Original Investigation

Substance Use Disorder Among Anesthesiology Residents, 1975-2009

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IMPORTANCE Substance use disorder (SUD) among anesthesiologists and other physicians poses serious risks to both physicians and patients. Formulation of policy and individual treatment plans is hampered by lack of data regarding the epidemiology and outcomes of physician SUD.

OBJECTIVE To describe the incidence and outcomes of SUD among anesthesiology residents.

DESIGN, SETTING, AND PARTICIPANTS Retrospective cohort study of physicians who began training in United States anesthesiology residency programs from July 1, 1975, to July 1, 2009, including 44 612 residents contributing 177 848 resident-years to analysis. Follow-up for incidence and relapse was to the end of training and December 31, 2010, respectively.

MAIN OUTCOMES AND MEASURES Cases of SUD (including initial SUD episode and any relapse, vital status and cause of death, and professional consequences of SUD) ascertained through training records of the American Board of Anesthesiology, including information from the Disciplinary Action Notification Service of the Federation of State Medical Boards and cause of death information from the National Death Index.

RESULTS Of the residents, 384 had evidence of SUD during training, with an overall incidence of 2.16 (95% CI, 1.95-2.39) per 1000 resident-years (2.68 [95% CI, 2.41-2.98] men and 0.65 [95% CI, 0.44-0.93] women per 1000 resident-years). During the study period, an initial rate increase was followed by a period of lower rates in 1996-2002, but the highest incidence has occurred since 2003 (2.87 [95% CI, 2.42-3.39] per 1000 resident-years). The most common substance category was intravenous opioids, followed by alcohol, marijuana or cocaine, anesthetics/hypnotics, and oral opioids. Twenty-eight individuals (7.3%; 95% CI, 4.9%-10.4%) died during the training period; all deaths were related to SUD. The Kaplan-Meier estimate of the cumulative proportion of survivors experiencing at least 1 relapse by 30 years after the initial episode (based on a median follow-up of 8.9 years [interquartile range, 5.0-18.8 years]) was 43% (95% CI, 34%-51%). Rates of relapse and death did not depend on the category of substance used. Relapse rates did not change over the study period.

CONCLUSIONS AND RELEVANCE Among anesthesiology residents entering primary training from 1975 to 2009, 0.86% had evidence of SUD during training. Risk of relapse over the follow-up period was high, indicating persistence of risk after training.

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Substance use disorder (SUD) is a serious public health problem,[1] and physicians are susceptible. Anesthesiologists have drawn special attention because of their ready access to potent substances such as intravenous opioids, although only indirect evidence exists that SUD is more common in anesthesiologists than in other physicians.[2-5] There is limited information regarding the epidemiology of SUD in physicians in general and anesthesiologists in particular. Estimates of incidence are based on surveys, which have methodological limitations.[6-10] The long-term outcomes of SUD in physicians are not known, with current estimates limited to short-term outcomes in residency provided by surveys, and outcome reports from selected physician health programs.[5,11,12] The lack of this information contributes to current controversies regarding the prevention and management of SUD in physicians, with discussions often relying on anecdotes and selected case series rather than firm evidence.[13-15]

DANS *Disciplinary Action Notification Service*

NDI *National Death Index*

PGY *postgraduate year*

SUD *substance use disorder*

The purpose of this study was to describe the incidence and outcomes of SUD among anesthesiology residents in the United States.

Methods

The Mayo Clinic Institutional Review Board determined that the study protocol was exempt from review and thus waived any requirement for consent. This report includes physicians who entered an Accreditation Council for Graduate Medical Education-accredited residency program in the United States for primary training in anesthesiology from July 1, 1975, to July 1, 2009, with follow-up for outcomes after residency up to December 31, 2010.

Ascertainment

SUD Flag

The American Board of Anesthesiology (ABA) has collected information on the training experiences of those enrolled in its certification programs since its inception in 1938. The ABA data set includes all physicians who entered an accredited program in the United States for primary residency training in anesthesiology, a pain medicine fellowship, and/or a critical care medicine fellowship. One element of this data set is an indicator set by ABA personnel when information is received to indicate the presence of possible SUD (SUD flag), using several potential sources. This flag can be set either during or after residency training.

Clinical Competence Committee Reports

The ABA receives biannual reports from each anesthesiology training program director assessing the performance of each trainee for that 6-month period as satisfactory or unsatisfactory. By policy predating 1975, program directors are required to report episodes indicating SUD. Before 1987, these were reported by program directors via narrative. Beginning in 1987, the reason for an unsatisfactory Clinical Competence Committee report was quantified in a structured data field, with SUD as an option.

Examination Application

As a part of the examination application process (completed during the last year of training), beginning in 1989 trainees were queried specifically for SUD on the application form.

Disciplinary Action Notification Service (DANS)

Provided by the Federation of State Medical Boards, this service aggregates information from all US state medical boards regarding actions taken that resulted in loss of medical license or restrictions from the practice of medicine. This information is forwarded to the ABA (since 2004) for individuals who have participated in the ABA certification process and is reviewed as a potential basis for actions on board certificates. Reports may refer to any license actions (before or after 2004).

Others

The ABA notes direct communication regarding potential substance use from trainees, program directors, and others.

As an initial step, the records of all physicians with a SUD flag set in the database were reviewed for confirmatory evidence in at least 1 of the information sources described above that substance use consistent with SUD as defined by *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) criteria (including evidence of hazardous use, social/interpersonal problems related to use, neglect of major roles to use, legal problems, and indicators of substance dependence) occurred during residency. If the review revealed that the SUD flag was apparently set for a reason clearly not related to SUD in the individual (eg, inappropriate prescribing of opioids), that individual was excluded from further consideration.

Cause of Death Information

Deaths related to SUD during residency may not be noted in training records. The Social Security Administration Death Master File was used to identify individuals who are deceased and did not finish their training programs. The National Death Index (NDI), an index of death record information on file in state vital statistics offices, was used to determine the cause of death for these individuals. Individuals whose cause of death codes were related to substance use according to the definitions of the Centers for Disease Control and Prevention[16] were included in the analysis.

Cause of death information was also used to confirm SUD in individuals with suspected SUD. A similar procedure was followed for all individuals with the SUD flag set to ascertain current vital status and, if applicable, cause of death. Among those in whom SUD had not otherwise yet been confirmed, those whose cause of death codes were related to substance use were included in the analysis.

Data Abstracted

For each case, information was abstracted by ABA personnel into the web-based Research Electronic Data Capture (REDCap)

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system (version 3.6.7, Vanderbilt University), which provides data capture for building databases. Regarding the initial episode of SUD (first known use during residency), the date of manifestation (to anyone, if known) was recorded, as was the date (if known) of first substance use. If either date was not known, for purpose of calculating incidence, the dates were set as the last day of residency training. The immediate consequences of the initial episode, disposition by the training program, and participation in treatment programs were noted, as were whether the individual eventually completed training and whether he or she eventually was certified by the ABA. Similar information was abstracted for any relapses of SUD (known use after the initial episode, either during or after residency, up to December 31, 2010), including actions against medical licenses and civil or criminal legal actions.

Data Handling/Analysis

Data were abstracted by ABA personnel, who also coordinated the searches through national databases. The data were then exported through REDCap for analysis. During the exporting process, all identifying information was removed. To preserve anonymity, a random number of days between 1 and 365 was subtracted from each date for each individual during export (with the number constant within each individual) so that exact dates could not be identified but time intervals could be calculated. All analyses were conducted using the deidentified data set.

Cases of SUD were stratified by age, sex, and calendar year of first use in residency. Incidence rates of SUD were estimated using the number of cases as the numerator, with corresponding denominators obtained from data sets provided by the ABA summarizing the number of anesthesiology residents in training (including the first postgraduate year [PGY 1]) according to age and sex for each calendar year. Denominators were not adjusted for incident cases, as the date of first substance use was not available for all cases. All cases of substance use during residency were included in the numerator, regardless of any history of substance use prior to residency. Incidence rates were summarized using point estimates and 95% confidence intervals were calculated assuming a Poisson distribution for the number of cases. Survival and relapse following SUD detection were estimated using the Kaplan-Meier method for individuals whose SUD was detected in residency and who survived their initial episode, with follow-up to December 31, 2010. Relapse curves over different study periods were compared using the log-rank test. For analysis of outcomes according to the class of substance used in the initial episode, binary outcomes (death, completing residency, achieving ABA certification) were analyzed using logistic regression and relapse was analyzed using proportional hazards regression. Because individuals may have used multiple substances, separate binary indicator variables were created for each substance class (intravenous opioid, oral opioid, alcohol, anesthetics/hypnotics, marijuana/cocaine, or others). These indicator variables were included as explanatory variables in the model and the likelihood ratio χ^2 test for the overall model was used to assess whether the given outcome differed across substance categories. All analyses were performed using SAS software version 9.2 (SAS Institute Inc). The threshold of statistical significance was set at $P < .05$ and 2-sided tests were used in all analyses.

Results

Case Ascertainment

A total of 45 581 unique individuals were added to the ABA data set during the period of study, with 44 612 enrolling in primary anesthesiology training (an additional 969 participated only in pain or critical care medicine subspecialty training). The SUD flag was set in 1042 of these individuals (**Figure 1**). At the time of initial review, confirmatory evidence of SUD was available from other information in ABA records for 842 of these 1042. Of those with the SUD flag set, 61 were deceased, and NDI codes for cause of death were available for 51. The cause of death was consistent with SUD in 21. Of these, 9 had not been previously confirmed as SUD cases. There were an additional 120 individuals with the SUD flag not set who were deceased and did not finish their training program. Among these, the cause of death was related to SUD in 45, and death occurred within 4 years of starting training in 26. At the time of initial review, 69 individuals were identified with the SUD flag set who clearly did not have SUD (eg, inappropriate prescribing of opioids for profit). Thus, the final data set contained 896 individuals with confirmed SUD and 122 individuals with unconfirmed SUD. Among the former, there was evidence that 384 were abusing substances during primary anesthesiology training (n=380) or during PGY 1 (n=4). This included the 26 individuals who died within 4 years of starting training (ie, the start of PGY 1) and were thus considered to have died during the training period. The remainder of this report concerns the analysis of these 384 individuals.

Incidence

These 384 individuals represented 0.86% of the 44 612 who began primary training in anesthesiology. Among the 384, 30 (8%) were women; among all residents who began primary training during this period, 11 801 (26%) were women. The median age at SUD incidence was 31 years (interquartile range [IQR], 29-33 years). The overall incidence of SUD during the study period was 2.16 (95% CI, 1.95-2.39) per 1000 resident-years (2.68 [95% CI, 2.41-2.98] men and 0.65 [95% CI, 0.44-0.93] women per 1000 resident-years), with 177 848 resident-years analyzed. Incidence varied over the period studied (**Figure 2**). An initial rate increase was followed by a period of lower rates in approximately 1996-2002, but the highest rates have occurred since 2003 (2.87 [95% CI, 2.42-3.39] per 1000 resident-years).

A history of SUD before residency was documented in 56 (15%) of the 384 individuals, including use of alcohol (n=43), marijuana (n=24), cocaine (n=8), and others (n=14), with 19 individuals abusing multiple substances.

The most common substance category involved in the initial SUD episode was intravenous opioids, followed by alcohol, marijuana or cocaine, anesthetics/hypnotics, and oral opioids (**Table 1**), with 85 individuals (22%) having used more than

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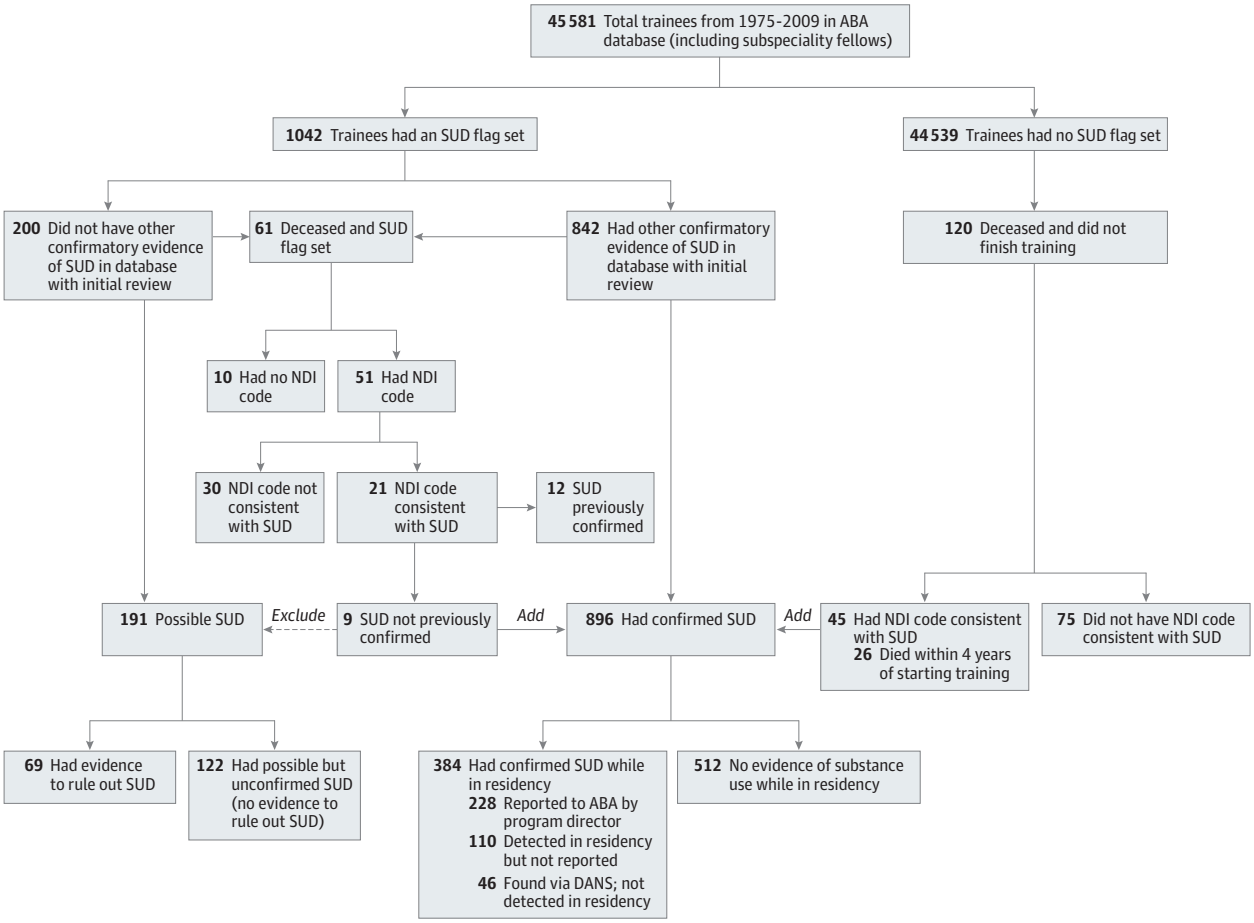
Figure 1. Ascertainment of SUD Cases



A total of 45 581 unique individuals were added to the American Board of Anesthesiology (ABA) data set over the period of study (1975-2009), with 44 612 participating in primary anesthesiology training and an additional 969 participating in only pain or critical care medicine subspecialty training. The substance use disorder (SUD) flag could be set either during or after training. Deceased individuals could have died during or after training. Methods of ascertainment are shown for the 384 individuals who used substances during primary anesthesiology training (ie, not including those who may have used substances during pain or critical care subspecialty training). NDI indicates National Death Index; DANS, Disciplinary Action Notification Service.

Figure 2. Incidence of Substance Use Disorder (SUD) According to Year of First Substance Use for Residents Entering Anesthesiology Training in 1975-2009 and Number of Residents Enrolled Each Year

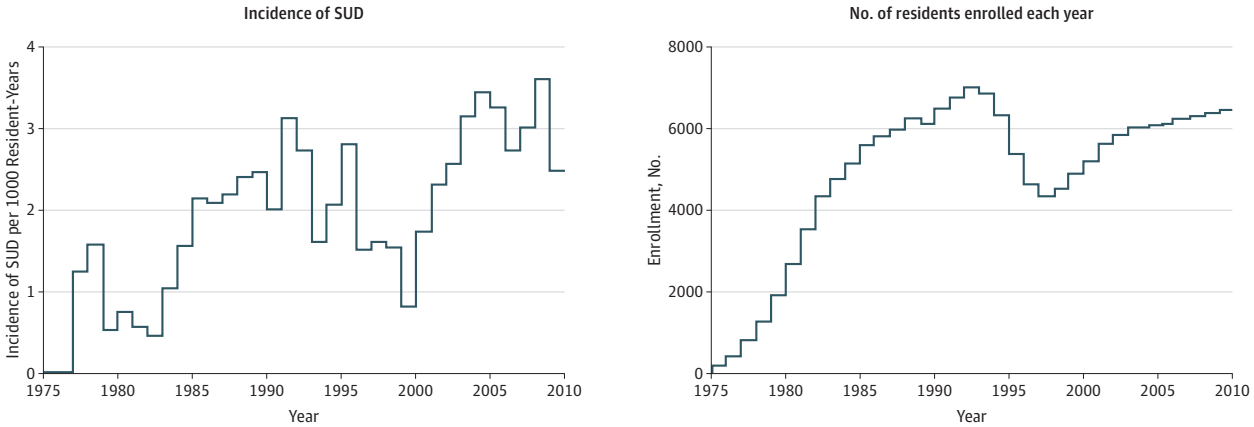


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Table 1. Substances Used at Initial Episode, if Known, 1975-2009[a]

Substance	No. (%) Total (N = 242)	Men (n = 231)	Women (n = 11)
Opioids	151 (62)	145 (63)	6 (55)
Intravenous	137 (57)	132 (57)	5 (45)
Fentanyl	114 (47)	109 (47)	5 (45)
Sufentanil	21 (9)	20 (9)	1 (9)
Other intravenous opioid	39 (16)	38 (16)	1 (9)
Oral	26 (11)	25 (11)	1 (9)
Alcohol	85 (35)	82 (35)	3 (27)
Anesthetics/hypnotics	46 (19)	43 (19)	3 (27)
Propofol	11 (5)	9 (4)	2 (18)
Ketamine	6 (2)	6 (3)	0
Inhaled	6 (2)	6 (3)	0
Benzodiazepines	30 (12)	28 (12)	2 (18)
Marijuana/cocaine	51 (21)	50 (22)	1 (9)
Marijuana	33 (14)	32 (14)	1 (9)
Cocaine	30 (12)	30 (13)	0
Others[b]	33 (14)	29 (13)	4 (36)

[a] The substance(s) used during the initial episode of abuse were known in 242 (63%) individuals, and unknown in 142 (37%) individuals. Eighty-five individuals (35%) used more than 1 substance (3 women [27%] and 82 men [35%]), so columns may not sum to total.

[b] Others include diphenhydramine, 3,4-methylenedioxy-N-methamphetamine (MDMA), psilocybin mushrooms, lysergic acid diethylamide (LSD), methamphetamines, dexedrine, promethazine, and butalbital.

1 substance. The substance(s) used could not be determined in 142 individuals (37%). The median time from the beginning of residency training (ie, the beginning of PGY 1) to the time of first use (available in 340 individuals) was 29.5 months (IQR, 20.7-36.8 months), and the median time from first use to detection was 4.0 months (IQR, 0.0-7.0 months).

Consequences of Initial SUD Episode

Substance use disorder was detected and reported to the ABA during training in 228 (59%) of the 384 individuals by program directors. There was evidence that SUD was known to program directors in an additional 110 residents (29%) but not reported to the ABA by indicating SUD on Clinical Competency Committee reports. Based on DANS records of license actions, an additional 46 residents used substances during residency, but their use was apparently not detected during training. Thus, of the 384 individuals, substance use was detected during training in 338 (88%).

Twenty-eight individuals (7.3%; 95% CI, 4.9%-10.4%) died during the training period, and all of these deaths were directly attributable to substance use. Among these individuals, the median time from the start of training to death was 27.5 months (IQR, 22.8-34.6 months). The SUD flag was set by the ABA in only 2 of these individuals; ie, the ABA was not informed that the remainder died of causes related to substance use. Two additional individuals had SUD that was not detected during residency but died of a SUD-related cause shortly after leaving training.

Of those whose SUD was detected in residency and who survived their initial episode (n = 310), documentation of participation in a treatment program during residency training was present in 237 (76%). The median duration of treatment was 3 months (IQR, 1-4 months) in individuals for whom duration was known (n = 164). Of the 310 individuals, 12 (4%) transferred to another anesthesiology residency program and 23 (7%) either resigned or were dismissed from their program and did not resume training after the initial episode of SUD. An anesthesiology residency was eventually completed by 173 individuals (56%), and 135 (44%) eventually achieved ABA certification (**Table 2**). Those who used alcohol, marijuana, or cocaine were more likely to complete residency but not more likely to achieve certification (Table 2).

Relapse

Among the 310 individuals whose SUD was detected in residency and who survived their initial episode, 91 (29%) relapsed at least once, 19 (6%) while still in training (**Figure 3**). The cumulative percentage who experienced at least 1 relapse by 30 years after the initial episode by Kaplan-Meier analysis (based on a median of 8.9 years [IQR, 5.0-18.8 years] of follow-up) was 43% (95% CI, 34%-51%). The proportion of individuals who relapsed did not depend on the category of substance used (Table 2). In 45 individuals (49%), the substance used at first relapse overlapped with at least 1 of the substances used in the initial episode. Among those who relapsed, the median time from the date that the initial SUD episode was apparent to first relapse was 2.6 years (IQR, 0.8-8.3 years). The first relapse was manifested as death in 12 individuals (13%), with cause of death related to substance use. For the 79 individuals who survived their first relapse, as of December 31, 2010, 7 (9%) had been charged with a crime, 6 (8%) had changed their medical specialty and were still practicing physicians (although not as anesthesiologists), 37 (47%) had their licenses revoked and were no longer practicing medicine, and 15 (19%) had restrictions or conditions placed on their licenses. At least 1 subsequent relapse after the initial relapse occurred in 22 individuals, and 2 of them died.

To probe for changes in the risk of relapse over the period of study, relapse rates were also analyzed according to the years that SUD was apparent. The relapse rates from cases apparent in the period from 1975 to 1994 and the period from 1995 to 2009 were not significantly different (P = .57 by log-rank test)

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Table 2. Outcomes According to Class of Substance Used in Initial Episode for SUD Cases Detected in Residency Who Survived Initial Episode Through December 31, 2010 (n=310)[a]

Outcome	Substances Known								Substances Unknown, Overall (n = 104)
	Intravenous Opioids (n = 113)	Oral Opioids (n = 22)	Alcohol (n = 74)	Anesthetics/ Hypnotics (n = 41)	Marijuana/ Cocaine (n = 44)	Others (n = 30)	Multiple Substances (n = 73)	Overall (n = 206)	
Death, No. (%)[b]	6 (5)	1 (5)	2 (3)	4 (10)	2 (5)	2 (7)	5 (7)	11 (5)	11 (11)
Relapse, No. (%)	37 (33)	8 (36)	28 (38)	12 (29)	16 (36)	12 (40)	26 (36)	66 (32)	25 (24)
At 5 y[c]	23.1 (14.7-30.7)	38.6 (13.2-56.6)	23.7 (13.2-33.0)	25.1 (10.3-37.4)	32.9 (17.1-45.7)	39.1 (17.8-54.9)	31.3 (19.4-41.4)	23.0 (16.8-28.7)	16.0 (8.2-23.2)
At 15 y[c]	37.5 (26.1-47.2)	38.6 (13.2-56.6)	44.8 (29.7-56.6)	33.1 (15.0-47.4)	41.6 (21.9-56.3)	47.8 (20.0-65.9)	40.6 (26.4-52.1)	38.1 (29.6-5.6)	33.7 (19.8-45.3)
At 20 y[c]	44.2 (29.7-55.7)	38.6 (13.2-56.6)	44.8 (29.7-56.6)	33.1 (15.0-47.4)	41.6 (21.9-56.3)	47.8 (20.0-65.9)	40.6 (26.4-52.1)	42.5 (32.1-51.2)	39.2 (23.8-51.4)
Completed residency, No. (%)[d]	75 (66)	16 (73)	62 (84)	28 (68)	37 (84)	19 (63)	57 (78)	142 (69)	31 (30)
ABA certified, No. (%)	57 (50)	11 (50)	48 (65)	21 (51)	26 (59)	11 (37)	40 (55)	106 (51)	29 (28)

Abbreviation: ABA, American Board of Anesthesiology.

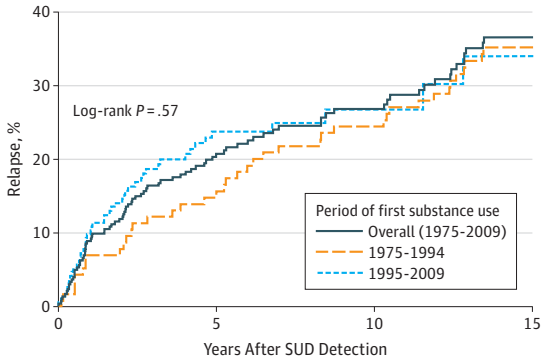
[a] Among residents whose substance use disorder (SUD) was detected during residency and who survived their initial episode (n = 310), the substance(s) used during the initial episode of abuse were known in 206 (66%) and unknown in 104 (34%). Denominators presented in the column headings represent the number of individuals who used the given substance. There were 73 individuals (35%) who used more than 1 substance and are included in the columns for each substance as well as the column summarizing those using multiple substances.

[b] A total of 22 deaths had occurred among the 310 individuals whose SUD was detected in residency and who survived their initial episode. Of these, 14 deaths were known to be related to SUD. These deaths are distinct from the 28 deaths in individuals who did not survive their initial episode.

[c] The Kaplan-Meier method was used to obtain point estimates and 95% confidence intervals for relapse at 5, 15, and 20 years.

[d] Significant difference across substance classes for individuals for whom substance type were known (excluding data on multiple substances) (P = .005 by overall model likelihood ratio χ^2 test). Differences across classes were not significant for any other variable (death, relapse, or ABA certified).

Figure 3. Relapse of SUD



No. at risk

1975-2009	310	187	115	81
1975-1994	114	96	85	72
1995-2009	196	91	30	9

Relapse incidence is shown for individuals in whom SUD was detected in residency and who survived their initial episode (n = 310), showing the percentage of residents who relapsed as a function of the time that their initial episode was apparent. To compare relapse rates over the earlier and later periods of the study, data are shown for individuals whose date of first use was from 1975 to 1994 (n = 114) and from 1995 to 2009 (n = 196), as well as for the entire study period (1975- 2009; n = 310). Rates did not differ between the 1975-1994 and 1995-2009 periods. Numbers at risk are those who had not relapsed and were not censored at the time of last follow-up (December 31, 2010) in each group at each time point.

(Figure 3). Similar results were found for relapse rates analyzed over shorter periods (eTable in the Supplement).

Summary of Overall Mortality

Overall, 53 individuals were known to be deceased as of December 31, 2010. The cause of death was known in 49; of these, the cause of death was related to SUD in 44 (11% of the 384 individuals with SUD). Twenty-eight individuals died during residency, 2 individuals had SUD during residency that was not detected and died shortly after leaving training, and 14 had SUD detected during residency and died of a relapse after leaving training. The death rate did not differ according to the class of substance used in the initial episode (Table 2).

Discussion

To our knowledge, this report provides the first comprehensive description of the epidemiology and outcomes of SUD for any in-training physician specialty group, showing that the incidence of SUD has increased over the study period and that relapse rates are not improving.

Much of the existing literature on physician addiction relies on surveys of training and treatment programs.[5-9,11,17-23] Although these provide valuable insights, there are limitations of this method, including recall bias, incomplete responses, lack of definitions, inconsistent documentation, and absence of long-term follow-up. Furthermore, the stigma associated with SUD, as well as privacy concerns, may limit reporting. Although the current analysis used several unique data resources that obviate some of these limitations, our method also has limitations, primarily related to the quality of extant data. Our case ascertainment is almost certainly incomplete because we could ascertain only cases that were reported, and stigma and privacy concerns may still apply. For example, we showed that residency program directors did not consistently report SUD to the ABA. The DANS system provided a valuable mechanism to improve ascertainment, but not all manifestations of SUD necessarily result in DANS-reported li-

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cense actions, and some cases may never be manifest. Also, there is a delay between an event and license actions prompting DANS reports, such that ascertainment in the most recent periods may be falsely low. The use of NDI cause of death information for case ascertainment is limited by the lack of identified cause in some cases and the potential for misclassification, particularly in distinguishing between drug overdose (intentional or not) as a consequence of SUD and suicide unrelated to SUD. Moreover, supporting information in ABA records was insufficient to allow for confirmation of SUD in some cases. For these reasons, our results reflect the lower bound of the true incidence. In addition, our results pertain only to individuals who used substances during residency, and our ascertainment method suggests that an even greater number of SUD cases occur subsequent to conclusion of training.

These limitations notwithstanding, the overall incidence of SUD over the study period is consistent with that estimated by surveys (range of incidences estimated as 1.4-5.6 per 1000 resident-years).[6-8,17,19,24] For example, the most recent survey of anesthesiology program directors[17] found 135 cases of SUD among 11 293 anesthesiology residents from 1997 to 2007, for an incidence of approximately 3 per 1000 resident-years (assuming a 4-year training period). Like other reports estimating the incidence of SUD among anesthesiology residents,[6-8,17,19,24] incidence in our study was calculated according to substance use during training, without accounting for substance use before residency training (ie, rates reflect the incidence of use after commencement of training).

We noted temporal patterns in incidence over the period of study (Figure 2). It is possible that this pattern could simply reflect changes in the proportion of actual cases that are reported, although the methods and requirements used by the primary data sources (such as NDI) have been relatively stable, and incidence did not simply increase over time. The cause of the temporary interruption in the overall pattern of increasing incidence is unclear but is closely associated with the decrease in the overall number of residents in training in the early 1990s; it is possible that it is related to changes in the characteristics of residents entering training. Also, educational programs on the hazards of SUD and efforts to better regulate controlled substances in residency training environments that were initiated around this period may have had an effect.[6,25] Nonetheless, incidence rates were highest during the most recent period, suggesting that any such effects have waned. Also notable is the predominance among men, which has been observed for SUD in the general population but not to this degree.[1]

The outcomes of SUD in residency are consistent with reports suggesting relatively high rates of relapse (range of 29%-58%)[6,17,19] and death (range of 3%-23%).[6-8,17,19] Almost all deceased cohort members died of substance use. Estimated relapse rates over the course of a typical 30-year career exceed 40%, with significant consequences to both personal and professional well-being.

Previous reports have focused on intravenous opioid use as particularly characteristic of anesthesiologists, and this was the most commonly abused substance when the substance was known.[5,6,8,19] However, use of both alcohol and illicit drugs was also prevalent. Also, in contrast with some reports that outcomes are more severe in opioid users,[19] major outcome differences were not observed among classes of substances abused (Table 2), emphasizing that the consequences of the abuse of any substance can be serious.

These data do not permit evaluation of how treatment and aftercare may affect outcomes. Records of treatment while in residency were often incomplete or nonexistent, as were records of posttreatment programs such as physician's health programs that have been established in most states.[5,22,26] However, we found no significant differences in relapse rates over the period of study (Figure 3 and eTable in the Supplement), including the most recent period, suggesting little overall effect at a population level of recent efforts to address SUD in anesthesiologists.

Although these are novel data, their limitations highlight the need for better data to guide policy and practice. The gaps in this data set, including the incomplete reporting of SUD to the ABA by program directors and lack of standardized reporting of substances used, treatment, and disposition, represent lost opportunities to improve physician well-being and patient safety. Furthermore, because comparable published information regarding other physician specialties is not available, it is difficult to determine whether SUD is of special concern to anesthesiologists or is merely representative of the larger physician issue. Despite the considerable attention paid to this issue, there is no evidence that the incidence and outcomes of SUD among these physicians are improving over time.

Conclusion

Among anesthesiology residents entering primary training from 1975 to 2009, 0.86% had evidence of SUD during training. Risk of relapse during the follow-up period was high, indicating persistence of risk after training. Risk of death was also high; at least 11% of those with evidence of SUD died of a cause directly related to SUD.

ARTICLE INFORMATION

Author Contributions: Dr Warner had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Warner, Berge.
Acquisition of data: Warner, Berge, Sun, Harman.
Analysis and interpretation of data: Warner, Berge, Harman, Hanson, Schroeder.
Drafting of the manuscript: Warner, Berge.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Warner, Sun, Harman, Hanson, Schroeder.
Administrative, technical, or material support: Berge, Harman.
Study supervision: Warner.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Warner is a director of the American Board of Anesthesiology. Dr Berge chairs the American Society of Anesthesiologists Task Force on Chemical Dependency and is vice president of the Minnesota Board of Medical Practice. No other disclosures were reported.

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