Differentiating Drugs by Harm Potential: The Rational versus the Feasible*

Harold Kalant, M.D., Ph.D.†

Department of Pharmacology, University of Toronto, Toronto, Ontario M5S 1A8, Canada; Addiction Research Foundation of Ontario, Toronto, Ontario, Canada

ABSTRACT

In an ideal harm reduction model, drugs would be ranked according to their potential to cause harm, with varying implications for control policies and interventions. In such a public health oriented approach, the maximum protection of the public from harm would be balanced with the least possible restriction of freedom. In reality, however, the accuracy and completeness of the necessary information for such a ranking is highly limited. Many other factors not readily incorporated in a rational model, such as values, beliefs, and traditions, also affect drug policy decisions. Thus, rather than relying on acquisition of the necessary knowledge, it may be preferable to focus efforts on developing effective nonlegal measures to reduce drug use and harm. [Translations are provided in the International Abstracts Section of this issue.]

Key words. Harm reduction; Policy; Public health

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†Correspondence should be addressed to the author at the University of Toronto address.

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"HARM REDUCTION" AS A PUBLIC HEALTH CONCEPT

The drugs that constitute the focus of harm reduction are not primarily those prescribed by physicians for the treatment or prevention of disease, but those used mainly for nonmedical purposes and, to a lesser extent, those purchased without prescription but used quasi-medically for the relief of discomfort that may or may not be the result of recognizable disease. Nonmedical use applies to both licit substances (such as coffee, tobacco, and alcohol) and illicit ones (such as cannabis, cocaine, and heroin). Nonprescribed quasi-medical use refers to over-the-counter sale of such things as sleeping pills, antihistaminics, and cold remedies, or to sedatives and tranquilizers given by one friend to another out of a generous but sometimes misguided desire to help relieve discomfort or distress. Prescribed medical use is already subjected to a detailed system of controls intended to achieve the maximum benefit for the minimum risk, and this system is seldom the object of concern from the public at large. It is nonprescribed use that is really the object of our attention here.

The question of ranking of drugs according to their potential for causing harm is of interest because of the implication that such rankings could form the basis of differential control policies, reflecting rationally and realistically the relative magnitudes of the problems posed by different types of drug. This approach clearly treats drug use as a public health issue (Goldstein, 1994), comparable to pasteurization of milk, fluoridation of public water supplies, or compulsory inoculation of school children against common communicable diseases. Each of these is seen as constituting in some sense a restriction of individual freedom of action or choice, and introducing new potential dangers (e.g., from fluoride or from allergic reactions to the vaccines), for the sake of a greater common good. This in turn implies some type of cost-benefit evaluation in which the restriction of freedom, the introduction of new risks, and the financial burden of the proposed measures constitute the major costs, and the protection of the public against a serious health hazard constitutes the major benefit. The objective of the evaluation would ideally be to select a policy combining the least possible restriction of freedom and the least possible new harm, compatible with the maximum attainment of the desired "good" objective.

In such evaluations it is commonly accepted that different degrees of gravity of the original problem call for different degrees of intervention. Dental cavities are generally not considered as serious a problem as tuberculosis or diphtheria. Therefore the public is free to buy nonfluoridated bottled spring water if it chooses to, but all milk that is sold here must be pasteurized, and all school children must be inoculated against diphtheria. By the same reasoning, one is entitled to ask whether it is possible to rank different types of nonmedical drug use according to their respective degrees of potential for harm, so that differentially

selective control policies and measures of public health at the minimum cost would require many types of policies.

INFORMATION REQUIRED

The information needed for this factor that enters into the cost-benefit analysis is accurate and complete with respect to costs and benefits, and the accuracy varies greatly. The question posed for this session, considering the shortcomings of the available pharmacological properties of the various substances.

For the purposes of the propose macological properties of the various drugs:

- How potent are the drugs with effects? These are the effects on the brain that determine whether an individual uses the drug, or may be reinforcing effects in the brain. The question is whether the "recreational" factors may determine which drug is used by others in a given society. The macological action must be present.
- What are the biochemical and molecular mechanisms that produce harm, and how may they produce this harm? We must understand the structural damage to body organs and physical processes, as well as the economic harm caused by interference with personal and social activities.
- How do these various actions and possible range of levels of influence to the daily use of large amounts of the drug most or all of the time?
selective control policies and measures could achieve the maximum protection of public health at the minimum cost (in all senses) to society. To do this rationally would require many types of information. Is that information available to us?

INFORMATION REQUIRED FOR RATIONAL DIFFERENTIATION OF DRUG RISKS

The information needed for this task relates to a number of quite different factors that enter into the cost-benefit evaluation. In the ideal case, it should be accurate and complete with respect to each of these factors. In reality, it is far from complete, and the accuracy varies greatly from one factor to another. To answer the question posed for this session, one must first examine the possibility of remedying the shortcomings of the available information.

Pharmacological Properties of the Drugs

For the purposes of the proposed ranking we need to know the intrinsic pharmacological properties of the various drugs with respect to at least three different questions.

- How potent are the drugs with respect to their reinforcing and aversive effects? These are the effects on the brain “reward” and “punishment” systems that determine whether an individual would find the drug attractive enough to use (Wise, 1989; Koob, 1992). They do not, by themselves alone, determine how much and how widely a given drug is actually used; but a reasonably potent reinforcing effect must be produced or the drug would not be of any interest to the “recreational” user. Cultural and other nonpharmacological factors may determine which reinforcing psychoactive drugs are preferred over others in a given society at a given time, but in every instance the pharmacological action must be present or the substance will not be used.

- What are the biochemical and physiological mechanisms by which the drugs can produce harm, and how much drug over how long a time is required to produce this harm? We must consider here all types of harm, whether it is structural damage to body organs or tissues, functional disturbance of mental and physical processes, accidents caused by such functional disturbance, economic harm caused by interference with work capability, or social harm by interference with personal interactions.

- How do these various actions and effects of the drugs vary over the whole possible range of levels of intake, from the occasional use of small amounts to the daily use of large amounts that keep the user under the influence of the drug most or all of the time? Is there, for example, a threshold or mini-
mum dosage below which a particular type of harm will not occur [e.g., the liver damage caused by the over-the-counter pain reliever, acetaminophen (Zimmerman and Maddrey, 1987)], or does any level of use carry some risk that increases progressively with dosage [e.g., the risk of lung cancer with cigarette smoking (Surgeon General, 1979)]? What is the shape and the steepness of the dose-effect curve above the damage threshold, if there is one?

This would help us predict the numbers of users at each level of use who would suffer that particular damage, and on that basis we could predict the total prevalence of each type of damage resulting from a given distribution of consumption levels in the population (Schmidt, 1977; Popham et al., 1984).

All of these questions are potentially answerable by scientific research, and for many drugs there is already a reasonable degree of factual knowledge available. Unfortunately, the amount of such knowledge varies greatly with respect to different drugs and different questions. For example, there is a huge body of knowledge about the effects of alcohol on the liver, brain, and heart (NIAAA, 1994), but very much less about those of cannabis or cocaine (Hollister, 1986; Benowitz, 1992; Hall et al., 1994). In contrast, there is a great deal of knowledge about the reinforcing properties of cocaine or heroin, but either much less knowledge or much less clarity of the conclusions about those of alcohol, cannabis, or phencyclidine (Gardner and Lovinson, 1991; Fibiger et al., 1992; Harris et al., 1992; Koob, 1992; Kornetsky and Porrino, 1992).

Nevertheless, knowledge about the drug actions and their effects is, at least in theory, obtainable through research. Once obtained, that knowledge should be relatively enduring, because the biology of human responses to drugs is not subject to rapid changes, and the information should be reasonably objective, even if the choice of research questions is not always wholly so.

Levels of Use under Present and Possible Future Policies

The preceding questions deal with the harm that a given drug is potentially able to cause. As a basis for public policy, however, it is much more important to be able to estimate or predict how much total harm it causes in reality. It does not matter very much, for policy purposes, that a substance is potentially deadly, if nobody uses it or is ever likely to use it. We therefore need accurate knowledge of present levels of use as a starting point for estimates of real harm under present conditions. Again, one finds that knowledge of such levels of use and their distribution throughout a population is fairly good for widely used licit substances such as alcohol and tobacco (Single et al., 1994) but for obvious reasons it is very incomplete and tentative for illicit drugs. In the absence of accurate knowledge about total consumption of these substances, there is much less opportunity for cross-check validation of the self-report data. As a result, while we have sound evidence from alcohol or tobacco to their patterns of consumption in the population (Schmidt, 1977; Popham et al., 1984), there is much less secure evidence from self-report data on the use of cannabis or cocaine.
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cross-check validation of the self-report data on which current estimates are based. As a result, while we have sound epidemiological bases for relating total harm from alcohol or tobacco to their past and current levels of use, we have very little basis for comparable estimates for heroin, cocaine, or cannabis.

For purposes of policy decisions, we also need to be able to estimate how changes in drug control policies might affect future levels of consumption, and thus affect the frequency of occurrence of the various potential harmful consequences of drug use. Once again, past experience provides reasonable bases for making such projections with respect to alcohol, tobacco, and other licit drugs. In contrast, the absence of comparably accurate data on illicit drug use makes such projections much less secure, and we are frequently forced to assume that the same general principles that govern the levels of use of licit substances apply equally to illicit ones. The limitations of such assumptions are examined below.

Availability and Price as Determinants of Use

An abundance of evidence indicates the importance of ease of availability and price as determinants of the levels of use of alcohol and tobacco. For example, the level of consumption of alcohol in Ontario and California, and of cigarettes in the United Kingdom, have been shown to vary inversely with the cost of these items relative to mean per capita income and cost of living (Russell, 1973; Popham et al., 1975; Kalant, 1989). There is no valid reason to doubt that the same principle applies to the use of illicit drugs. Because alcohol and tobacco are licit, and economically important, the necessary information about them is routinely gathered by governments and other agencies for a variety of purposes. In contrast, information about the current levels of supply, price, and ease of availability of illicit substances such as cannabis, heroin, or cocaine is notoriously unreliable and incomplete. It depends heavily on police reports of seizures and estimated values, and fluctuates rapidly as a result of local success or failure in intercepting supplies. Therefore it is impossible to trace systematically the relation between price and consumption, for example, in a way that is precise enough to serve as a basis for predictions or projections concerning the consequences of future changes of policy or practice. If we can not foretell with any precision how the level of use would be affected, we can not predict with any greater precision how the magnitude of the health risk would alter.

Fads, Fashion, and Public Attitudes toward Use

Apart from price and availability, the prevailing public attitudes toward use of a given drug are important determinants of the levels of use in a population.
(Skog, 1986). For example, the decline in use of cannabis by high school students in North America in the 1980s has been attributed principally to a growing view among them that smoking cannabis was simply not a very sensible thing to do (Bachman et al., 1988; Smart, 1992). On the other hand, the increase in tobacco cigarette smoking among teen-age girls, at a time when most other groups in the population are decreasing their use, is also widely attributed to fashion and attitude in the group involved, for whom such considerations as a sense of independence, chic, and mere imitation may outweigh the impact of knowledge about the potential future public health effects of smoking. Changes in fashions and attitudes are not really predictable on a rational and informed basis: who, for example, foresaw in the 1950s the dramatic rise of the sixties drug culture? If one can not foretell how such attitudes are likely to change in a given population over a given span of time, how will one be able to foretell the changes in total health risks posed by the use of a given drug?

DEFINITIONS AND YARDSTICKS

In addition to all the types of information that we would need for a rational ranking of drugs with respect to their potential for harm, we also need an agreed set of definitions as to what constitutes "harm," and a set of quantitative measures with which to estimate the degree of harm. This immediately raises a major problem because the definition of harm is heavily dependent on one's value systems. Most people will have little difficulty in agreeing that cirrhosis of the liver from too much alcohol, or permanent injury or death resulting from an automobile accident caused by drug impairment, or murder caused by cocaine-induced aggressiveness and paranoid delusions, is harm. But there are many who will disagree that a reduction of drive and work orientation under the influence of cannabis is necessarily harmful; for them, the intense and competitive goal orientation of Western society is the harm, and decreased drive is therefore a benefit.

Added to this is the problem of devising quantitative yardsticks that can measure and compare not merely apples with oranges, but apples with kangaroos or clouds. Is death from alcoholic cirrhosis worse or less bad than breakup of a family because of drug-induced violence? And how much worse or better? What set of measures could be agreed on for comparing all the diverse consequences that have to be weighed in deciding on the relative harm caused by drug A vs drug B? Attempts have been made to do this by finding artificial monetary equivalents for quite heterogeneous consequences. For example, a respondent may be asked "How much would you be prepared to pay for insurance that could protect you against the possibility of such-and-such an outcome?" Arguments may be made for and against such a procedure, but the important fact is that, so far, no satisfactory procedure has been widely used.

AD HOC MEASURES NOT II COI

It is important to bear in mind the more than reliance exclusively on legal measures available that do not depend in their potential for harm. For example, health action with respect to tobacco by teen-agers. Current laws in Canada are not flexible enough to address the problem. For example, if cigarettes from vending machines be permitted only in licensed establishments are already excluded under alcohol laws, more recently, the government has proposed to allow vending machines completely. Such a policy would probably reduce the frequency of smoking.

It is also important to recognize the cost factor in determining a broad range of behavior. As noted earlier, the decline over the 1980s decade was due primarily to the increase in abuse that had come to be viewed as unacceptable by North Americans. Hence, an attitude toward the nonmedical use of specific ranking of drugs and their relative level of problem, any radical changes in present drug policy is a significant factor contributing to the decrease.

CONCLUSIONS: WHAT IS

Given the daunting difficulties in creating a strictly rational and useful system of ranking drugs in terms of their potential for harm, is there some other approach to differentiating that can be of practical use? No one can "yes."

Most health economists, epidemiologists, and members of the general public would not at their current levels of use, cause of death, and phencyclidine, however, have serious functional consequences, and would pose serious problems if the numbers of users were to increase.
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AD HOC MEASURES NOT INVOLVING CHANGES IN LEGAL CONTROLS

It is important to bear in mind the fact that drug control policy includes much more than reliance exclusively on legal prohibition. A variety of other options are available that do not depend in any sense on a ranking of drugs and their respective potentials for harm. For example, one of the major goals for public health action with respect to tobacco is to prevent the initiation of cigarette use by teenagers. Current laws in Canada forbid the sale of cigarettes to those under the age of 18, but it is relatively easy to circumvent this restriction by buying cigarettes from vending machines. It was therefore suggested that these machines be permitted only in licensed drinking establishments, from which minors are already excluded under alcohol control regulations (Goldstein and Kalant, 1990). More recently, the government of Ontario has proposed banning cigarette vending machines completely. Such a move would not completely prevent older youths from buying cigarettes for younger ones, but the added inconvenience would probably reduce the frequency of their doing so.

It is also important to recognize that public consensus is a very important factor in determining a broad range of individual behaviors, including drug-using behavior. As noted earlier, the decline in use of cannabis by high-school students over the 1980s decade was due primarily to a change in attitude toward drug use, which had come to be viewed as incompatible with the lifestyle that most young North Americans find desirable. A strategy aimed at producing similar changes in attitude toward the nonmedical uses of all types of drug would not require any specific ranking of drugs and their potentials for harm. Neither would it require any radical changes in present drug control legislation, since it would be an independent factor contributing to the same end but by quite different means.

CONCLUSIONS: WHAT IS FEASIBLE, EVEN IF NOT IDEAL?

Given the daunting difficulties, if not real impossibility, of arriving at a strictly rational and useful system of differentiating among drugs with respect to their potential for harm, is there some reasonable basis for lesser degrees of differentiation that can be of practical value for policymakers? The answer is probably a very guarded “yes.”

Most health economists, epidemiologists, health professionals, and informed members of the general public would probably agree that alcohol and tobacco, at their current levels of use, cause much the greatest degree of harm. Cocaine and phencyclidine, however, have very high potential for harm to health and social functioning, and would possibly cause greater total harm than alcohol and tobacco if the numbers of users were to become as great. Cannabis is clearly
responsible for less total harm than alcohol or tobacco at current levels of use, but it seems likely that total harm would increase substantially if the levels of cannabis use came to approximate those of alcohol and tobacco. On the other hand, hallucinogens such as LSD or mescaline have such inherently low reinforcing properties, and so little direct toxicity, that they are unlikely ever to attain high enough levels of use in the population to constitute major sources of harm. Thus, without attempting any strict quantitative scale, we might usefully talk of high, low, and intermediate levels of risk, and fit present drugs into these groupings.

One problem, however, is raised by the opioids. Current patterns of illicit use of heroin and other opioids obviously carry risks of many kinds of harm, apart from the legal and social problems caused by the illegality of these drugs. With respect to health, most of the dangers of opioids, other than those on the fetuses and newborn children of opioid-using mothers (Finnegan, 1985), are attributable to the crude and unhygienic methods of using them rather than to the pharmacological actions of these drugs themselves. Such problems as AIDS, viral hepatitis, microembolism, septicemia, and so forth are due to poor injection techniques and improper use of drug preparations meant only for oral use (Levine et al., 1986; Dressler and Roberts, 1989; Foley, 1993; Ottomanelli, 1993). Acute overdoses are due mainly to unanticipated variability in the potency of illicit material. Heroin use, apart from the harm caused by bad intravenous injection techniques, carries relatively few health hazards other than constipation, disturbance of some endocrine and immune functions, and weight loss (Cushman, 1980).

Since the great majority of citizens of Western countries are opposed to the legalization of heroin, it is likely that many of the hazards associated with its present manner of use will continue, even if needle exchange programs succeed in reducing the incidence of some of them. Should we then classify heroin as a high-risk drug, even though the risks are primarily attributable to factors other than the drug itself?

In summary, what is feasible is very limited and does not offer the prospect of a major change in the process by which drug control policy is currently made. The reason is that, if sound information and rational decision are not yet equal to the task, policy will necessarily continue to be heavily influenced by ideology, society’s predominant values and beliefs, tradition, public acceptability, vested interests, and other factors that intervene in all complex matters of this type. Rationality is more likely to enter the process if both governors and governed come to recognize clearly how their decisions are made, rather than through sudden and broad expansion of our pool of necessary knowledge. Such a process, combined with imaginative and energetic use of nonlegal measures to reduce drug use, will probably be of greater immediate and long-term value than attempts to formulate completely rational legal policies.
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REFERENCES


THE AUTHOR

Harold Kalant, M.D., Ph.D., received his medical degree in 1945 and his doctoral degree in pathological chemistry in 1955, both from the University of Toronto. He is Professor Emeritus of Pharmacology at the University of Toronto and has been Associate Research Director of the Addiction Research Foundation, now also Emeritus status. Author of hundreds of publications in addictions, he has also received numerous awards and continues to publish and speak widely on various topics related to drugs, behavior, and social policy. His book, Drugs, Society and Personal Choice (1971), with coauthor Oriana Kalant, is that rarity, a scientific best-seller.

Histories of Harm
Illicit Drugs, Too

Virginia Berridge, Ph.D.

Department of Public Health and P
School of Hygiene & Tropical Med
FAX: 44 171 637 3238 E-mail

This paper traces the differing concept of “harm reduction” and nicotine. It locates these of dangerousness or risk, both have been mediated through and cultural/conceptual parent routes of medicalization, changing cultural and class relations in the link between categories of “solutions are provided in the link

Key words: Harm reduction

Harm reduction has, as a mode of drug use and, is as a mode of drug injection (s) a cross substance, comparative different recent histories of harm
tine in the UK. Why are illicit c

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