that was 127% higher than that among women in general but there was indication of publication bias. Subsequently, the most recent meta-analysis using international data from 1960 to 2020 has found a higher age-standardized risk of suicide for female physicians than women in general (IRR, 1.76; 95% CI, 1.40-2.21) with high heterogeneity (I^2, 84%; $P < .001$) and no evidence of publication bias.[16] However, other than Zimmerman and team's work, previous meta-analyses were derived from older data which could not be assumed to reflect current conditions.

Within the US, cohort studies using the NVDRS from 2007 to 2018 found that both male and female physicians had comparable suicide rates to the general population.[17,18] Another study linking the 2008 American Community Survey with the 2019 National Death Index Records similarly found no elevated suicide risk for physicians overall.[22] Age-adjusted SMR estimates for US physician suicides from 2010 to 2015 also showed no significant differences overall, nor across both sexes for most years, except a significantly lower finding for female physicians in 2015.[23] Our findings using the most current available data contradict these prior studies, with female physicians having a higher risk of suicide than female nonphysicians and male physicians having a lower risk of suicide than male nonphysicians. It is not possible to determine from these data why female physicians, like female nurses, are at higher risk of suicide. It cannot be ignored that there may be factors yet unknown about being a woman in health care that increases suicide risk. Possible contributors include underrecognition for similar work and achievements, inequitable pay and opportunities for promotion, greater domestic responsibilities leading to work-life imbalance, and risk of sexual harassment.[24,25]

Our findings on preceding circumstances to suicide aligned with previous studies showing physician suicides had higher odds of depressed mood, mental health issues, and job problems.[18] Similarly, poisoning as a higher odds primary method of suicide continues to be consistent.[14,17,18] As nurses, pharmacists, and physicians were found to be 3 to 5 times more likely to use poisoning in their death than other occupations (eg, military personnel, hunters, farmers, and police), it is possible that access to different medications in the hospital influences the weapon type used in suicide.[26] Within this study, sharp instrument use was also at much higher odds than previously reported, a similar finding to suicide deaths among nurses.[18,20] While using an evidence-based approach to suicide prevention, such as removing access to lethal means could be a prevention strategy specific to the health care workforce, such strategies for sharp instruments are less clear.[27] Further exploration in terms of the type of sharp instruments and context in which the suicides occurred is needed.

Previous studies of physician suicide have highlighted several substances being higher odds for positive toxicology than nonphysicians: barbiturates, benzodiazepines, antipsychotics, opiates, and antidepressants.[17,28] While our study showed consistent findings with benzodiazepines and opiates, cardiovascular agents; antidiabetic agents; and anxiolytics, nonbenzodiazepine sedatives, or hypnotics also emerged as substance classes associated with physician suicide. As chronic medical conditions, such as diabetes, stroke, and heart disease, are associated with depression and anxiety, these patterns may suggest how managing these conditions along with the toll of occupational hazards are impacting physician well-being.[29-34] The use of benzodiazepines and opiates among physicians should also be a warning sign, since these highly lethal agents may be self-prescribed or misused. Physicians should be encouraged to seek treatment for their physical and mental health conditions; however, considerable barriers to care remain, including long-hour workloads and stigma regarding mental health treatment due to potential repercussions on one's licensure to practice.[11,35]

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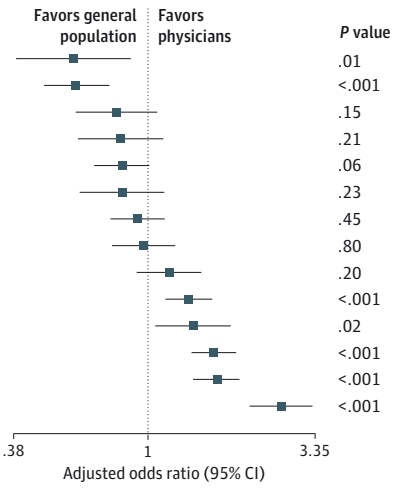
Figure 2. Adjusted Odds Ratios of Circumstances Preceding Suicide Among Physicians Compared to the General Population

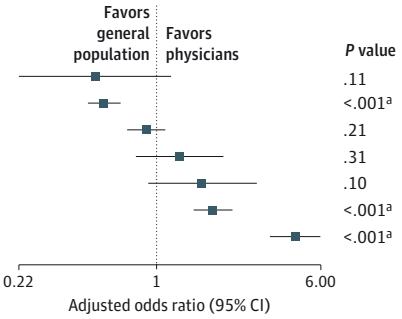
Circumstances preceding suicide	No. (%) Physicians (n = 569)	General population (n = 119 229)	Adjusted odds ratio (95% CI)	P value
Family problem	23 (4)	9253 (8)	0.58 (0.38-0.88)	.01
Substance problem	93 (16)	37 862 (32)	0.59 (0.47-0.75)	<.001
Financial problem	51 (9)	9747 (8)	0.80 (0.59-1.08)	.15
Argument or conflict prior to suicide	57 (10)	19 247 (16)	0.82 (0.60-1.12)	.21
Physical health problem	175 (31)	28 399 (24)	0.83 (0.68-1.01)	.06
Death or suicide of friend, family, or other	46 (8)	10 655 (9)	0.83 (0.61-1.13)	.23
Disclosed suicide intent	124 (22)	28 272 (24)	0.93 (0.76-1.13)	.45
Suicide attempt history	92 (16)	22 110 (19)	0.97 (0.77-1.22)	.80
Intimate partner problem	129 (23)	32 273 (27)	1.17 (0.92-1.48)	.20
Depressed mood	247 (43)	39 500 (33)	1.35 (1.14-1.61)	<.001
Criminal or noncriminal legal problem	61 (11)	13 097 (11)	1.40 (1.06-1.84)	.02
Left suicide note	248 (44)	37 417 (31)	1.61 (1.37-1.91)	<.001
Mental health problem	338 (59)	61 382 (51)	1.66 (1.39-1.97)	<.001
Job problem	106 (19)	11 269 (9)	2.66 (2.11-3.35)	<.001



Analysis was completed using a Firth penalized logistic regression adjusted by age, sex, race, ethnicity, and marital status.

Figure 3. Adjusted Odds Ratios of the Primary Method of Suicide Among Physicians Compared to the General Population

Primary method of suicide (1 adjusted model per method)	No. (%) Physicians (n = 611)	General population (n = 133 843)	Adjusted odds ratio (95% CI)	P value
All other methods	5 (1)	2753 (2)	0.51 (0.22-1.17)	.11
Firearm	276 (45)	70 904 (53)	0.56 (0.47-0.67)	<.001[a]
Hanging, strangulation, or suffocation	129 (21)	35 819 (27)	0.90 (0.72-1.10)	.21
Fall	17 (3)	2931 (2)	1.28 (0.79-2.08)	.31
Drowning	11 (2)	1258 (1)	1.65 (0.91-2.99)	.10
Poisoning	117 (19)	17 319 (13)	1.85 (1.50-2.30)	<.001[a]
Sharp instrument	56 (9)	2859 (2)	4.58 (3.47-6.06)	<.001[a]



Analysis was completed in individual Firth penalized logistic regressions each adjusted by age, sex, race, ethnicity, and marital status.

[a]Significant after post hoc Holm-Bonferroni correction. All *P* values shown are noncorrected original values.

In addition, the finding related to substances not prescribed for home use highlights a potential risk mitigation strategy. These drugs indicate diversion or extralegal purchase, and use is contingent on the user possessing psychopharmacological knowledge that may not be common within the general population. Whether this finding represents the use of substances strictly obtained for the purpose of suicide or whether they are the result of preexisting substance use issues is unknown and cannot be established due to the limitations of this dataset. However, reducing possible diversion of these substances still provides one opportunity for meaningful harm reduction.

Following publicly reported physician deaths during 2020 and 2021, societal pressure led to the development of the Lorna Breen Act and the Lorna Breen Foundation where, despite the absence of available US data, change was stimulated through the emotional testimonies of personal tragedy. To date, this foundation has been working toward destigmatizing help-seeking behaviors by calling for the removal of intrusive questions from licensure and credentialling questions.[11,35] Further, the Surgeon General, American Hospital Association, and US Centers for Disease Control and Prevention have issued calls for action and recommendations for change within the workplace to address suicide risks.[10,36] The results of this study further confirm the necessity of these actions while spotlighting previously unaddressed issues in national prevention strategies: diversion and addressing preceding criminal or legal circumstances.

Limitations

This study has limitations. First, our analysis included NVDRS data only from available jurisdictions each possibly having different resources and protocols to code complete data (eg, toxicology) for the NVDRS. Therefore, our study may not be nationally representative, have underreporting of the physician occupation, and is limited to information from death investigations.[19,37-39] Further, given the COVID-19 pandemic, NVDRS sources and coders may have been overwhelmed, lead-

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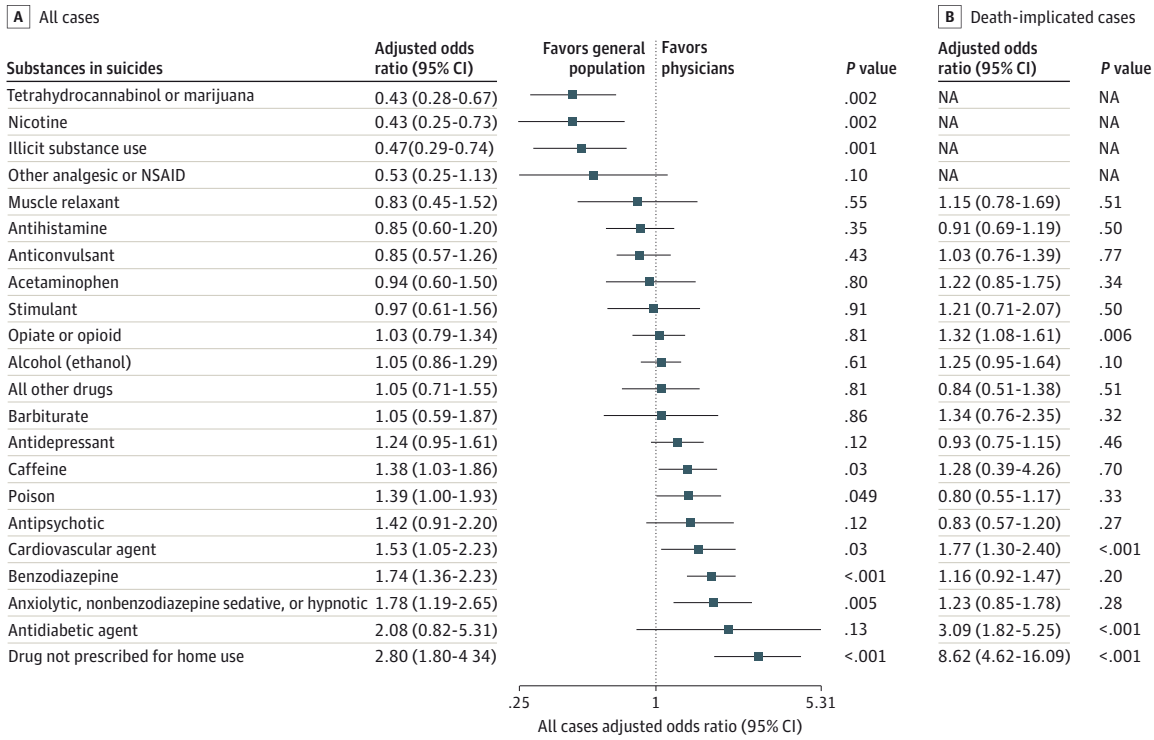
Figure 4. Adjusted Odds Ratios of Substance Use in All and Death-Implicated Cases Among Physicians Compared to the General Population



Analyses were completed using a Firth penalized logistic regressions adjusted by age, sex, race, ethnicity, and marital status. NA values represent substance classes where physicians had 0 cases. Further information on unadjusted counts can be found in eTable 6 in Supplement 1. NSAID indicates nonsteroidal anti-inflammatory drug.

ing to errors or underreported suicides. Second, as this cohort study was retrospective and the NVDRS has prior circumstance underreporting, these data cannot be interpreted as precipitating factors to suicide nor can connections be made between each circumstance (eg, legal problems and substance problems).[19] Third, individuals of unknown sex were excluded from physician denominators, possibly overestimating suicide incidence among physicians. Fourth, as the Federation of State Medical Boards only reports 4 nationwide age group categories, SMR estimations may be biased. Future research to explore suicide from the perspective of suicide attempt survivors may begin to overcome data limitations and highlight protective factors for physicians.

Conclusions

This study found that US female physicians were at higher risk of suicide than the general female population. Comprehensive and multimodal suicide prevention strategies remain warranted for physicians, with proactive consideration for those experiencing mental health issues, job problems, legal issues, and diversion investigations.

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Concept and design: Makhija, Davidson, Lee, Zisook.
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