**Urine Drug Screening: An Effective Means to Reduce A Persistent Killer of Anesthetists**
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The personal impact of substance use disorders (SUDs) among anesthesiologists includes, job loss, divorce, financial downfall, depression, as well as death. We are also seeing an increase in the number of reports of patients being injured and even killed by impaired health care providers including anesthesiologists.

Urine drug screening was introduced in the early 1980's after an accident aboard the USS Nimitz[1]. The investigation revealed that nearly 50% of those individuals killed tested positive for illicit substances. The NCAA implemented random drug testing during the late 1980's in the spirit of fair play to detect athletes trying to gain an unfair advantage as well as deter those that may be subject to the pressures[2]. The **Drug-Free Workplace Act of 1988** (41 U.S.C. 81) requires Federal contractors and all Federal grantees to agree that they will provide drug-free workplaces as a precondition of receiving a contract or grant from a Federal agency[3]. Included in this act was drug testing of individuals in sensitive professions. Since this time reductions in the incidence of substance abuse in the transportation industry and military has raised the question: **Can Random Drug Testing Reduce the Incidence of Substance Use Disorders Among Anesthesiologists?**

To argue the effectiveness of drug testing we need to approach this query as one would any screening test and ask several pointed questions?

1. Do we have a problem?
2. Does anything else work?
3. Does it pay to have a screening test?
4. Is this screening effective?
5. Is it easy to beat?
6. Is it dangerous?
7. Is there any treatment?

**Do We Have a Problem?** The answer is yes. Multiple studies over many years have repeatedly demonstrated that attending anesthesiologists, nurse anesthetists, and residents in anesthesia are impacted by substance abuse (Table 1). The problem is not limited to the United States as other countries have similar problems[4,5].

**Table 1 – Studies of the incidence / impact of substance use disorders (SUDs) in anesthetists**

| Study (Year) | Programs | Incidence | Notes |
|---|---|---|---|
| Gravenstein, 1983[6] | 15 | 1-2% | 16% of those with SUD died |
| Ward, 1983[7] | 247 programs | 0.9% residents<br>1.3% faculty<br>8.9% death | 74% of programs had at least one incident |
| Menk, 1990[8] | 113 programs | 2% residents | 15% death |

| | | | |
|---|---|---|---|
| | | | 16% relapse death |
| Bell, 1999[9] | CRNA survey | 9.8% prevalence of drug misuse | |
| Booth, 2002[10] | 123 programs | 1.6% residents<br>1% faculty | |
| Collins, 2005[11] | 111 programs | | 80% reported experience<br>19% had a fatality |
| Wischmeyer, 2007[12] | 126 programs (propofol abuse survey) | | 18% reported propofol SUD<br>28% death |
| Wilson, 2008[13] | 106 programs (inhalational agent abuse survey) | | 22% had an inhalational agent event, 26% of individuals died, only 22% returned to work |
| Warner, 2013[14] | All physicians beginning anesthesiology training in 1975-2009 | 0.86% incidence | After decrease in the 1990's incidence is increasing, 7.3% death rate |

Our problem is not just with our individual health but the perception of anesthesiologists in the public. The cover of the December 2005 *New Republic* shows an anesthesiologist administering a narcotic to himself and is titled "A Doctor's Death...and a Profession's Struggle with Addiction"[15]. The magazine *Mean's Health* in 2006 published an article that stated, "One of the most dangerous and best-kept secrets of the medical profession is the epidemic of anesthesiologists who are addicted to their own drugs"[16]. The article correctly points out that these individuals are "young, ambitious, highly talented physicians". The cases of Kirsten Parker and Major Jon Dale Jones who were both convicted of passing on hepatitis C to patients, some of which ultimately died, demonstrates that this is not a problem whose effects are limited strictly to the individual with a SUD but that the impact on others can be tragic[17,18]. This has led to calls for drug testing of physicians in both the medical and lay literature[19,20,21].

**Does Anything Work?** Would a physician who observes or suspects a colleague is impaired or incompetent report that to a professional society, hospital, clinic, and/or relevant authority? The answer should be yes but DesRoches, et al reported in JAMA in 2010 that only 64% of physicians would pursue such actions[22]. Booth et al reported that between 1990 and 1996 formal education increased as well as the use of drug dispensing machines, yet the incidence of SUD did not change[10]. Richard Epstein, M.D. studies whether development of a system that provides high level surveillance of drug transactions could determine patterns that would indicate drugs are being diverted for use[23]. Factors such as transactions late in the day as well as transactions in locations other that the primary site of clinical care did correlate with two instances where individuals were diverting drugs. This was retrospective though. Very little has helped to reduce the incidence.

**Does Drug Testing Pay?** There is limited data as to the financial benefits of drug testing among physicians and other health care providers given the paucity of testing programs that include pre-placement and random screening. The United States Postal Service performed a longitudinal study in 1978[24]. Five thousand (5000) applicants submitted drug tests and 4396 were hired. Results were confidential. Those that tested positive (9%) ultimately had higher rates of absenteeism, turnover, Employee Assistance Program Referrals, as well as disciplinary actions and medical claims. Has these individuals not been hired over $100,000,000 would have been saved over 10 years ($19,000 per employee not hired). The total cost of an incidence of treatment of a substance use disorder includes

initial assessment, detoxification if needed, inpatient treatment (ideal), outpatient follow-up, psychiatry, treatment contracts, testing as part of recovery program as well as time from work (lost revenue, clinical coverage). This cost could total $500,000 or more. The cost of our program is approximately $50,000 per year.

**Is Drug Screening Effective?** Data from the Federal Railroad Administration has shown that after drug testing was initiated the incidence of positive tests performed after accidents decreased[25]. A Federal Highway Administration study of random testing of truck drivers demonstrated a 3.2-4.7% incidence of positive tests in different states. We reported our experience in 2008 in *Anesthesia & Analgesia* [26]. We had performed 236 drug tests. The incidence in the 6 years prior to testing was 1% for all residents but 2.2% for residents in their initial clinical anesthesia year (CA-1). There were no events in the first 4 years following implementation of our program. The reduction in the incidence was not significant at the time ($P = 0.13$). We have now completed a total to 10 years worth of testing. We have seen ZERO events among residents in anesthesia and the P value at 0.05 is significant (unpublished). We argue that our results indicate that drug testing is associated with a reduction but cannot claim the sole causal factor.

**Is a Drug Test Easy to Beat?** Any look through the Internet reveals quickly that there are many methods available to potentially "beat", invalidate a urine drug screen, or switch a sample with "clean" urine (Table 2) . Some of these are common household agents while others are specifically modified[27].

**Table 2 – Means to invalidate or alter urine drug screen**

| Household agents | Adulterants |
|---|---|
| Lemon juice<br>Lysol<br>Eye Drops<br>Table salt<br>Clorox<br>Purex | Stealth (peroxide)<br>Klear (nitrite)<br>Instant Clean (glutaraldehyde)<br>Urine Luck (PCC) |

Adulterants are generally oxidizing agents that interfere with marijuana, codeine, and morphine (Table 3).

**Table 3 – Urine Screen Adulterants**

| Product | Class | Active Ingredient | Interfere |
|---|---|---|---|
| Urine Luck | Oxidizing Agent | Peridium chlorochromate | Marijuana, codeine, morphine |
| Klear | Oxidizing Agent | Potassium nitrate | Marijuana, codeine, morphine |
| Stealth | Oxidizing Agent | Peroxidase and hydrogen peroxide | Marijuana, codeine, morphine |

Adulteration detection devices are designed to determine whether an attempt has been made to invalidate a sample. These test for the integrity of samples (pH, creatinine, specific gravity) but can also test for added substance such as nitrates, glutaraldehyde, and oxidants.

**Is It Dangerous?** Screening tests should be benign and comfortable and with far lower risk than the disease we are searching for or associated treatment. It must be accepted though that a positive drug test does not clearly define the chronicity, frequency, or presence of an SUD, only that a substance is present. The risk most cited with drug testing is the possibility of a false positive and errant determination of a SUD. False positive results are indeed a possibility. Our group has reported 2 such events. The Medical Review Officer (MRO) determined that there was no plausible explanation. We performed an intervention

and determined one result was an administrative false positive caused by a testing threshold for a substance set too low[26]. The second event resulted in a "negative" result upon "split sampling"[28]. Department of Transportation (DOT) testing guidelines call for "split sampling". Split sampling is the division of the collected sample into two separate vials which are closed, labeled, and secured under the vision of the individual tested. One sample is sent for screening while the second is held in a secure setting until testing is completed on the first. If the first sample is determined to be positive or " indeterminant", the second sample is sent to the lab of the individual's choice for testing again. It is incredibly unlikely that 2 separate credentialed labs would both determine the presence of a substance that is in fact not there. Some substance can give false positive results for drugs but most of these require a prescription. Even when a test is determined to be a false positive, the individual must be provided emotional support.

**Is there Treatment?** The good news is that SUDs is treatable in anesthesiologists as well as other health care providers[29],[30]. Pelton et al studied the success of anesthesiologists in recovery through the California Physicians Diversion Program. Overall success for anesthesiologists versus other physicians was the same[30]. When anesthesiologists were compared to other physicians in a 5-year outcome study, recovery was equal at about 73%[29]. The incidence of relapse as well as death during treatment was equal. This study has its limitations. Only 16 of the 42 Physicians Heath Programs that received the survey actually completed it. Those failing to complete the survey cited lack of resources and regulatory impediments. Residents were a small number of the individuals in the survey and were not included for statistical analysis. The overall success rate for residents is poorer than staff members and those that do complete a program have years of clinical practice and exposure to substances ahead of them which may place them at higher risk[31].

**Random drug testing** is associated with a reduction in the incidence of SUD among a cohort of residents in an academic medical center. Drug testing should be one component of a **comprehensive effort to educate** all members of a department as to the effects of SUD. **Enhanced substance control** measures have not to my knowledge reduced SUDs but strong surveillance may help detect patterns that could be associated with SUD. All institutions should have a well designed and written plan for conducting professional interventions when the possibility of an SUD is present as well as a plan for treatment of those care providers found to be suffering the disease of a substance use disorder.

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