

GUEST EDITORIAL

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Cost-Effective Drug Testing

Drug testing of employees has become very popular. It has been stated that such testing is necessary because of the widespread use of drugs that affect the health, safety, and performance of workers. The sudden increase in demand for such testing has led to inadequate testing and questionable interpretation of results. High quality testing is relatively expensive. A method for evaluating the effect of drug testing programs is sorely needed. Even more important is a program for evaluating the quality of testing and the competency of those who interpret the tests. There is practically no documentation of the past and present extent of the drug problem in the workplace.

If it had been possible to establish the extent and gravity of the drug abuse problem before testing, it must have been possible to identify those with problems without testing. Why is it now necessary to test randomly everyone to control the problem? Most of the published information is anecdotal or has been obtained from surveys of people interviewed about their use of drugs.

Much money is being expended in testing urine for marijuana and cocaine metabolites, little for alcohol and other drugs. Does the use of marijuana and cocaine off the job have an effect on the job? Little has been documented about the costs and benefits of testing programs. The U.S. military services, which spent \$525 million in 3 years on urine drug testing, 1983 through 1985, discharged 51 000 and disciplined 92 000 members [1]. How much testing for drugs other than marijuana was done? Were tests performed for impairing drugs such as alcohol, barbiturates, opiates, methaqualone, phencyclidine (PCP), lysergic acid diethylamide (LSD), and antihistamines?

A survey reported that the incidence of drug abuse in the military dropped from 27% in 1980 to 19% in 1982 to about 9% in 1985 [2]. It was concluded that, "The findings suggest that alcohol use is by far the most serious substance use problem, although the illegality of many drugs used by military personnel presents important disciplinary problems for the military." "Marihuana-only users present a discipline problem for violation of laws, but experience relatively few serious negative effects. In contrast, users of drugs other than marijuana-only (e.g., cocaine, amphetamines, barbiturates, and tranquilizers) present both discipline problems and impaired performance problems." The testing procedures were questionable before 1984 [3]. Most of the testing was for one drug, marijuana. Comprehensive testing of all specimens for the other controlled substances would cost about ten times more. It was also reported that 87% of the personnel consumed alcohol. The "evidence" was based on

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surveys of members of the armed services who were asked about their use of alcohol and other drugs. The expenditures of funds and the disruption of people's lives should require a meaningful evaluation that any benefits to the armed services were cost-effective and that the alleged drug users were helped.

A recent report has been cited as evidence of the problems drugs create and the need for testing workers [4]. The economic cost to society in 1983 was estimated to be about \$176 billion for alcohol and other drug abuse, \$116 billion for alcohol abuse, and \$60 billion for other drug abuse. This report strongly supports the need for alcohol testing, since the cost of alcohol abuse was twice that of drug abuse.

Some comments on Table 1 are appropriate particularly after referring to the report which explains the sources of the estimates. The reduced productivity has been estimated from people who said that someone in the household "had ever smoked marijuana daily for a period of at least one month." The amount of reduced productivity for those who it was said were current users and lifetime users of marijuana was not statistically significant. Since testing will reveal only recent or current use of marijuana, testing would be of questionable value based on the results of this survey. It was also stated that the impact on productivity of other drugs except alcohol was not statistically significant. Thus, it does not appear to be cost-effective to test for other drugs based upon reduced productivity.

Examination of some of the other costs is enlightening. Since marijuana users do not normally require "treatment and support," most of this cost should not be charged to marijuana users. Unlike alcohol and most other drugs, overdoses of marijuana have never been known to be lethal; the "mortality" estimate could not be due to marijuana. Little of the costs for crime and crime careers should be attributed to marijuana. Evidence has not been found to support the theory that crimes must be committed to obtain money to buy the readily available and relatively inexpensive marijuana. Although it is illegal to possess and distribute the drug, few of the many reported users are convicted; fewer are incarcerated and lose their job. It is doubtful that marijuana use when compared to alcohol use has been proven to be a significant factor in reduced productivity. No substantial evidence has been found that marijuana use has a significant adverse effect on health, safety, and performance in the workplace. Some adjustments were made for the overlap caused by those who were reported to use alcohol together with other drugs. Those over 34 years of age were assessed no productivity loss as a result of drug abuse. Alcohol abuse contributed to reduced productivity at all ages.

For alcohol abuse, this survey used data from the 1979 National Household Survey on Alcohol Abuse sponsored by National Institute on Alcohol Abuse and Alcoholism. The anal-

TABLE 1—*Updated costs to society of alcohol abuse, drug abuse, and mental illness, 1983 (dollars in billions).^a*

	Alcohol	Drug	Mental	Total
Treatment and support	\$14.9	2.0	33.4	50.4
Mortality	18.2	2.5	9.0	29.7
Reduced productivity	65.6	33.3	4.0	103.0
Lost employment	5.3	0.4	24.0	30.0
Motor vehicle crashes	2.7	2.7
Crime	2.6	6.6	1.0	10.1
Victims of crime	0.2	0.9	...	1.1
Crime careers	0.0	10.8	...	10.8
Incarceration	3.0	2.4	0.1	5.5
Other	4.3	0.7	1.1	6.1
Total	116.7	59.7	72.8	249.2

^aTotals may not add as a result of rounding.

ysis for drug abuse used data from the 1982 National Household Survey sponsored by National Institute on Drug Abuse. A major difference between the two surveys is reported:

Studies of alcohol abuse have focused on both lifetime patterns and current levels of consumption as well as impacts of alcohol consumption on social functioning. Alcohol abuse has been increasingly defined in terms of its consequences. In the field of drug abuse, primary emphasis has been placed on lifetime patterns and recency of use of illicit substances or nonmedical use of various prescription drugs.

Based on the above review of the survey, it appears that the economic cost of alcohol abuse is about ten or more times greater than that of drug abuse.

A study involving 600 operators killed in single-vehicle crashes provides further evidence that by far the most significant and most often impairing drug is alcohol [5]. Alcohol was found in 79% of the victims. Evidence of marijuana use was found in about 8% of the victims and alcohol was found in 87% of these victims. Other drugs were found in 6% and alcohol was found in 71% of these victims. Three other studies of fatally injured operators revealed essentially the same data [6-8].

A consensus has been published recently which reviews the problem of trying to correlate drug concentrations and driving impairment [9]. Inadequate performance should not be attributed to a substance when neither the substance or metabolite is found in blood or other specimens, or when a pharmacologically inactive metabolite is found in urine. The panel concluded: For experts to provide opinions concerning the possible impairment of driving ability based on body fluid concentrations of drugs requires access to a body of knowledge on the measurement of driving ability, the chemical analyses of body fluids, and particularly the correlation and interpretation of those measurements. "Such a body of knowledge is not yet sufficient for dealing with drugs such as marijuana, sedative-hypnotics, antihistamines, and benzodiazepines."

Alcohol is the drug most abused by workers, members of the armed services, as well as by others. Alcohol testing is much simpler than testing for other drugs, and can be noninvasive, inexpensive, and more accurate. Breath can be tested by persons with minimal training, results are immediately available, and inexpensive instruments can provide tests at less than one dollar each. Saliva can be tested inexpensively. Confirmatory tests of urine and blood are also relatively inexpensive. An excellent and timely review of alcohol analysis has been reported [10]. Concentrations of alcohol can be correlated with impairment. At the present time, concentrations of other drugs in urine and most drugs in blood cannot be correlated with impairment [9].

It should be much more cost-effective to test when there is a reasonable cause to test. Reduced productivity, unsafe performance, responsibility for an accident, and deterioration of health should be investigated by an employer. An apparently impaired person whose test for alcohol reveals none could be examined by a physician and tested for other drugs.

It has been widely publicized that random drug testing is needed to help solve the drug problem. When there is suspicion of impairment, test the person's performance on his or her assigned task. If performance is unsatisfactory, make whatever tests are indicated to establish the cause. The courts will have to decide whether testing randomly or without reasonable cause is unreasonable search and seizure in violation of the Fourth Amendment to the U.S. Constitution, but private sector employers may not be constrained by the Constitution. Adequate, properly conducted, and interpreted testing could be required where reasonable cause is supported by evidence of impairment or deterioration of performance. Litigation can be minimized by proper drug testing and by scientific evaluation and interpretation of positive findings.

Advocates of drug testing should be able to prove that finding marijuana metabolites in urine is evidence that the health, safety, or productivity of workers is adversely affected. The effects of marijuana are subtle and last about two hours but the nonpsychoactive metabolite may be found in urine for a week or more. Advocates should also state what other drugs are

being determined and how the tests will be interpreted. Workers are being required to submit to drug testing programs that have been poorly conceived. Employers are coercing employees by establishing policies that drugs may not be used off the job, that employees may not work "under the influence of drugs or alcohol," or "subject to their effects." The employee is not told how he or his employer will know what drugs might do this or how these conditions will be established. This should not be surprising because the employer does not know and he probably does not know that qualified scientists do not know how to establish these effects. If workers are discovered who have drug problems, it would be more cost-effective to rehabilitate rather than to fire them. The unemployed may commit crimes to obtain money for their drugs and may abuse drugs to the extent that they join the heavy chronic users who are discernibly impaired. It appears that the unemployed will not be tested.

Analyses for the substances which have a greater effect on health, safety, and performance than marijuana are rarely made. Table 2 lists the substances that were misused and caused deaths in a large state for which there is good data (North Carolina, population 6.2 million). Should workers be tested for these substances? An adequate drug screen for the commonly misused drugs could cost at least \$100 per urine specimen plus \$50 more for each drug confirmed. If each of the 108 million employees in the United States was tested 1 time for only marijuana and cocaine it would cost between \$1.5 to 11 billion dollars. This does not include school and college students. In North Carolina, there are about 100 alcohol overdose deaths and about 3000 alcohol related deaths a year. All the other substances accounting among them for less than 150 deaths a year can have adverse effects on health, safety, and performance. The list does not include the new, potent psychoactive "designer drugs" which are synthesized in clandestine laboratories. Increased attention should be given to this source of drugs if the supply of marijuana and imported drugs is interdicted.

Conclusions

Cost-effective drug testing in the workplace should be based on reasonable cause. Advocates should prove that their drug testing program is a cost-effective way of protecting the

TABLE 2—Overdose poisoning deaths in North Carolina, 1970–1985.^a

alcohol 1600 ^b	antidepressants 385	barbiturates 355
propoxyphene 347	heroin 171	aspirin 108
isopropanol 94	cocaine 56	meprobamate 45
ethchlorvynol 41	arsenic 31	pesticides 31
phenothiazines 30	freons 26	pentazocine 17
cyanide 17	codeine 15	glutethimide 14
methanol 14	antihistamines 14	MDA 12
pethidine 9	methadone 12	caffeine 11
trichloroethane 9	paraldehyde 8	nitrous oxide 7
strychnine 7	chloral hydrate 7	propranolol 7
ethylene glycol 7	acetaminophen 6	quinidine 6
quinine 5	hydromorphone 5	gasoline 5
lead 5	theophylline 5	lidocaine 4
methaqualone 4	digoxin 3	phenelzine 3
haloperidol 2	phenylpropanolamine 2	oxycodone 2
phenmetrazine 1	hydrocodone 1	BMDA 1
ketamine 1	insulin 1	dilantin 1
flurazepam 1		

Ninety-nine more deaths were due to forty-one other substances.

No deaths were attributed to diazepam, amphetamines, LSD, or marijuana.

^aRef 11.

^bNumber of deaths.

public, the employer, and the employee. Better methods of testing and criteria for identifying impairment need to be developed.

If health, safety, productivity, performance and cost-effectiveness are criteria, testing for marijuana should have a very low priority.

Alcohol has a greater adverse effect on health, safety, and performance than all of the other drugs. Adequate personnel, procedures, and instruments are available for testing for alcohol, and the results can be satisfactorily interpreted. After testing for alcohol it would be efficient to test for other drugs in the following order: antidepressants, opiates, propoxyphene, barbiturates, and antihistamines. These drugs can impair performance.

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