



Online article and related content  
current as of March 17, 2010.

## Risk Factors for Relapse in Health Care Professionals With Substance Use Disorders

Karen B. Domino; Thomas F. Hornbein; Nayak L. Polissar; et al.

*JAMA*. 2005;293(12):1453-1460 (doi:10.1001/jama.293.12.1453)

<http://jama.ama-assn.org/cgi/content/full/293/12/1453>

Correction

[Contact me if this article is corrected.](#)

Citations

[This article has been cited 42 times.](#)  
[Contact me when this article is cited.](#)

Topic collections

Public Health; Substance Abuse/ Alcoholism  
[Contact me when new articles are published in these topic areas.](#)

Related Articles published in  
the same issue

Physician Substance Abuse and Recovery: What Does It Mean for  
Physicians—and Everyone Else?  
[David R. Gastfriend. \*JAMA\*. 2005;293\(12\):1513.](#)

Subscribe

<http://jama.com/subscribe>

Email Alerts

<http://jamaarchives.com/alerts>

Permissions

[permissions@ama-assn.org](mailto:permissions@ama-assn.org)  
<http://pubs.ama-assn.org/misc/permissions.dtl>

Reprints/E-prints

[reprints@ama-assn.org](mailto:reprints@ama-assn.org)

# Risk Factors for Relapse in Health Care Professionals With Substance Use Disorders

Karen B. Domino, MD, MPH

Thomas F. Hornbein, MD

Nayak L. Polissar, PhD

Ginger Renner

Jilda Johnson

Scott Alberti

Lynn Hankes, MD

**T**HE PREVALENCE OF CHEMICAL dependency (excluding nicotine) among physicians has been estimated to be 10% to 15%,<sup>1</sup> similar to that in the general population.<sup>1-3</sup> Following completion of primary treatment, recovery is best achieved through continuing group therapy and regular attendance at mutual help groups.<sup>4</sup> Because of the proclivity to relapse, ongoing monitoring can help ensure sustained remission of individuals occupying safety-sensitive positions. Monitoring methods have changed over the past decade and now include frequent contact for behavioral assessment, random urine testing with observed micturition, and workplace surveillance.<sup>5,6</sup> Treatment programs estimate that up to 70% of health care professionals successfully return to medical practice.<sup>7-12</sup>

Data on the incidence of relapse and risk factors contributing to the likelihood of relapse after initial treatment for substance use are lacking. Virtually every study of chemical dependency

**For editorial comment see p 1513.**

**Context** Substance use disorders among physicians are important and persistent problems. Considerable debate exists over whether use of major opioids, especially among anesthesiologists, is associated with a higher relapse rate compared with alcohol and nonopioids. Moreover, the risk factors for relapse with current treatment and monitoring strategies are unknown.

**Objective** To test the hypothesis that chemically dependent health care professionals using a major opioid (eg, fentanyl, sufentanil, morphine, meperidine) as drug of choice are at higher risk of relapse.

**Design, Setting, and Participants** Retrospective cohort study of 292 health care professionals enrolled in the Washington Physicians Health Program, an independent posttreatment monitoring program, followed up between January 1, 1991, and December 31, 2001.

**Main Outcome Measure** Factors associated with relapse, defined as the resumption of substance use after initial diagnosis and completion of primary treatment for chemical dependency.

**Results** Twenty-five percent (74 of 292 individuals) had at least 1 relapse. A family history of a substance use disorder increased the risk of relapse (hazard ratio [HR], 2.29; 95% confidence interval [CI], 1.44-3.64). The use of a major opioid increased the risk of relapse significantly in the presence of a coexisting psychiatric disorder (HR, 5.79; 95% CI, 2.89-11.42) but not in the absence of a coexisting psychiatric disorder (HR, 0.85; 95% CI, 0.33-2.17). The presence of all 3 factors—major opioid use, dual diagnosis, and family history—markedly increased the risk of relapse (HR, 13.25; 95% CI, 5.22-33.59). The risk of subsequent relapses increased after the first relapse (HR, 1.69; 95% CI, 1.13-2.53).

**Conclusions** The risk of relapse with substance use was increased in health care professionals who used a major opioid or had a coexisting psychiatric illness or a family history of a substance use disorder. The presence of more than 1 of these risk factors and previous relapse further increased the likelihood of relapse. These observations should be considered in monitoring the recovery of health care professionals.

JAMA. 2005;293:1453-1460

www.jama.com

among health care professionals has had relatively short follow-ups, limitations in statistical methods or analyses, and variable intensity of monitoring.

Among health care professionals, anesthesiologists appear to be at somewhat higher risk. They are overrepresented in drug treatment programs

**Author Affiliations:** Departments of Anesthesiology (Drs Domino and Hornbein) and Psychiatry (Dr Hankes), University of Washington, Seattle; Mountain-Whisper-Light Statistical Consulting, Seattle (Dr Polissar); and Washington Physicians Health Program, Seattle (Dr Hankes and Mss Renner and Johnson and Mr Alberti).

**Corresponding Author:** Karen B. Domino, MD, MPH, Department of Anesthesiology, University of Washington, Box 356540, Seattle, WA 98195-6540 (kdomino@u.washington.edu).

**Table 1.** Cohort Characteristics

Characteristics	No. (%) of Individuals (N = 292)
Sex	
Women	47 (16)
Men	245 (84)
Age, y	
<40	82 (28)
≥40	210 (72)
Degree	
Physicians	239 (82)
MD	232 (79)
DO	7 (2)
Nonphysicians	53 (18)
DVM	14 (5)
DDS/DMD	3 (1)
PA	32 (11)
DPM and RPh	4 (1)
Specialty of physicians*	
Anesthesiology	33 (14)
Emergency medicine	13 (5)
Family medicine	52 (22)
Internal medicine/ medical specialties	49 (21)
Obstetrics/gynecology	10 (4)
Pediatrics	7 (3)
Psychiatry	19 (8)
Radiology	8 (3)
Surgery/surgical specialties	43 (18)
Other specialties	5 (2)
Resident	
No	281 (96)
Yes	11 (4)
Current smoking	
No	148 (51)
Yes	144 (49)
Drug of choice†	
Fentanyl	27 (9)
Other major opioids	15 (5)
Minor opioids	53 (18)
Alcohol	164 (56)
Cocaine	8 (3)
Benzodiazepines	5 (2)
Other drugs	20 (7)
Family history of substance use disorder	
No	83 (28)
Yes	209 (72)
Dual diagnosis	
No	185 (63)
Yes	107 (37)
Axis I	100 (93)
Axis II	5 (5)
Both	2 (2)

Abbreviations: DDS, doctor of dental surgery; DMD, doctor of dental medicine; DO, doctor of osteopathy; DPM, doctor of podiatric medicine; DVM, doctor of veterinary medicine; MD, medical doctor; PA, physician assistant; RPh, registered pharmacist.

\*Percentage of physicians.

†For specific drugs for each category, see "Methods" section.

relative to their proportion among medical specialties.<sup>10,13,14</sup> With their hands-on access to many potent addicting drugs,<sup>15</sup> they have a predilection for parenteral opioids<sup>16</sup> and nearly 3 times the risk of drug-related death than general internal medicine physicians.<sup>17</sup>

We examined 11 years of outcome data from the Washington Physicians Health Program (WPHP), a posttreatment program monitoring health care professionals with substance use disorders. We sought in particular to identify factors that might predispose individuals to relapse. In addition, we examined whether those who self-administered potent opioids might be more at risk of relapse (and perhaps death) than users of other drugs.

## METHODS

### Study Design and Description of Variables

The study was approved by the University of Washington Human Subjects Review Committee. Outcome data from the WPHP were analyzed using a retrospective cohort design. The WPHP monitors physicians (MD, DO), veterinarians (DVM), dentists (DDS, DMD), podiatrists (DPM), registered pharmacists (RPh), and physician assistants (PA). The cohort we selected consisted of those entering the program for monitoring of a substance use disorder between January 1, 1991, and December 1, 2001, and followed up through December 31, 2001. Excluded from the study were those who entered the program after relapse, those for whom date of enrollment was missing from the database, and those for whom outcome was not known.

Information from the WPHP database included the following: date of program enrollment, age at entry, sex, type of medical professional training status, family history of substance use disorder, current smoking status, diagnosis of a coexisting psychiatric disorder (dual diagnosis), drug of choice, and route of drug administration. Multiple-drug use was classified by the treatment program according to the predominant substance used. All major opioids were considered predominant over alcohol and other classes of drugs. Drug of choice was initially categorized into 6 groups: fentanyl (includes fentanyl citrate and sufentanil citrate), other major opioids (morphine, meperidine hydrochloride,

methadone hydrochloride, heroin, controlled-release oxycodone hydrochloride), minor opioids (butorphanol, codeine, hydrocodone, nalbuphine hydrochloride, oxycodone, pentazocine, propoxyphene, and tramadol hydrochloride), alcohol, cocaine, and others (including benzodiazepines).

Family history of substance use disorder and presence of current smoking were ascertained from 1 or all of 3 sources: (1) at initial contact by WPHP staff's structured interview, (2) by reviewing the discharge summary from the treatment center, and (3) by reviewing the standard intake form completed by the individual at the beginning of the monitoring program.

The diagnoses of psychiatric disorders were made by a board-certified psychiatrist doing clinical evaluation while individuals were in inpatient treatment. Dual diagnosis was ascertained by the WPHP staff reviewing the individual's discharge summary from the treatment center. The diagnoses for those individuals who had a coexisting psychiatric disorder were taken from their *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* discharge diagnoses. Using the *DSM-IV* discharge diagnoses following several months of inpatient treatment and multiple negative urine toxicology results diminishes the likelihood of substance-induced psychiatric disorders.

Specialties were categorized as medical (family practice, internal medicine and medical specialties, pediatrics, psychiatry, radiology, other), surgical (emergency medicine, obstetrics and gynecology, surgery and surgical specialties), anesthesiology, and nonphysicians (veterinary medicine, dental surgery and dental medicine, physician assistants, podiatric medicine, pharmacy).

Relapse was defined as the resumption of substance use after initial diagnosis and completion of primary treatment for chemical dependency. The method of detection of the relapse (self-report, behavioral monitoring, chemical monitoring, workplace monitor-

ing, regulatory board reports, or other) was noted. The date of relapse, date of death, return to medical practice, and specialty change were also recorded.

### Statistical Analysis

Due to differences in time of follow-up and covariates that may affect outcome, the effects of factors potentially influencing the risk of relapse and the time to first relapse were analyzed using methods of survival analysis, including the Cox proportional hazards regression model and the log-rank test. These methods provide unbiased estimates of the cumulative relapse rate in the population from which this cohort was drawn for any specified duration after enrollment and an unbiased way to compare the risk of relapse among the various drugs of choice and between categories of other variables.

To determine whether the risk of relapse varies over time after enrollment, the relapse rate per 1000 person-years in each period in the program was calculated (<2, 2 to <5, and  $\geq 5$  years); these groupings are based on monitoring stages in the program. Using the  $\chi^2$  test, the observed number relapsing in each period was compared with the expected number relapsing based on the assumption that the risk of relapse does not change after enrollment. Differences in the distribution of drug of choice and other characteristics were compared in early (1991-1996) and late (1997-2001) periods by the  $\chi^2$  test.

To ascertain variables potentially confounding the effect of drug choice on relapse and therefore to be included in a multivariate analysis, cross-tabulation with  $\chi^2$  tests, *t* tests, or the Mann-Whitney test were used to detect covariates associated with the drug of choice. Furthermore, the association of each covariate with risk of relapse was also determined. From these initial analyses, appropriate variables were included in a multivariate analysis. Because drug of choice was highly associated with route of administration and specialty, only drug of choice was analyzed in the multivariate model. Estimated 5-year relapse rates (based

on the Kaplan-Meier method) with 95% confidence intervals (CIs), based on the log-transformation method,<sup>18</sup> were calculated.

The Cox proportional hazards model (as used in survival analysis) was used to compare the risk of a second or later relapse with the risk of a first relapse. For this analysis, we defined the following treatment periods: stage 0 consisted of all individuals; stage 1 were those with 1 relapse, stage 2 were those with 2 relapses, and stage 3 were those with 3 or more relapses. Calculations of standard errors and statistical significance in the Cox models were adjusted for the statistical dependence of multiple observations (stages) per patient using the robust sandwich estimator of the variance, which adjusts the estimates of variance to take into account the correlation of observations within a person.<sup>19</sup> Analyses were performed using R version 2.0.1 (R Foundation for Statistical Computing, Vienna, Austria);  $P < .05$  was used to determine statistical significance.

## RESULTS

### Group Characteristics

Of 300 individuals who met inclusion criteria, 8 were excluded for enrollment in the program after relapse ( $n=2$ ), missing date of enrollment ( $n=5$ ), and uncertain outcome status ( $n=1$ ). Of the 292 individuals remaining, 84% were men, 72% were 40 years or older, and 72% had a family history of substance use disorder (86% involving first-degree relatives; TABLE 1). Thirty-seven percent had a dual diagnosis and of those, 93% had a DSM-IV Axis I diagnosis only (Table 1). The drug of choice was alcohol in more than half of the individuals ( $n=164$ ); fentanyl ( $n=27$ ) and other major opioids ( $n=15$ ) represented the drug of choice in 14% (Table 1). There were no cases involving use of heroin, methadone, or time-released oxycodone. Most fentanyl users were anesthesiologists (22 of 27). There were no significant differences in most individual characteristics and in the drug of choice for the 161 individuals

**Table 2.** Characteristics at First Relapse ( $n = 74$ )

Characteristics	No. (%) of Relapses
Relapse drug	
Drug of choice	63 (85)
Other drug	11 (15)
Years in program	
0-1	43 (58)
2-5	21 (28)
>5	10 (14)
Method of detection	
Self-reported	17 (23)
Behavioral monitoring	3 (4)
Chemical monitoring	23 (31)
Workplace monitoring	20 (27)
Board	2 (3)
Other	9 (12)
Disposition	
Re-treatment	48 (65)
Intensity monitoring	15 (20)
Inactive*	8 (11)
Died	3 (4)

\*Indicates that individuals were discharged from the Washington Physicians Health Program because of non-compliance with the monitoring program.

who entered from 1991 through 1996 compared with the 131 individuals entered from 1997 through 2001. However, an increased proportion of individuals in the later period presented with a dual diagnosis (50% in 1997-2001 vs 26% in 1991-1996,  $P < .001$ ).

### Characteristics of Relapse Group

Seventy-four (25%) of 292 individuals had at least 1 relapse. Fourteen (5%) had exactly 2 relapses and 10 (3%) had 3 or more relapses. The drug of relapse was the initial drug of choice in 85% ( $n=63$ ) of the cases (TABLE 2). Most relapses were detected by chemical or workplace monitoring and 58% occurred within the first 2 years in the program (Table 2). The risk of relapse decreased ( $P < .001$ ) with increasing duration in the program, from 91 per 1000 person-years at 0 to 2 years in the program, to 58 per 1000 person-years at 2 to 5 years, and to 32 per 1000 person-years after 5 years. Ten individuals (13%) had first relapses after 5 years. Of the 51 individuals who had a relapse and were followed up for 5 years or more, 61% ( $n=31$ ) successfully returned to the practice of medicine. In contrast, all individuals followed up for 5 years or more ( $n=110$ ) without a relapse successfully returned to the practice of medicine ( $P < .001$ ). Only 5 anesthesiologists of 22

**Table 3.** Univariate Models for Risk of Relapse in Relation to Drug of Choice

	No.	Hazard Ratio (95% CI)	P Value	Cumulative Relapse Rate at 5 y, % (95% CI)*
Other drugs	25	Reference	.41 (Overall)	25 (3-43)
Fentanyl	27	1.71 (0.56-5.24)	.35	32 (7-50)
Other major opioids†	15	2.59 (0.85-7.94)	.10	41 (9-61)
Minor opioids	53	1.38 (0.49-3.88)	.54	28 (12-41)
Alcohol	164	1.11 (0.44-2.82)	.83	24 (17-31)
Cocaine	8	1.05 (0.20-5.43)	.95	14 (0-37)

\*The cumulative relapse rates at 5 years were calculated using the Kaplan-Meier estimates and the log-transformation method for its confidence intervals (CIs).

†For a definition of other major opioids, see the "Methods" section.

**Table 4.** Univariate Models for Risk of Relapse in Relation to Predictive Factors

	No.	Hazard Ratio (95% CI)	P Value	Cumulative Relapse Rate at 5 y, % (95% CI)
Drug of choice				
Not major opioid	250	Reference	.04	25 (18-30)
Major opioid	42	1.80 (1.03-3.13)		35 (17-49)
Parenteral administration				
No	263	Reference	.007	22 (18-28)
Yes	29	4.36 (2.55-7.44)		60 (32-76)
Family history of substance use disorder				
No	83	Reference	.01	16 (7-23)
Yes	209	2.14 (1.18-3.90)		31 (23-37)
Dual diagnosis				
No	185	Reference	.002	20 (14-26)
Yes	107	2.12 (1.33-3.36)		38 (26-49)
Age, y				
<40	82	Reference	.19	30 (19-40)
≥40	210	0.72 (0.45-1.17)		25 (18-31)
Sex				
Women	47	Reference	.48	28 (12-41)
Men	245	0.81 (0.45-1.45)		26 (19-31)
Residents				
No	281	Reference	.47	26 (19-31)
Yes	11	1.57 (0.49-5.02)		31 (0-56)
Current smoking				
No	148	Reference	.62	28 (19-35)
Yes	144	0.89 (0.56-1.41)		25 (16-32)
Specialty			.04 (Overall)	
Medical	140	Reference		24 (16-32)
Anesthesiology*	33	1.81 (0.91-3.60)	.09	29 (11-44)
Surgical	66	0.82 (0.44-1.55)	.60	17 (8-27)
Nonphysician	53	1.95 (1.09-3.50)	.03	43 (23-52)
Changed specialty†				
Yes	13	Reference		8 (0-23)
No	20	8.54 (1.08-67.56)	.04	42 (14-60)

Abbreviation: CI, confidence interval.

\*Although the cumulative relapse rates at 5 years for the anesthesiology and medical groups are similar, the hazard ratio estimated by the Cox proportional hazards model is substantially different from 1.0. A closer look at the Kaplan-Meier estimates of the cumulative relapse curves showed that the cumulative relapse rates differed markedly between the 2 groups for most of the follow-up but were close around the fifth year of follow-up. The significant P value for nonphysicians vs anesthesiologists is due to the smaller sample size of the anesthesiology group and reflects larger uncertainty about the true hazard ratio for anesthesiologists' being different from the null value of 1.0.

†For anesthesiologists only.

with fentanyl as drug of choice returned to anesthesia practice without known relapse. Four of these anesthesiologists had a family history, 1 had dual diagnosis, and none had both of these characteristics.

### Univariate Predictors of First Relapse

Hazard ratios (HRs) for relapse for the various classes of drug of choice are shown in TABLE 3. Fentanyl had a slightly but nonsignificantly lower risk of relapse than other major opioids (morphine, meperidine), and was combined with other major opioids for analysis. Pairwise comparisons demonstrated that there were no significant differences in relapse risk between cocaine, alcohol, minor opioids, and other drugs. Therefore, for subsequent analyses, the drug of choice was categorized as major opioid vs all other drugs. Compared with all other drugs, the risk of relapse was almost doubled when a major opioid was the drug of choice (HR, 1.80; 95% CI, 1.03-3.13;  $P = .04$ ; TABLE 4). The estimated cumulative relapse at 5 years was 35% for major opioid use compared with 25% for all other drugs (Table 4). The risk of relapse was also approximately doubled by having a dual diagnosis (HR, 2.12; 95% CI, 1.33-3.36;  $P = .002$ ) or family history of substance use disorder (HR, 2.14; 95% CI, 1.18-3.90;  $P = .01$ ; Table 4). Specialty affected relapse risk, with an increased risk in nonphysicians compared with physicians in medical specialties (Table 4). Age, sex, current smoking, and training status did not influence the risk of relapse (Table 4).

Those anesthesiologists who returned to the practice of anesthesiology had an increased risk of relapse compared with those who did not return to anesthesiology practice (HR, 8.54; 95% CI, 1.08-67.56;  $P = .04$ ; Table 4). Comparing anesthesiologists who returned to anesthesiology vs those who did not, there were no substantial differences in drug of choice or any of the characteristics, except for a greater proportion of residents in those who did not return to anesthesiology

( $P=.07$ ). Multivariate analyses could not meaningfully be performed on specialty change from anesthesiology due to the small sample size.

**Multivariate Predictors of Relapse**

Family history (HR, 2.29; 95% CI, 1.44-3.64), dual diagnosis (HR, 2.25; 95% CI, 1.23-4.11), and use of a major opioid (HR, 1.78; 95% CI, 1.02-3.09) were statistically significant predictors of relapse, even when controlling for the other 2 factors in a model with just these 3 factors. However, there was an important interaction in the risk of relapse with use of a major opioid and dual diagnosis (TABLE 5; FIGURE). Major opioid users with a coexisting psychiatric illness had a significantly increased risk of relapse compared with nonopioid users with (HR, 3.36; 95% CI, 1.64-6.87; data not shown) or without (HR, 5.79; 95% CI, 2.89-11.42) a dual diagnosis (Table 5). In contrast, major opioid users without a coexisting psychiatric illness had a relapse risk similar to that of nonopioid users (HR, 0.85; 95% CI, 0.33-2.17; Table 5; Figure). A major opioid user with both a coexisting psychiatric illness and family history of substance use had a markedly increased risk of relapse (HR, 13.25; 95% CI, 5.22-33.59; Table 5).

**Predictors of Relapse for Alcohol Users**

Risk factors for relapse in the subset of individuals with alcohol as the drug of choice (TABLE 6) show similar HRs and estimated cumulative relapse rates as the entire cohort. Family history (HR, 2.31; 95% CI, 1.01-5.26;  $P=.05$ ) and dual diagnosis (HR, 2.41; 95% CI, 1.26-4.61;  $P=.008$ ) were significant predictors of relapse in the multivariate model (Table 6).

**Multiple Relapses**

The likelihood of relapse increased with each relapse. The estimated 5-year rate of first relapse for all individuals in stage 0 was 26% (95% CI, 20%-31%). For those who relapsed once (stage 1), the probability of 2 or more relapses increased to 43% (HR, 1.69 vs stage 0; 95%

CI, 1.13-2.53;  $P=.02$ ). We could discern no significant differences in characteristics for individuals who had multiple relapses compared with those who had only 1 relapse.

**Deaths**

Three individuals died of unintentional overdose in relapse; 2 deaths occurred while still in the monitoring program and 1 death after completion of the program. The drug of choice was meperidine in all 3 individuals; 2 had a family history and 1 had dual diagnosis. None was an anesthesiologist and none was a resident. None of the 27 individuals whose drug of choice was fentanyl died. Two additional deaths in relapse were reported to the WPHP after the end

of the study follow-up period; in both cases the drug of choice was alcohol.

**COMMENT**

The risk of relapse with substance use was markedly increased in health care professionals who used a major opioid, had a coexisting psychiatric illness, or had a family history of a substance use disorder. The presence of more than 1 of these risk factors and previous relapse further increased the likelihood of relapse. Major opioid users without a coexisting psychiatric illness did not have a significantly elevated risk of relapse.

**Study Limitations**

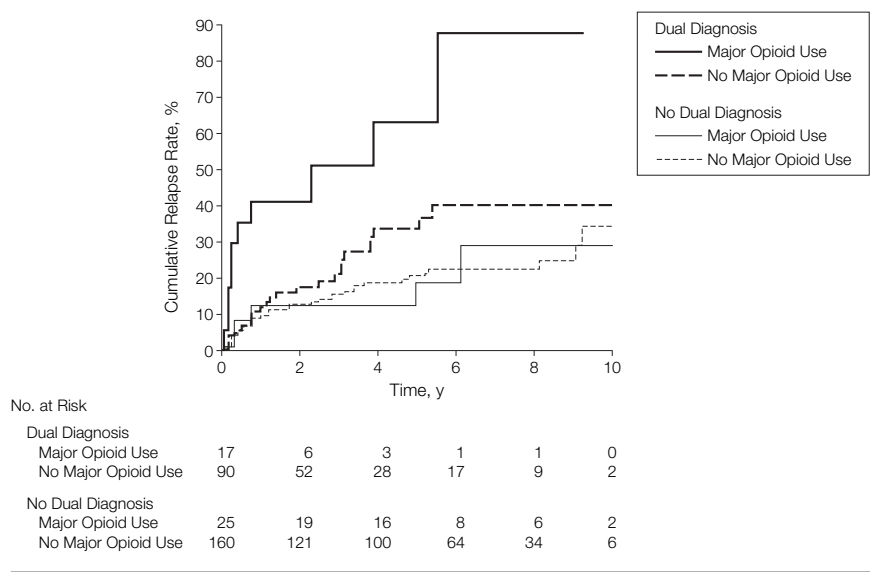
The study used a retrospective cohort design, and, as is true for any observa-

**Table 5.** Multivariate Model of Relapse

	Hazard Ratio (95% CI)*	P Value
Family history of substance use disorder	2.29 (1.44-3.64)	<.001
Major opioid and dual diagnosis		<.001
No major opioid and no dual diagnosis	Reference	
Major opioid with dual diagnosis	5.79 (2.89-11.42)	<.001
Major opioid without dual diagnosis	0.85 (0.33-2.17)	.73
Dual diagnosis without major opioid	1.71 (1.01-2.90)	.05

\*Hazard ratios (HRs) and 95% confidence intervals (CIs) for combinations of risk factors not noted in the table include family history plus major opioid plus dual diagnosis (HR, 13.25; 95% CI, 5.22-33.59), family history plus major opioid (HR, 1.95; 95% CI, 0.65-5.83), and family history plus dual diagnosis (HR, 3.94; 95% CI, 1.74-8.95).

**Figure.** Influence of Drug of Choice and Coexisting Psychiatric Disorder



Represents a cumulative percentage in each group over time after program entry. Major opioid users with dual diagnosis had an increased risk of relapse compared with nonopioid users with or without a dual diagnosis ( $P<.001$ ). Without dual diagnosis, major opioid users and nonopioid users did not have a significantly different relapse risk.

tional study, risk factors represent associations not causation. Several of the covariates were highly correlated with each other, such as major opioid with parenteral route of administration and with specialty as an anesthesiologist. These associations prevented us from isolating route of administration and medical profession or specialty independent from the drug of choice.

Although drug of choice and most individual characteristics did not differ over the 11-year study period, having a coexisting psychiatric disorder, a factor strongly associated with risk of relapse, was increased in the later compared with the earlier period. Implementation of more comprehensive psychological assessment may have contributed to this increase. During the study period, treatment centers became more sophisticated in diagnosing and treating other mental health conditions due to a heightened aware-

ness among chemical dependency counselors, more involvement of psychiatrists, and use of psychometric testing as a standard procedure. In addition, medical professional clients spent more time in treatment, and this longer period of observation revealed mental health symptoms that were not necessarily attributable to chemical toxicity or withdrawal.

Although rehabilitation with return to successful medical practice may be ultimately achieved despite recurrent substance use, in our study population, all health care professionals who did not successfully return to medical practice or who died were in the relapse group. Thus even 1 relapse has poor prognostic significance. Because the number of individuals with more than 1 relapse was small, we chose the first relapse as the major outcome variable. The incidence of relapse after the 5-year monitoring program had ended

may have been underestimated because of loss of follow-up by the program. Although most relapses were observed in the first 2 years, 13% of relapses occurred after the 5-year monitoring period, with some identified even 9 years after initial diagnosis.

Because data were derived from a single monitoring program, one must extrapolate to other programs with caution. The number of individuals was small, particularly within subgroups, causing us to combine drugs of disparate classes and addictive potential (eg, cocaine with alcohol).

### Risk Factors for Relapse

Major opioid use increased the risk of relapse significantly in the presence of a coexisting psychiatric disorder but not in the absence of a coexisting psychiatric disorder (Table 5). This finding, while supported by early literature,<sup>14,20</sup> is in contrast to some recent

**Table 6.** Risk Factors for Relapse for Alcohol Users

Characteristics	No.	Univariate Analysis			Multivariate Analysis	
		Hazard Ratio (95% CI)	P Value	Cumulative Relapse Rate at 5 y, % (95% CI)	Hazard Ratio (95% CI)	P Value
Family history						
No	49	Reference	.04	13 (3-22)	2.31 (1.01-5.26)	.05
Yes	115	2.19 (0.96-4.98)		30 (19-38)		
Dual diagnosis						
No	108	Reference	.01	18 (10-25)	2.41 (1.26-4.61)	.008
Yes	56	2.30 (1.21-4.38)		39 (22-53)		
Age >40 y						
No	35	Reference	.59	18 (4-30)		
Yes	129	1.25 (0.55-2.85)		26 (17-34)		
Sex						
Women	28	Reference	.88	23 (3-38)		
Men	136	1.07 (0.45-2.55)		24 (16-32)		
Resident						
No	161	Reference	.27	25 (17-32)		
Yes	3	†		0		
Current smoking						
No	83	Reference	.79	23 (13-33)		
Yes	81	0.92 (0.48-1.73)		25 (14-35)		
Specialty			.42 (Overall)			
Medical	88	Reference		22 (12-31)		
Anesthesiology*	9	1.80 (0.56-6.09)	.35	22 (0-45)		
Surgical	41	0.83 (0.36-1.89)	.65	19 (6-32)		
Nonphysician	26	1.71 (0.75-3.92)	.21	42 (11-62)		

Abbreviation: CI, confidence interval.

\*Although the cumulative relapse rates at 5 years for the anesthesiology and medical groups are similar, the hazard ratio estimated by the Cox proportional hazards model is different from 1.0. A closer look at the Kaplan-Meier estimates of the cumulative relapse curves showed that the cumulative relapse rates differed between the 2 groups for most of the follow-up period but were close around the fifth year of follow-up.

†The hazard ratio is not estimable because there were no cases among the 3 residents.

studies.<sup>21,22</sup> The absence of a detected increased opioid risk in earlier studies may result from small sample sizes,<sup>10,22</sup> a shorter follow-up period,<sup>21</sup> or variation in important covariates such as coexisting psychiatric diagnosis and family history.<sup>10,21,22</sup>

The importance of a coexisting psychiatric disorder in increasing the risk of relapse is consistent with other reports in the literature.<sup>10,21</sup> Analysis of 101 physicians treated at the Rush Behavioral Health program between 1984 and 1991 found higher proportions of coexisting psychiatric diagnoses, especially personality disorder, in relapsing compared with nonrelapsing physicians.<sup>21</sup> A variety of other psychological factors described as contributing to relapse, such as persistent denial, failure to accept the disease, dishonesty, stress, overconfidence, and withdrawal, could reflect the presence of coexisting psychiatric illness.<sup>10</sup>

### Anesthesiologists

Anesthesiologists represent a larger proportion of physicians in substance abuse programs than predicted by their relative numbers,<sup>13,14,21</sup> perhaps reflecting their ease of access to highly addictive major opioids<sup>13,15</sup> or the heightened awareness of the behavioral indicators of chemical dependency by anesthesiology departments.<sup>23</sup> In addition, Alexander et al<sup>17</sup> found that anesthesiologists had nearly 3 times the risk of drug-related death than general internal medicine physicians. Due to the confounding of use of major opioids and specialty, we did not have sufficient power to investigate the independent effects of the specialty of anesthesiology with risk of relapse. However, recent studies from the Medical Society of New Jersey's Physician Health Program<sup>22</sup> and the California Physicians Diversion Program<sup>9</sup> found no higher risk for anesthesiologists compared with other specialists. These findings differ from those reported by Menk et al<sup>20</sup> more than a decade ago. That retrospective survey of anesthesiology residency program directors described a poor success rate of reentry into anesthesiology residency, with a

high death rate for residents using parenteral opioids. Treatment protocols and recommendations for return to specialty have evolved in the last decade, with increased emphasis on aggressive follow-up and monitoring<sup>5,6</sup> and an increasing tendency to encourage opioid-addicted anesthesia personnel to change to a different specialty. The report by Menk et al<sup>20</sup> poses the possibility that trainees may be at higher risk for relapse although our study did not observe a statistically significant influence of age or training status on relapse rates.

We did not find the incidence of relapse to be greater for persons using fentanyl or sufentanil than for those using other major opioids such as morphine and meperidine. Although the numbers are small, the risk of relapse appeared to be increased for those anesthesiologists who returned to the practice of anesthesiology compared with those who did not. Five of the 22 anesthesiologists using fentanyl or sufentanil did return to the practice of their specialty with no evidence of relapse. All 5 possessed 1 additional risk factor; 4, a family history; and 1, a dual diagnosis. Multivariate analysis regarding how these additional factors influenced relapse was impractical because of the small sample size.

Should anesthesiologists using major opioids return to the practice of anesthesiology? From experience with only 22 individuals, we are not comfortable making a definitive recommendation, yet certain of our observations may shed helpful light on this question. First, because the risk of relapse for major opioid users without other risk factors is no higher than that for users of other drugs with no other risk factors (Table 5), perhaps anesthesiologists who have used fentanyl or other major opioids but who have no other risk factors and no history of relapse might be reasonable candidates for return to their specialty. Second, a coexisting psychiatric disorder and family history of substance use increase the likelihood of relapse, as does each relapse; the combination of more than 1 of these con-

ditions appears to further compound the risk. Thus additional risk factors and relapse make return to anesthesia practice more problematic. Whatever the decision on this question, more intensive and more prolonged monitoring and treatment might enhance the odds for successful recovery. To better explore the question of the advisability of returning to the practice of anesthesiology, aggregating the experience from other physician health programs would be highly desirable.

### Conclusions

In health care professionals with a substance use disorder, the presence of a coexisting psychiatric illness or a family history of substance use disorder significantly increased the likelihood of relapse, as did the presence of prior relapse. Use of major opioids also increased risk of relapse in the presence of family history and even more dramatically in those with a dual diagnosis, and the combination of all 3 risk factors further magnified the likelihood of relapse. State physician health programs might wish to consider managing substance-using professionals who have 1 or more of these 3 risk factors and those with prior relapse with more intensive and more prolonged monitoring.

**Author Contributions:** Dr Domino 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:** Domino, Hornbein, Renner, Johnson, Alberti, Hanks.

**Acquisition of data:** Renner, Johnson, Alberti, Hanks. **Analysis and interpretation of data:** Domino, Hornbein, Polissar, Hanks.

**Drafting of the manuscript:** Domino, Hornbein, Polissar, Hanks.

**Critical revision of the manuscript for important intellectual content:** Domino, Hornbein, Polissar, Renner, Johnson, Alberti, Hanks.

**Statistical analysis:** Domino, Polissar.

**Administrative, technical, or material support:** Domino, Polissar, Renner, Hanks.

**Study supervision:** Domino, Polissar, Hanks.

**Financial Disclosures:** None reported.

**Acknowledgment:** We would like to acknowledge Blazej Neradilek, MS, for data analysis and Lynn Akerlund for manuscript preparation.

### REFERENCES

1. Hughes PH, Brandenburg N, Baldwin DC, et al. Prevalence of substance use among US physicians. *JAMA*. 1992;267:2333-2339.



2. Hanks L, Bissell L. Health professionals. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse, A Comprehensive Textbook*. 2nd ed. Baltimore, Md: Williams & Wilkins; 1992:897-908.
3. Robins LN, Helzer JE, Weissman MM, et al. Lifetime prevalence of specific psychiatric disorders in three sites. *Arch Gen Psychiatry*. 1984;41:949-958.
4. Galanter M, Talbott D, Gallegos K, Rubenstone E. Combined Alcoholics Anonymous and professional care for addicted physicians. *Am J Psychiatry*. 1990;147:64-68.
5. Leshner AI. Science-based views of drug addiction and its treatment. *JAMA*. 1999;282:1314-1316.
6. Talbott GD, Earley P. Physician health programs and the addicted physician. In: Graham AW, Schultz TK, Mayo-Smith MF, Ries RK, Wilford BB, eds. *Principles of Addiction Medicine*. Chevy Chase, Md: American Society of Addiction Medicine; 2003:1009-1022.
7. Morse RM, Martin MA, Swenson WM, Niven RG. Prognosis of physicians treated for alcoholism and drug dependence. *JAMA*. 1984;251:743-746.
8. Shore JH. The Oregon experience with impaired physicians on probation. *JAMA*. 1987;257:2931-2934.
9. Pelton C, Ikeda RM. The California Physicians Diversion Program's experience with recovering anesthesiologists. *J Psychoactive Drugs*. 1991;23:427-431.
10. Gallegos KV, Lubin BH, Bowers C, Blevins JW, Talbott GD, Wilson PO. Relapse and recovery: five to ten year follow-up study of chemically dependent physicians: the Georgia experience. *Md Med J*. 1992;41:315-319.
11. Bohigian GM, Croughan JL, Sanders K. The impaired physician, II: Missouri State Physicians Health Program. *Mo Med*. 1994;91:275-277.
12. Reading EG. Nine years experience with chemically dependent physicians: the New Jersey experience. *Md Med J*. 1992;41:325-329.
13. Gallegos KV, Browne CH, Veit FW, Talbott GD. Addiction in anesthesiologists: drug access and patterns of substance abuse. *QRB Qual Rev Bull*. 1988;14:116-122.
14. Talbott GD, Gallegos KV, Wilson PO, Porter TL. The Medical Association of Georgia's Impaired Physicians Program: review of the first 1000 physicians: analysis of specialty. *JAMA*. 1987;257:2927-2930.
15. Zacny JP, Galinkin JL. Psychotropic drugs used in anesthesia practice: abuse liability and epidemiology of abuse. *Anesthesiology*. 1999;90:269-288.
16. Booth JV, Grossman D, Moore J, et al. Substance abuse among physicians: a survey of academic anesthesiology programs. *Anesth Analg*. 2002;95:1024-1030.
17. Alexander BH, Checkoway H, Nagahama SI, Domino KB. Cause-specific mortality risks of anesthesiologists. *Anesthesiology*. 2000;93:922-930.
18. Link CL. Confidence intervals for the survival function using Cox's proportional-hazard model with covariates. *Biometrics*. 1984;40:601-609.
19. Lin DY, Wei LJ. The robust inference for the Cox proportional hazards model. *J Am Stat Assoc*. 1989;84:1074-1078.
20. Menk EJ, Baumgarten RK, Kingsley CP, Culling RD, Middaugh R. Success of reentry into anesthesiology training programs by residents with a history of substance abuse. *JAMA*. 1990;263:3060-3062.
21. Angres DH, Talbott GD, Bettinardi-Angres K. *Healing the Healer: The Addicted Physician*. Madison, Conn: Psychosocial Press; 1998:34-42.
22. Paris RT, Canavan DI. Physician substance abuse impairment: anesthesiologists vs other specialties. *J Addict Dis*. 1999;18:1-7.
23. Spiegelman WG, Saunders L, Mazze RI. Addiction and anesthesiology. *Anesthesiology*. 1984;60:335-341.

People grow through experience if they meet life honestly and courageously. This is how character is built.  
—Eleanor Roosevelt (1884-1962)