Special Report

Suicidal Ideation Among American Surgeons

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Background: Suicide is a disproportionate cause of death for US physicians. The prevalence of suicidal ideation (SI) among surgeons and their use of mental health resources are unknown.

Study Design: Members of the American College of Surgeons were sent an anonymous cross-sectional survey in June 2008. The survey included questions regarding SI and use of mental health resources, a validated depression screening tool, and standardized assessments of burnout and quality of life.

Results: Of 7905 participating surgeons (response rate, 31.7%), 501 (6.3%) reported SI during the previous 12 months. Among individuals 45 years and older, SI was 1.5 to 3.0 times more common among surgeons than the general population ($P<.02$). Only 130 surgeons (26.0%) with recent SI had sought psychiatric or psychologic help, while 301 (60.1%) were reluctant to seek help due to concern that it could affect their medical license. Recent SI had a large, statistically significant adverse relationship with all 3 domains of burnout (emotional exhaustion, depersonalization, and low personal accomplishment) and symptoms of depression. Burnout (odds ratio, 1.910; $P<.001$) and depression (odds ratio, 7.012; $P<.001$) were independently associated with SI after controlling for personal and professional characteristics. Other personal and professional characteristics also related to the prevalence of SI.

Conclusions: Although 1 of 16 surgeons reported SI in the previous year, few sought psychiatric or psychologic help. Recent SI among surgeons was strongly related to symptoms of depression and a surgeon's degree of burnout. Studies are needed to determine how to reduce SI among surgeons and how to eliminate barriers to their use of mental health resources.

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SUICIDE IS A DISPROPORTIONATE cause of mortality for physicians relative to both the general population and other professionals.[1-4] Although suicide is strongly linked to depression,[5,6] the lifetime risk of depression among physicians is similar to that of the general US population.[1,7,8] This observation suggests that other factors may contribute to the increased risk of suicide among physicians. Access to lethal medications and knowledge of how to use them has been suggested as 1 factor; however, the influence of professional characteristics and forms of distress other than depression (eg, burnout) are largely unexplored.

See Invited Critique at end of article

The prevalence of suicidal ideation (SI) in the previous 12 months for the general US population is approximately 3.3%.[5] The 2003 National Comorbidity Survey found that approximately one-third of individuals with SI make a plan, 72% of those with a plan make an attempt, and 26% proceed directly from SI to an unplanned attempt.[6] In aggregate, these statistics suggest that as many as 50% of individuals with SI may eventually make a suicide attempt, with the majority of attempts occurring within 1 year of onset of SI.[6] Recent data suggest that the increased risk for suicide among physicians may begin as early as medical school.[9,10]

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In the study reported here, commissioned by the American College of Surgeons (ACS) Committee on Physician Competency and Health, we evaluated the frequency of SI and the use of mental health resources among surgeons who were members of the ACS and measured the relationship between SI and surgeon burnout, quality of life (QOL), and symptoms of depression as assessed by standardized metrics.

METHODS

PARTICIPANTS

As previously reported,[11] members of the investigative team conducted a survey evaluating burnout and QOL among American surgeons in June 2008. All surgeons who were members of the ACS, had an e-mail address on file with the college, and permitted their e-mail to be used for correspondence with the college were eligible for participation. Participation was elective and responses were anonymous. Participants were blinded to any specific hypothesis of the study. Institutional review board oversight was provided by the Mayo Clinic.

DATA COLLECTION

A detailed description of the survey has been published.[11] The survey included 61 questions about a wide range of variables, including demographic information, practice characteristics, self-perceived medical errors, and career satisfaction. Standardized survey tools were used to identify burnout,[12-15] mental and physical QOL,[16,17] and symptoms of depression.[18,19] Burnout was measured using the Maslach Burnout Inventory, a 22-item questionnaire considered a standard tool for measuring burnout.[12-15] The Maslach Burnout Inventory has 3 subscales to evaluate the 3 domains of burnout: emotional exhaustion, depersonalization, and low personal accomplishment. We considered surgeons with a high score for medical professionals on either the depersonalization and/or emotional exhaustion subscales as having at least 1 manifestation of professional burnout.[12,20-23] Symptoms of depression were identified using the 2-item Primary Care Evaluation of Mental Disorders,[18] a standardized and validated assessment for depression screening that performs as well as longer instruments.[19] Mental and physical QOL were measured using the Medical Outcomes Study 12-Item Short-Form Health Survey,[16,17] with norm-based scoring methods used to calculate mental and physical QOL summary scores.[16] The mean (SD) mental and physical QOL summary scores for the US population are 50 (10) (range, 0-100).[16]

Recent SI was evaluated by asking surgeons, "Have you ever had thoughts of taking your own life, even if you would not really do it?" as well as "During the past 12 months have you had thoughts of taking your own life?" These questions originated from an inventory developed by Meehan et al,[24] have been used in studies of physicians in training,[9] and allow ready comparison with the prevalence of SI in the general US population.[25] Surgeons were also asked whether they had sought psychiatric or psychologic help in the previous 12 months, whether they had used antidepressant medications in the previous 12 months, and, if so, who had prescribed medication for treatment of depression. All surgeons were also asked, "If you were to need medical help for treatment of depression, alcohol/substance use, or other mental health problem, would concerns about the repercussions on your medical license make you reluctant to seek formal medical care?" (Survey items are available from the corresponding author upon request.)

STATISTICAL ANALYSIS

Descriptive statistics were used to characterize sample demographics. Comparisons between surgeons with recent SI and surgeons without recent SI were tested using Wilcoxon rank sum, Mann-Whitney, and Fisher exact tests. Such comparisons with approximately 7300 and 500 surgeons reporting in the 2 groups have 80% power to detect an average difference of 11% times the SD, a small effect size.[26,27] Accordingly, the *P* values in this report are not as important as the observed effect sizes. Consistent with recent advances in the science of QOL assessment,[26] we a priori defined a 0.5 SD in QOL scores as a clinically meaningful effect size.[26,27] Linear regression was used to evaluate the incremental effect of each measure of distress on recent SI. In addition, the odds ratio (OR) for recent SI associated with screening positive for depression or each 1-point change in burnout or QOL score was calculated. The multivariable associations among demographic characteristics, professional characteristics, and distress with recent SI were assessed using logistic regression. Both forward and backward elimination methods were used to select significant variables for the models in which the directionality of the modeling did not affect the results. The independent variables used in these models included age, sex, relationship status, spouse/partner current profession, having children, age of children, subspecialty, years in practice, hours worked per week, hours per week spent in the operating room, number of nights on call per week, practice setting (private practice, academic medical center, Veteran's Affairs hospital, active military practice, not in practice or retired, or other), current academic rank, primary method of compensation (eg, salaried, incentive-based pay, or mixed), percentage of time dedicated to non–patient-care activities (eg, administration, education, or research), self-perceived medical error in the previous 3 months, depression, and burnout. All analyses were done using SAS version 9 (SAS Institute Inc, Cary, North Carolina) or R (R Foundation for Statistical Computing, Vienna, Austria; http://www.r-project.org). A likelihood ratio test was used to test the overall fit of the model. The likelihood ratio test compares the likelihood function of the final model with the likelihood of the reduced model. A significant *P* value for this test indicates that the expanded model fits the data better than the reduced model. Since the hazard ratio measures magnitude of risk rather than a model's ability to accurately classify individuals, the C statistic was also used to further evaluate the discriminatory value of the model for predicting SI.[28] The C statistic estimates the proportion of correct predictions of the model ($C=1$ indicates perfect discrimination between those with and without SI; $C=0.5$ is equivalent to chance).

RESULTS

Of the 24 922 ACS members surveyed, 7905 returned surveys (31.7%). A detailed description of the survey and analysis of the rates of burnout, QOL, and symptoms of depression among surgeons responding to the 2008 ACS survey has been reported.[11] The personal and professional characteristics of responders are shown in **Table 1**. The prevalence of SI and reported use of mental health resources by surgeons are shown in **Table 2**. Of the 7905 returned surveys, SI data were successfully collected from 7825. Suicidal ideation was reported by 501 surgeons (6.4%) during the previous 12 months. Although the prevalence of SI among surgeons aged 25 to 34 years (7.3% vs 6.7%; $P=.85$) and 35 to 44 years (6.3% vs 6.8%; $P=.21$) was similar to that of the general population,[25] SI was 1.5 to 3.0 times more common among surgeons relative to the general population among surgeons aged 45 to 54 years (7.6% vs 5.0%; $P=.008$), 55 to 64 years (6.9% vs 2.3%; $P<.001$), and 65 years or older (2.7% vs 1.2%; $P=.02$). Only 561 surgeons (7.2%) reported that they had sought psychiatric/psychologic help in the previous 12 months. More than one-third (3046 [38.8%]) of surgeons indicated that they would be reluctant to seek help

Table 1. Personal Characteristics

Characteristic	No. (%) or Median (Q1, Q3)[a] (N=7905)
Age, median, y	51 (43-59)
25-34	224 (2.8)
35-44	2096 (26.7)
45-54	2517 (32.0)
55-64	2015 (25.6)
65-74	834 (10.6)
>74	175 (2.2)
Missing	44
Sex	
Male	6815 (86.7)
Female	1043 (13.3)
Missing	47
Relationship status	
Single	678 (8.6)
Married	6950 (88.0)
Partnered	221 (2.8)
Widow or widower	50 (0.6)
Missing	6
Ever been divorced	
Yes	1671 (21.3)
No	6176 (78.7)
Missing	58
Partner or spouse works outside home[b]	
Yes	3700 (51.6)
No	3471 (48.4)
Missing	734
Partner or spouse current profession[c]	
Surgeon	335 (9.2)
Physician but not surgeon	830 (22.7)
Other health care professional (eg, nurse, therapist)	1060 (29.0)
Nonmedical professional (eg, engineer, business)	1033 (28.3)
Other	397 (10.9)
Missing	4250
Have children	
Yes	6917 (87.5)
No	987 (12.5)
Missing	1
Age of youngest child, y[d]	
<5	1314 (19.0)
5-12	1605 (23.3)
13-18	1208 (17.5)
19-22	746 (10.8)
>22	2025 (29.4)
Missing	1007
Specialty	
Cardiothoracic	489 (6.2)
Colorectal	302 (3.8)
Dermatologic	2 (0)
General	3233 (41.1)
Neurologic	184 (2.3)
Obstetric/gynecologic	105 (1.3)
Oncologic	407 (5.2)
Ophthalmologic	181 (2.3)
Orthopedic	155 (2.0)
Otolaryngologic	371 (4.7)
Pediatric	243 (3.1)
Plastic	458 (5.8)
Transplant	123 (1.6)
Trauma	345 (4.4)
Urologic	315 (4.0)
Vascular	463 (5.9)
Other	485 (6.2)
Missing	44
Years in practice	
Median (range)	18.0 (9-27)
<5	872 (11.2)
>5 to <10	1115 (14.3)
>10 to <20	2209 (28.3)
>20 to <30	2137 (27.4)
>30	1462 (18.8)
Missing	110
Worked, h/wk	
Median (range)	60 (50-70)
<40	666 (8.5)
40-49	800 (10.3)
50-59	1410 (18.1)
60-69	2539 (32.6)
70-79	1048 (13.4)
>80	1336 (17.1)
Missing	106
Operating room, h/wk	
No.	7734
Median	16 (10-24)
No. of nights on call, wk	
No.	7748
Median	2 (1-4)
Primary method determining compensation	
Salaried, no incentive pay	1674 (21.7)
Salaried, bonus pay based on billing	2372 (30.7)
Incentive pay based entirely on billing	2934 (38.0)
Other	746 (9.7)
Missing	179
Time dedicated to non–patient-care activities	
0	384 (4.9)
<10	2273 (29.0)
10-20	2539 (32.4)
21-30	1204 (15.3)
31-50	805 (10.3)
>50	643 (8.2)
Missing	57

[a] Q1, Q3 indicates quartiles 1 and 3. Q1 is the lower 25th percentile and Q3 is the upper 75th percentile.
[b] Only asked of surgeons indicating they currently are married or partnered.
[c] Only asked of surgeons indicating their spouse is currently working outside the home.
[d] Only asked of surgeons indicating they have children.

for treatment of depression, alcohol/substance use, or other mental health problems due to concern that it could affect their license to practice medicine. Among the 461 surgeons (5.8%) who had used antidepressant medication in the previous 12 months, 41 (8.9%) had self-prescribed and 34 (7.4%) had received the prescription from a colleague who was not formally caring for them as a patient.

The relationship between SI and personal and professional characteristics is shown in **Table 3**. The prevalence was highest among surgeons aged 45 to 54 and did not differ significantly by sex. Being married (OR, 0.561; $P<.001$) and having children (OR, 0.668; $P=.001$) were associated with a lower likelihood of SI, and risk was higher among those who had been divorced (OR, 1.634; $P<.001$). Although SI was more common among the 7133

surgeons (91.5%) working more than 40 hours per week (OR, 2.071; $P=.001$), no further stratification of risk was observed by the number of hours worked for this subgroup. Surgeons with SI reported a greater frequency of overnight call (mean, 3.0 d/wk vs 2.6 d/wk; $P<.001$). The perception of having made a major medical error in the previous 3 months was associated with a 3-fold increased risk of SI, with 16.2% of surgeons who reported a recent major error experiencing SI compared with 5.4% of surgeons not reporting an error ($P<.001$). No significant difference in SI was observed by subspecialty discipline, hours spent in the operating room per week, percentage of time dedicated to non–patient-care activities (eg, research and administration), method of compensation, or years in practice, with the exception of lower risk among those who had been in practice for more than 30 years.

The relationship between SI and surgeon burnout, QOL, depression, and use of mental health resources is shown in **Table 4**. Suicidal ideation was strongly correlated with measures of distress and QOL. Symptoms of depression were acknowledged by 390 of 501 surgeons with SI (77.8%) compared with 1938 of those without SI (26.7%) ($P<.001$). Suicidal ideation demonstrated a large positive correlation with each domain of burnout. For each 1-point higher score on the emotional exhaustion (OR,1.069; $P<.001$) or depersonalization (OR, 1.109; $P<.001$) subscale or each 1-point lower score on the personal accomplishment (OR, 1.057; $P<.001$) subscale, surgeons were 5.7% to 10.9% more likely to report SI. The aggregate effect of the relationship between burnout and SI is large since the scale for emotional exhaustion ranges from 0 to 54, depersonalization from 0 to 33, and personal accomplishment from 0 to 48. Based on the strong association between both burnout and depression with SI, interactions between these variables were explored. The prevalence of SI increased in relation to the severity of burnout independent of symptoms of depression (**Figure**). Although SI demonstrated a strong inverse association with mental QOL (OR for each 1-point higher score=0.906; $P<.001$), the association with physical QOL was small (OR for each 1-point higher score=0.986; $P=.03$).

Surgeons with SI were more likely to have sought psychiatric/psychologic help in the previous 12 months (26.0% vs 5.8%; $P<.001$) but were also more likely to report that they were reluctant to seek professional help due to concern that it could affect their license to practice medicine (60.1% vs 37.4%; $P<.001$). Similarly, although they were more likely to have used antidepressant medication in the previous 12 months (21.8% vs 4.8%; $P<.001$), they were also more likely to have self-prescribed (15.7% vs 6.9%; $P=.006$).

Finally, we performed multivariable logistic modeling to identify factors independently associated with SI. Burnout, depression, and report of a recent medical error were strongly and independently associated with SI after controlling for other personal and professional characteristics (**Table 5**). The likelihood ratio test was significant ($P<.001$), indicating that the model was a good fit to the data. The discriminatory value of the model was also significant, with a C statistic of 0.8.

Table 2. Suicidal Ideation and Use of Professional Mental Health Resources

Variable	No. (%) (N=7905)
Ever had thoughts of taking own life	
Yes	1163 (14.9)
No	6658 (85.1)
Missing	84
Had thoughts of taking own life in previous 12 mo	
Yes	501 (6.4)
No	7324 (93.6)
Missing	80
Sought psychiatric/psychologic help in previous 12 mo	
Yes	561 (7.2)
No	7261 (92.8)
Missing	83
Reluctant to seek depression help because of repercussions for medical license	
Yes	3046 (38.8)
No	4800 (61.2)
Missing	59
Used depression medication in previous 12 mo	
Yes	461 (5.8)
No	7435 (94.2)
Missing	9
Person who prescribed depression medication	
I prescribed for myself	41 (8.9)
Colleague prescribed even though I am not his/her patient	34 (7.4)
Professional of whom I am a patient	358 (77.7)
Other	23 (5.0)
Missing	5

Although SI did not differ significantly based on whether a surgeon had children, those whose youngest child was aged 19 to 22 years were at higher risk than were those with children of other ages. Practicing at an academic medical center and having incentive-only–based compensation as opposed to salary-based compensation were associated with reduced risk of SI. Being married was also associated with a reduced risk. Notably, number of nights on call per week, number of hours per week in the operating room, subspecialty discipline, and number of hours worked were not associated with SI after controlling for other factors.

COMMENT

In this large national study, 1 of 16 responding American surgeons had experienced SI in the previous year. The rate of SI among surgeons 45 years and older was approximately 1.5-fold to 3-fold greater than that of the general US population. The higher rate of SI among surgeons is even more striking considering that surgeons are highly educated, nearly universally employed, and overwhelmingly (88%) married—all factors known to reduce risk of suicide in the general population.[5,6] It is also notable that although individuals aged 45 to 54 in the general population have a lower risk of SI than younger individuals do,[5] the reverse appears to be true for surgeons. Although the relative risk of death by suicide for physicians compared with the general population in some

Table 3. Characteristics Among Surgeons With and Without Suicidal Ideation in the Previous 12 Months

Characteristic	No. (%) Yes (n=501)	No (n=7324)	Unadjusted OR (95% CI)[a]	*P* Value
Age, y				
Median	50.0	51.0	0.986 (0.978-0.995)	.002
25-34	16 (7.3)	203 (92.7)	1.0 [Reference]	. . .
35-44	131 (6.3)	1947 (93.7)	0.87 (0.51-1.48)	.60
45-54	189 (7.6)	2308 (92.4)	1.05 (1.04-1.60)	.84
55-64	137 (6.9)	1860 (93.1)	0.95 (0.87-1.41)	.85
65-74	24 (2.9)	798 (97.1)	0.387 (0.291-0.745)	.004
>74	3 (1.7)	170 (98.3)	0.227 (0.085-0.848)	.02
Sex				
Male	427 (6.3)	6323 (93.7)	0.92 (0.71-1.19)	.50
Female	71 (6.9)	962 (93.1)	1.0 [Reference]	. . .
Relationship status				
Single	68 (10.1)	604 (89.9)	1.0 [Reference]	. . .
Married	409 (5.9)	6470 (94.1)	0.561 (0.429-0.735)	<.001
Partnered	23 (10.5)	197 (89.5)	1.04 (0.63-1.71)	.89
Widow or widower	1 (2.0)	48 (98.0)	0.19 (0.03-1.36)	.10
Ever been divorced				
No	349 (5.7)	5766 (94.3)	1.0 [Reference]	. . .
Yes	149 (9.0)	1507 (91.0)	1.634 (1.337-1.995)	<.001
Partner or spouse works outside home				
No	192 (5.6)	3241 (94.4)	1.0 [Reference]	. . .
Yes	240 (6.5)	3426 (93.5)	1.18 (0.97-1.44)	.09
Have children				
No	86 (8.8)	891 (91.2)	1.0 [Reference]	. . .
Yes	415 (6.1)	6432 (93.9)	0.668 (0.524-0.852)	.001
Age of youngest child, y				
No children	86 (8.8)	891 (91.2)	1.0 [Reference]	. . .
<5	68 (5.2)	1233 (94.8)	0.571 (0.411-0.794)	<.001
5-12	107 (6.7)	1488 (93.3)	0.75 (0.55-1.00)	.05
13-18	83 (6.9)	1114 (93.1)	0.77 (0.56-1.06)	.11
19-22	66 (9.0)	671 (91.0)	1.02 (0.73-1.43)	.91
>22	91 (4.5)	1910 (95.5)	0.494 (0.364-0.670)	<.001
Specialty				
Cardiothoracic	35 (7.3)	446 (92.7)	1.05 (0.73-1.53)	.78
Colorectal	18 (6.0)	282 (94.0)	0.86 (0.52-1.41)	.54
Dermatologic	0	2 (100)	[b]	. . .
General	222 (6.9)	2978 (93.1)	1.0 [Reference]	. . .
Neurologic	8 (4.4)	174 (95.6)	0.62 (0.30-1.27)	.19
Obstetric/gynecologic	4 (3.8)	100 (96.2)	0.54 (0.20-1.47)	.23
Oncologic	20 (4.9)	385 (95.1)	0.70 (0.44-1.12)	.13
Ophthalmologic	11 (6.2)	167 (93.8)	0.88 (0.47-1.65)	.70
Orthopedic	9 (5.9)	144 (94.1)	0.84 (0.42-1.67)	.62
Otolaryngologic	17 (4.6)	350 (95.4)	0.65 (0.39-1.08)	.10
Pediatric	15 (6.3)	225 (93.8)	0.90 (0.52-1.54)	.69
Plastic	31 (6.8)	425 (93.2)	0.98 (0.66-1.45)	.92
Transplant	5 (4.1)	117 (95.9)	0.57 (0.23-1.42)	.23
Trauma	24 (7.0)	320 (93.0)	1.01 (0.65-1.56)	.98
Urologic	14 (4.5)	300 (95.5)	0.63 (0.36-1.09)	.10
Vascular	35 (7.7)	422 (92.3)	1.11 (0.77-1.61)	.57
Other	30 (6.3)	448 (93.7)	0.90 (0.61-1.33)	.60
Years in practice				
Mean	17.2	18.6	0.988 (0.980-0.997)	.007
<5	51 (5.9)	812 (94.1)	1.0 [Reference]	. . .
>5 to <10	74 (6.7)	1033 (93.3)	1.14 (0.79-1.65)	.48
>10 to <20	160 (7.3)	2029 (92.7)	1.26 (0.91-1.74)	.17
>20 to <30	158 (7.5)	1960 (92.5)	1.28 (0.93-1.78)	.13
>30	55 (3.8)	1390 (96.2)	0.630 (0.426-0.931)	.02

(continued)

previous studies was higher for women than for men,[3,4] the absolute rates of SI among the surgeons in our study did not differ significantly by sex.

Suicidal ideation among surgeons in the study reported here was strongly related to symptoms of depression and degree of burnout. Although the relationship

Table 3. Characteristics Among Surgeons With and Without Suicidal Ideation in the Previous 12 Months (continued)

Characteristic	No. (%) Yes (n=501)	No (n=7324)	Unadjusted OR (95% CI)[a]	*P* Value
Worked, h/wk				
Mean	60.7	59.2	1.00 (1.00-1.01)	.09
<40	22 (3.4)	634 (96.6)	1.0 [Reference]	. . .
40-49	58 (7.3)	733 (92.7)	2.280 (1.380-3.767)	.001
50-59	101 (7.2)	1300 (92.8)	2.239 (1.398-3.585)	<.001
60-69	164 (6.5)	2355 (93.5)	2.007 (1.275-3.158)	.003
70-79	64 (6.1)	977 (93.9)	1.888 (1.151-3.095)	.01
>80	87 (6.6)	1230 (93.4)	2.038 (1.264-3.285)	.004
Operating room, h/wk				
Mean	17.8	17.2	1.01 (0.10-1.01)	.22
No. of nights on call, wk				
Mean	3.0	2.6	1.080 (1.038-1.123)	<.001
0	57 (4.9)	1113 (95.1)	1.0 [Reference]	. . .
1	83 (5.3)	1481 (94.7)	1.09 (0.77-1.55)	.61
2	121 (6.3)	1788 (93.7)	1.32 (0.96-1.83)	.09
3	83 (7.7)	996 (92.3)	1.627 (1.149-2.304)	.006
4	39 (7.7)	469 (92.3)	1.624 (1.065-2.475)	.02
5	14 (4.8)	275 (95.2)	0.99 (0.55-1.81)	.98
6	12 (8.5)	130 (91.5)	1.80 (0.94-3.45)	.08
7	86 (8.5)	931 (91.5)	1.804 (1.276-2.549)	<.001
Self-perceived medical error in previous 3 mo				
No	388 (5.4)	6734 (94.6)	1.0 [Reference]	. . .
Yes	113 (16.2)	585 (83.8)	3.352 (2.68-4.20)	<.001
Primary method determining compensation				
Salaried, no incentive pay	118 (7.1)	1537 (92.9)	1.0 [Reference]	. . .
Salaried, bonus pay based on billing	133 (5.6)	2222 (94.4)	0.78 (0.60-1.01)	.06
Incentive pay based entirely on billing	193 (6.6)	2710 (93.4)	0.93 (0.73-1.18)	.54
Other	44 (5.9)	696 (94.1)	0.82 (0.58-1.18)	.29
Time dedicated to non–patient-care activities, %				
0	25 (6.6)	353 (93.4)	1.0 [Reference]	. . .
<10	163 (7.2)	2090 (92.8)	1.10 (0.71-1.70)	.66
10-20	157 (6.2)	2358 (93.8)	0.94 (0.61-1.46)	.78
21-30	71 (6.0)	1119 (94.0)	0.90 (0.56-1.44)	.65
31-50	50 (6.3)	745 (93.7)	0.95 (0.58-1.56)	.83
>50	33 (5.1)	609 (94.9)	0.77 (0.45-1.31)	.33

Abbreviations: CI, confidence interval; OR, odds ratio.

[a] OR for risk for suicidal ideation in the categorical group relative to the reference group. If there was >1 comparison group (eg, specialty), a reference group (ie, general surgeons) was selected with which all other groups were compared.

[b] Sample too small for meaningful comparison.

between SI and depression is well recognized,[5,6] the association between SI and burnout has only begun to be defined. Several members of our investigative team first reported this relationship in a large, prospective, longitudinal study of US medical students.[9] In that study, burnout at study entry predicted for subsequent SI during the following 12 months. Burnout had a substantial dose-response relationship with SI that persisted on multivariable analysis controlling for symptoms of depression.[9] Notably, the relationship between SI and burnout was reversible, with recovery from burnout decreasing the likelihood of subsequent SI.[9] A strong association between burnout and SI was also recently reported in a study of more than 2000 Dutch medical residents, although that study did not control for depression.[29] The findings of the study reported here suggest that burnout and depression are independently associated with SI where the consequences of burnout may be particularly important among individuals with underlying depression (Figure). Since the burnout syndrome affects a wide range of professionals (eg, teachers, police officers, social workers, and nurses),[12] the relationship between burnout and SI requires further evaluation in the general population. Suicidal ideation among physicians was also markedly increased among surgeons who perceived they had made a major medical error in the previous 3 months, highlighting the personal consequences of medical errors on physicians.[30]

This investigation is one of few studies to evaluate physicians' use of mental health resources where much of the available data is nearly 30 years old.[7] Only 26% of surgeons with SI in the previous year had sought care from a mental health provider during this interval—a value that appears substantially lower than the rate of approximately 44% for individuals with SI in the general population.[5] The magnitude of this difference is again underscored by the fact that surgeons are overwhelmingly insured, have ready access to medical care, and are aware of the implications of untreated mental health problems—factors that should lead to higher use of mental health

Table 4. Distress Among Surgeons With and Without SI in the Previous 12 Months

	No. (%)				
	SI (n=501)	No SI (n=7324)	Adjusted OR (95% CI)	Effect Size SD, %	*P* Value[a]
Burnout, mean					
Emotional exhaustion score	30.5	20.3	1.069 (1.061-1.077)	83.9	<.001
Depersonalization score	10.4	6.4	1.109 (1.094-1.124)	71.0	<.001
Personal accomplishment score	37.9	40.8	0.946 (0.935-0.957)	45.4	<.001
QOL, mean					
Mental QOL score	37.4	49.6	0.906 (0.899-0.914)	122.9	<.001
Physical QOL score	52.9	53.5	0.986 (0.973-0.999)	8.9	.03
Depression symptoms					
Screen positive	390 (77.8)	1938 (26.5)	9.758 (7.848-12.134)	. . .	<.001
Sought psychiatric/psychologic help in previous 12 mo	130 (26.0)	424 (5.8)	5.682 (4.454-7.092)	. . .	<.001
Reluctant to seek depression help because of repercussions for medical license	301 (60.1)	2721 (37.4)	2.525 (2.096-3.040)	. . .	<.001
Used depression medication in previous 12 mo	109 (21.8)	350 (4.8)	5.525 (4.367-7.042)	. . .	<.001
Person who prescribed depression medication					
I prescribed for myself	17 (15.7)	24 (6.9)	2.538 (1.307-4.926)	. . .	.006
Colleague prescribed even though I am not his/her patient	11 (10.2)	23 (6.6)	1.613 (0.759-3.426)	. . .	.21
Professional of whom I am a patient	80 (74.1)	276 (78.9)	0.766 (0.464-1.264)	. . .	.30
Other	0	27 (7.7)	[b]	. . .	.98

Abbreviations: CI, confidence interval; OR, odds ratio; QOL, quality of life; SI, suicidal ideation.
[a] *P* values are for difference in mean scores. Statistical significance of OR is indicated by 95% CI.
[b] Unable to calculate.

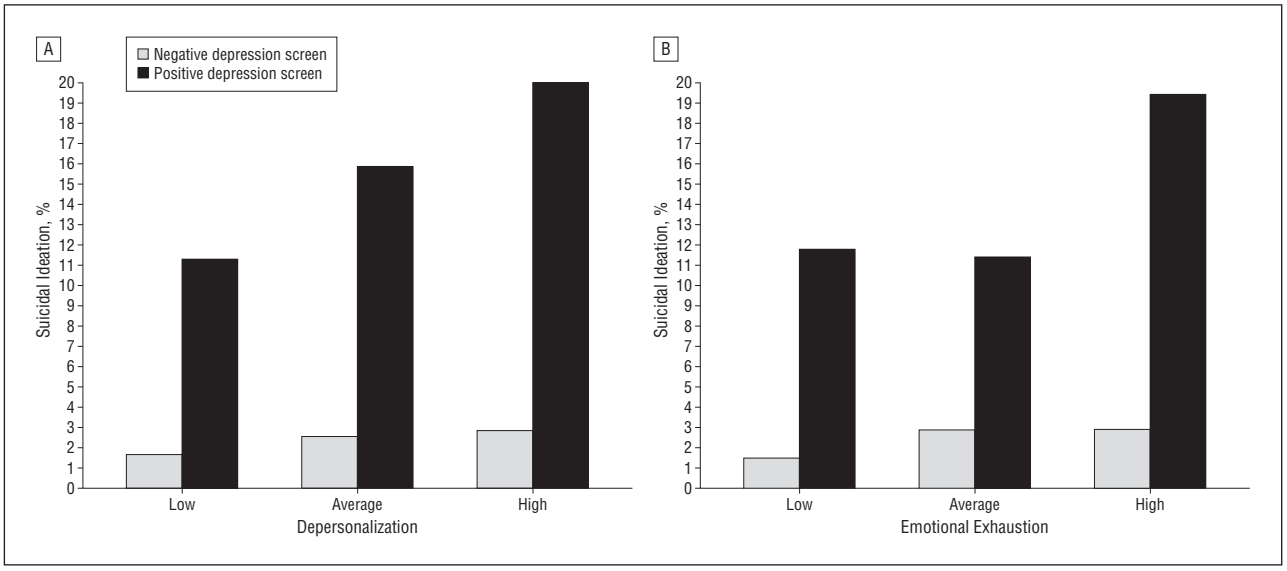

Figure. Relationship between depression screen, degree of depersonalization (A) or emotional exhaustion (B), and prevalence of suicidal ideation within the previous year. Thresholds to categorize physicians as having low, average, or high depersonalization were based on the published classifications for medical professionals[12]: low, 0 to 5; average, 6 to 9; and high, ≥10. Thresholds to categorize physicians as having low, average, or high emotional exhaustion were based on the published classifications for medical professionals[12]: low, 0 to 18; average, 19 to 26; and high, ≥27. The figures show that the prevalence of suicidal ideation increases as either depersonalization or emotional exhaustion increases (both $P < .001$), regardless of whether individuals screened positive for depression.

care services. Most (60%) surgeons with recent SI reported that they were reluctant to seek professional help due to concern that it could affect their medical license. Although this concern is well documented,[31] to our knowledge, its prevalence has not been studied. Physicians' concern regarding the implications of mental illness on their medical license is likely reinforced by the fact that 80% of state medical boards inquire about mental illness on initial licensure applications and 47% on renewal applications.[32] The study reported here indicates that distrust regarding how such information is used by licensing boards may be a disincentive for physicians to seek mental health care despite the fact that many licensing boards now focus not on whether a mental health condition is present but whether it is an impairment.[32,33] Requests for information about treatment for psychiatric problems by hospitals, clinics, and malpractice insurers may also perpetuate physicians' concerns, independent of the efforts made by licensing boards to address this issue. Other factors, including a professional culture that

Table 5. Factors Independently Associated With Suicidal Ideation in the Previous 12 Months on Multivariable Analysis

Characteristic and Associated Factors[a]	OR[b]	*P* Value
Screen positive for depression	7.012	<.001
Burnout	1.910	<.001
Perceived major medical error in previous 3 mo	1.872	<.001
Youngest child aged 19-22 y	1.562	.004
Pay: incentive pay only	0.790	.03
Married	0.661	.002
Practice in academic medical center	0.580	<.001

Abbreviation: OR, odds ratio.
[a] Nonsignificant factors included age, spouse/partner current profession, having children, subspecialty, years in practice, hours worked per week, hours per week spent in the operating room, number of nights on call per week, current academic rank, and percentage of time dedicated to non–patient-care activities (eg, administration, education or research).
[b] OR >1 indicates increased risk of suicidal ideation. OR <1 indicates lower risk of suicidal ideation.

discourages admission of personal vulnerabilities and places a low priority on physicians' mental health, may also be barriers to seeking professional help.[1]

Surgeons' reluctance to seek mental health treatment may have implications for patients as well as the affected surgeons. Studies suggest that physicians' personal health habits affect the health and prevention counseling they provide,[34-36] and, in a consensus statement, Center et al[1] suggested that physicians' greater attention to their own depression and SI may improve the mental health care that they provide patients. In this regard, studies suggest that physicians fail to detect or treat 40% to 60% of cases of depression in their patients[37,38] and that approximately 40% of individuals who die by suicide had contacted their primary care physician within a month of suicide.[39,40] Surgeons' inattention to their own distress may also adversely affect modeling of self-care and mentoring for physicians in training. This is notable since studies suggest that the prevalence of SI among medical students and residents may be even higher than among surgeons and that these physicians in training are unlikely to seek help on their own initiative.[9,29] Providing comprehensive recommendations for individual surgeons, health care institutions, academic medical centers, and state licensing boards to address physician suicide are beyond the scope of this article; detailed guidelines prepared by expert panels have recently been published.[1,41]

Our study is subject to a number of limitations. First, although similar to national survey studies of the members of physician societies,[42,43] our response rate of 31.7% is lower than that of physician surveys in general[44,45] and could therefore introduce substantial response bias. It is unknown whether distressed physicians are less likely to complete surveys due to apathy or more likely to complete surveys related to job stress due to greater interest in the topic. It is tempting to speculate that distressed physicians were less likely to participate and that the results represent a conservative estimate of the prevalence of SI among American surgeons. Second, while it is by far the largest surgical society in the US, it is also unknown as to what degree the ACS members are representative of American surgeons in general. Third, the study was cross-sectional, and we were unable to determine whether the associations between SI and measures of distress (eg, burnout) are causally related or the potential direction of the effects. Fourth, unmeasured confounding variables could explain some of the associations observed. The survey used a screening instrument for depression rather than a diagnostic instrument and did not evaluate for fatigue, substance abuse, or the presence of other mood disorders (eg, bipolar disorder) related to SI.[5] Previous studies suggest that physicians are far less likely to be current users of illicit substances than the general population but are more likely to use alcohol and minor tranquilizers.[46] Among physicians, however, surgeons appear to have the lowest rates of substance abuse and dependence.[47] Other confounders, such as personality traits (eg, narcissism, arrogance, cynicism, or self-criticism), could influence both an individual's vulnerability to distress and likelihood of SI.

In conclusion, although 1 of 16 surgeons reported SI in the previous year, few sought psychiatric/psychologic help. Recent SI among surgeons is strongly related to perceived medical errors, symptoms of depression, and degree of burnout. Additional studies are needed to evaluate the unique factors that contribute to the higher rate of SI among surgeons in conjunction with efforts to reduce surgeons' distress and eliminate barriers that lead to underuse of mental health resources.

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INVITED CRITIQUE

Failure Is Not a Fate Worse Than Death

We applaud this exemplary and timely contribution on a subject too often ignored and for which the findings sadly resonate with experience. Surgeons work hard—in this study, 92% worked 40 hours a week or longer—and their irregular hours and ultimate accountability for immediate life-and-death situations compound job stress. Surgeons care deeply about their patients. Surgeons also exist in a culture that, like it or not, honors self-denial, prizes impervious resilience, and tends to interpret imperfection as failure. Shanafelt and colleagues show for the first time that surgeons with a recent perceived medical failure may react by ideating about taking their own life.

These experts and others have already written about the increased rates of burnout, depression, SI, and suicide across all levels of training and practice in medicine today,[1-3] phenomena that are not limited to North America.[3-5] The age-related findings of this study suggest that, if more trainees are to enter surgery as a career, we must honestly address the problems that currently challenge their mentors. Coupled with maintaining essential personal relationships, participating in the com-