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ALCOHOL AND ROAD ACCIDENTS
IN CANADA:

ISSUES RELATED TO FUTURE STRATEGIES
AND PRIORITIES

SYNOPSIS

POLICY, PROGRAMS
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SYNOPSIS

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SYNOPSIS

This report is an integration, synthesis, and update of two other reports produced by the Traffic Injury Research Foundation of Canada. It presents a comprehensive overview of present knowledge, discusses major current issues, and explores the question of future directions for efforts to reduce alcohol-crash losses. The primary aim of this report is three-fold: (1) to reexamine the problems of alcohol and road accidents and alcohol-impaired driving, taking into account the social and cultural context in which they arise and persist; (2) to reassess the effectiveness of the societal response to these problems; and (3) to initiate a process of evolving new strategies and reordering priorities for the coming decades. A secondary purpose of this report is to provide a ready source of basic information along with extensive references to the original literature. The report concludes by describing an emerging perspective based on lessons from past experience and useful in considering options for future action.

PART ONE

DEFINING THE PROBLEM OF ALCOHOL AND ROAD ACCIDENTS

To define a problem is to create a sound basis for the search for solutions. Unfortunately, such phrases as "alcohol and road accidents", "drinking and driving", and "drunk driving" conceal the remarkable complexity of the problem so labelled. For example, these labels inspire a simple definition of the alcohol-crash problem, namely, adverse consequences of the overlap of two widespread behaviours: the consumption of alcoholic beverages and the use of motor vehicles. An immediate, general solution becomes obvious--separate drinking from driving.

Research has shown, however, that both behaviours include a wide range of personal and social patterns of use, some problematic, others not. The manufacture, distribution, and sale of motor vehicles and alcoholic

beverages represent billion-dollar enterprises and key strands in the fabric of society. Laws and regulations pertaining to each have a complexity all their own, stemming from social control policies that attempt to reconcile the often conflicting aims of economy, justice, health, and safety. Beyond the use of motor vehicles and alcohol, beyond individual behaviour, the very structure of society and current social practices contribute to the size and persistence of the problem. Separating drinking from driving, or driving from drinking, admits to no simple solution, even in the abstract.

CONTEXT AND PERSPECTIVES

The scale and complexity of phenomena associated with beverage alcohol and motor vehicle transportation in Canada offer insight into the dimensions--and problems--of the area called "alcohol and traffic safety".

Beverage Alcohol in Canada

Alcoholic beverages have a prominent place in society and play an important role in social behaviour. Alcohol is the only "recreational" drug both socially and legally acceptable. Its widespread use for many purposes, especially intoxication, seems firmly rooted. Social control policy seems to reflect public demand for its continued availability at a reasonable price. Alcohol-related health and safety problems affect many, but only small percentages of those who consume beverage alcohol. Prevailing attitudes and practices imply a general tolerance for the present level of personal and social costs associated with alcohol. The inference is that, so far as society is concerned, benefits outweigh costs.

Statistical reports and special studies describe patterns of alcohol use and estimate benefits and costs.

- o People aged 15 years and older consume on the average 11.27 litres (2.48 gallons) of absolute alcohol a year. The trend of increasing consumption has moderated since the mid-1970's. Total consumption of alcohol reflects the sale of beer (50%), wine (13%), and spirits (37%).

- o Patterns of alcohol use (how much and how often alcohol is consumed, where and when alcohol is consumed, and the characteristics of those who drink) remain poorly defined.
- o About 80% of Canadians over the age of 14 years drink beverage alcohol at least occasionally. From 12 to 27% of drinkers have 14 or more drinks weekly.
- o Men drink more often and more heavily than women. The proportion of alcohol users is highest among persons 20-39 years of age.
- o The "alcohol-addicted" population in Canada was estimated at 635,000 people in 1978--about 1 in 20 adult drinkers.

The benefits of beverage alcohol range from the tangible (economic) to the intangible (e.g., personal relaxation, social facilitation).

- o The alcoholic beverage industry contributes to the economy by providing employment and a readily taxable product. In 1980, over 19,000 persons earned about \$500 million in alcohol-related work. National advertising (\$91 million) is a major source of revenue for the electronic and print media. Canadian governments collected about \$3 billion in the control and sale of beverage alcohol in 1978-1979, about 3% of their total revenue.
- o Consumer demand for beverage alcohol indicates the reality of intangible benefits. The benefits may be small on any given occasion, but they are direct and certain for the large majority of drinkers. The adverse consequences of drinking excessively--accidental death or injury, serious disease--may be great, but are perceived as very unlikely and involving only a small minority of drinkers.

The costs of beverage alcohol include problems related to physical, mental, and social health and safety.

- o Deaths directly linked to alcohol totalled about 3,500 in 1980 (liver cirrhosis, 77%; alcoholism, 14%).
- o In 1978, 47,000 alcohol-related cases accounted for 1.3% of hospital discharges and 1.6% of patient-days. Alcohol-related problems accounted for 17% of first admissions and 14% of readmissions to in-patient psychiatric hospitals.

- o The indirect costs of alcohol use (e.g., chronic medical conditions, accidental death and injury, child abuse, marital problems, social aggression, violent crime, and suicide) are less easily measured, but are far greater than direct costs.

An old dilemma involves satisfying the express demand for beverage alcohol and minimizing their adverse effects among those who drink excessively or inappropriately. Resolving this dilemma has fallen largely to policymakers who, in the face of special interests and public pressure, are asked to decide how--and if--something effective can be done. The complexities of alcohol use patterns and the maze of present alcohol control policies should not be minimized as potential barriers to progress. Those concerned with specific alcohol-related problems (e.g., the alcohol-crash problem) would do well to appreciate and understand the broader social context and importance attached to beverage alcohol.

Motor Vehicle Transportation in Canada

Motor vehicle transportation is so integral to modern industrial society that its frequent comparison to the human cardiovascular system conveys an accurate though hackneyed impression. The motor vehicle has become essential to commerce and recreation. The private automobile represents freedom to travel, personal mobility, and rapid, comfortable, convenient transfers from point to point. Its ubiquitous presence and our strong reliance on it is reflected in massive investments (highway construction and maintenance, motor vehicle manufacturing) and in the large percentage of Canadians licenced to drive.

- o Manufacturers of motor vehicles and motor vehicle parts rank second and seventh among the top ten industries in Canada.
- o In 1980-1981, Canada had 270,000 kilometers of roads and highways under federal or provincial jurisdiction and 660,000 kilometers of roads and streets under municipal jurisdiction.
- o Motor vehicle registrations totalled about 13.7 million in 1980, 75% of which were automobiles.
- o In Canada, with a population of 24.6 million, 14.4 million driver licences were in force in 1982.
- o Canadians travelled an estimated 180 billion vehicle-kilometers in 1982.

The road transportation requires substantial investments in public funds; it also provides a significant source of governmental revenue.

- o Expenditures for roadway construction, maintenance, and administration now approaches \$5 billion annually.
- o Provincial revenue from vehicle and driver licensing, fuel taxes, and other sources was about \$2.2 billion in 1976.

Benefits from motor vehicle transportation include economic opportunity, commerce, socialization, personal mobility, and a multitude of other travel-related "commodities". Costs, however great and essential the benefits, are substantial. Road accidents may cost Canadians in excess of \$2.5 billion, including lost productivity, property damage, and hospital and medical expenses. Recent decreases in accident and casualty rates may be more than offset by increases in health care, motor vehicle repair, and insurance costs.

From the perspective of transportation safety, the "road accident problem" becomes small relative to the use of the system. Accident rates tell a story of steadily improving safety and increasing benefit to society. From the perspective of public health, deaths, injuries, disabilities, and other losses rank high among all causes of mortality and morbidity. As a social issue, prevention of road trauma ranks low among other social problems. The nature of the road-crash problem--large in aggregate, nearly nonexistent at the level of the individual--contributes to its low priority in policymaking spheres and to prevention efforts receiving funding inconsistent with its magnitude.

Alcohol and Road Accidents: Insoluble Problem?

The area known as "alcohol and traffic safety" deals with the complex intersection of two complicated spheres of human behaviour. The locus of concern--the alcohol-crash problem--is common to those active not only in traffic safety but also in the alcohol abuse field. The widespread use of alcohol in the driving-age population--or, alternatively, the frequent and necessary use of motor vehicles in the drinking-age population--poses a dilemma to the related fields of public health and transportation safety: How to separate these very prevalent, legal, and socially acceptable activities to reduce losses from road accidents due to alcohol-impaired driving.

Although the rate of increase in alcohol use may be levelling off, there is evidence of progressive integration of alcohol use into an increasingly broad range of social activities. As this trend continues, the probability that driving will occur following alcohol consumption increases. As use of the transportation system expands, particularly into the realm of "nonessential" uses, the probability of driving after drinking will likely increase as well. Transportation and alcohol are both viewed as essential to socialization and social interaction. The vast majority of drinking occasions are associated with pleasurable outcomes. Serious alcohol-related problems affect only the minority of drinkers; acute problems occur only on a very small percentage of drinking occasions. Similarly, although these transportation system may contribute substantially to public health problems, serious accidents remain rare events affecting a small minority of the population, with an extremely low probability of occurrence per driving occasion. Given the potentially substantial costs involved in attempting to further reduce losses related to alcohol use, transportation, or a combination of the two, it might be tempting to conclude that the problems are intractable and that societal resources would be more profitably directed elsewhere.

Finally, existing social conditions seem likely to inhibit progress in the field of alcohol and traffic safety. Some sectors of society encourage drinking as an adjunct to daily living and promote the purchase and use of automobiles as a preferred mode of transportation. Other sectors discourage both drinking and driving. This social schizophrenia, reflected in the public media, manifests itself most acutely in government. Some departments collect vast amounts of needed revenue from taxes and licencing fees, and even subsidize the manufacture and distribution of alcohol and motor vehicles, while other departments exist to manage the consequences of misuse of these products. The alcohol-crash problem may have effective solutions, but can all the disparate elements of society ever be persuaded to accept them?

THE MAGNITUDE AND CHARACTERISTICS OF THE PROBLEM

The study of alcohol and road accidents began over fifty years ago. Because emphasis has always been placed on "doing something about the problem" and not on understanding it, research taken as a whole has

rarely evidenced the systematic, methodical inquiry common to other scientific endeavours. Early studies demonstrated what many already believed as true.

- o alcohol can impair skills related to driving;
- o increasing amounts of alcohol produce greater impairment; and
- o drivers impaired by alcohol are more likely to have road accidents than nondrinking drivers.

Research has refined knowledge in these areas. Given uncritical acceptance of the statement that "alcohol causes road accidents", however, in-depth studies to understand the problem and to support the development of effective intervention strategies and programs have yet to receive funding needed to advance the state of knowledge much beyond "common wisdom".

Defining the problem of alcohol and road accidents involves a structured process of discovery. To summarize what is known, a certain order must be imposed on the hodgepodge of published studies. Experimentation and epidemiology are main categories of research to define drinking-driving problems. These basic approaches are complementary, each having limitations due to practical, legal, ethical, and theoretical constraints. Experimental studies investigate how and how much alcohol affects measures of driving performance. Epidemiologic studies establish the degree and nature of the association between alcohol and road accidents in the "real world".

Throughout the long history of research to define the problem, blood alcohol concentration (BAC) has remained an essential element. The special chemical and physical properties of ethyl alcohol allow its simple detection and quantitation in body fluids, including breath. Chemical tests to measure BAC are the vital link between experimentation and epidemiology and, of course, the cornerstone of legal counter-measures.

Alcohol and the Ability to Drive Safety

Experimental studies on the relationship between the consumption of beverage alcohol and driving impairment have had greatest relevance for interpreting the significance of blood alcohol concentrations. Most

laboratory tests of driving-related skills, however, bear little resemblance to actual driving. The great number of studies have focused more on demonstrating small though statistically significant effects on precise measures of behaviour. Some skills are affected by BACs equivalent to one or two drinks. Left unanswered is whether any degree of influence by alcohol translates into an inability to drive safely.

For example, studies have indicated that moderate BACs (less than the legal limit of 80 mg%) do not so adversely affect overall performance of the driving task as to be noticeable by observers. In general, the practical meaning of experiments remains in question. "Impairment" of certain skills may not equate with "unsafe" in the larger context.

At the root of this issue is the fact that the actual driving task is poorly defined. Moreover, the emphasis on establishing and justifying legal BAC limits has detracted from the study of variability in human response to alcohol. The focus on driving skills has all but ignored alcohol's effects on attitudes toward safe driving and risk taking. Few high-risk groups of drinking drivers have been studied. These and other factors have left large gaps in knowledge about alcohol-impaired driving and its relation to road accidents. A provocative unanswered question is why the vast majority of drivers impaired by alcohol do not have road accidents.

Alcohol and the Risk of Road Accidents

To demonstrate that alcohol in and of itself increases accident risk, researchers have used epidemiologic methods for the study and control of infectious disease. They compared accident- and nonaccident-involved drivers and pedestrians for their use of alcohol and other factors (e.g., time of day, day of week, and place of accident; age and sex of subject; etc.). As BAC increases over legal limits, accident risk also increases.

"Increased risk", however, does not necessarily mean "very likely". The actual probability of a fatal road accident may be about one in three million driving trips. Drinking drivers with a risk twice that of the average nondrinking driver would have a fatal accident once every one and half million driving trips (each trip occurring at a BAC associated with a "relative risk" of 2). Drivers with BACs indicating 30 times the

risk of the average nondrinking driver would have a fatal accident once every 100,000 driving trips.

Road accident risk varies greatly, not only as a function of BAC, but also as a function of other factors: age, driving experience, drinking experience, and time of day, to name a few. Studies have shown that personal characteristics and social circumstances of alcohol-impaired drivers may contribute to (and partly explain) their more likely involvement in road accidents. The historical focus on legal BAC limits has not encouraged the study of high-risk drinking drinkers. The relationship between BAC and accident risk oversimplifies a very complex phenomenon.

Alcohol and Road Accidents in Canada

Present knowledge does not answer the following questions:

- o How many road accidents are due, at least in part, to alcohol-impaired driving?
- o How many victims are killed and injured by alcohol-impaired drivers each year?
- o How many road accidents occur in which the person responsible was alcohol-impaired and had one or more previous convictions for alcohol-related driving offences?

Special studies to gather needed information are rarely funded. In many cases, data simply are not obtained and recorded by responsible agencies.

To estimate the magnitude of the alcohol-crash problem in Canada, therefore, we have to ask a less precise question: "How many road accidents involve alcohol-impaired people?" The definition of alcohol impairment is usually based, of necessity, on the legal BAC limit (80 mg% in Canada). "Alcohol-involvement" with BACs exceeding the legal limit is often used as an indicator (not proof) of "alcohol-caused" road accidents. Based on the best available information, this approach to estimating the magnitude of the alcohol-crash problem results in the following figures:

- o 50% of fatal road accidents;
- o 25-30% of injury road accidents; and

- o 5-10% of property-damage-only road accidents.

Applied to Canada in 1982, we can estimate that alcohol may have played a contributory role in

- o 1,800 fatal accidents (50% of 3,597);
- o between 39,200, and 47,000 injury accidents (25-30% of 156,779); and
- o between 24,300 and 48,600 property damage accidents (5-10% of 485,801 [1979 data, the last available]).

More sophisticated analyses have estimated the number of road accidents that would not have occurred had all drivers not consumed any alcohol. Based on one such analysis, expected reductions in road accidents were:

- o 23.7% of fatal road accidents;
- o between 8.2 and 15.8% of injury accidents, and
- o 5.7% of property-damage-only accidents.

Applied to Canada in 1982, the number of road accidents prevented if no one had driven after drinking would have been:

- o 863 fatal accidents (24% of 3,597);
- o between 12,500 and 25,100 injury accidents (8-16% of 156,779); and
- o 27,700 property damage accidents (5.7% of 485,801 [1979 data]).

Discussions of the magnitude of the alcohol-crash problem might seem unduly academic. Nevertheless, in the absence of precise measures of the magnitude of the problem over time, the effectiveness of the overall societal response cannot be known.

Drivers Who Drink/Drinkers Who Drive

People who drive after drinking represent the critical link between beverage alcohol and road accidents. Unfortunately, the dynamic nature of drinking-driving behaviour makes it difficult to answer the apparently simple question "Who is the drinking driver?". Past studies offer some insight into personal and social dimensions of drinking and driving. Present knowledge, while providing directions for further research, does not offer an adequate basis for dealing with the diversity of people who have drinking-driving problems.

Basic findings from research studies include the following:

- o Large percentages of licenced drivers report driving after drinking.
- o Roadside surveys conducted during nighttime hours on weekends consistently find that 6% of drivers in Canada have BACs exceeding the legal limit.
- o However nighttime drivers are grouped (by age, sex, education, employment, etc.), substantial percentages of drinking drivers are found. (This finding suggests that "drinking drivers" might represent very well the larger population of drivers who also consume alcohol on occasion).
- o Roadside surveys done in Canada in 1974, 1979, and 1981 indicated that little, if any, change in drinking-driving practices had occurred.

Persons arrested and convicted for alcohol-related driving offences are an important target group for programmatic efforts. Studies have "profiled" the "average offender"; however, the only variables that distinguish the convicted from other drinking drivers to any meaningful extent are those related to alcohol use: quantity and frequency of beverage alcohol consumption and BAC. Although a few general target groups have been identified--for example, young drivers and "problem drinkers"--research shows that very few groups of persons who both drive and drink are not part of the alcohol-crash and alcohol-impaired driving problems.

The problem with published "profiles" to identify "high-risk" and "problem" drinking drivers is their lack of depth in description. The personal characteristics and social circumstances of drinking drivers remain unexamined. The few comprehensive studies published to date strongly point to factors related to psychological and situational stress as an important casual link. Scientific, legal, and other issues do complicate the identification of high-risk groups for action. The limited state of knowledge concerning drinking drivers, however, remains the major barrier to developing effective programs.

To advance the state of knowledge and to support the development (and refinement) of programs for high-risk groups, the following requirements seem paramount:

- o improved methods and techniques of measuring the attributes of drinking drivers, especially personal characteristics and social circumstances;
- o longitudinal, prospective surveys (cohort studies) of drivers who drink, to assist in developing more accurate "predictive models"; and
- o integration of studies to define high-risk subgroups for on-going and planned action programs.

To advance knowledge and understanding of drinking drivers does not mean "more research" as an alternative to action. In this context, a strategic approach that combines action, evaluation, and research has great value. Especially for persons convicted of alcohol-related driving offences, knowledge can advance in the process of dealing with alcohol-impaired driving, and at lower cost.

PART TWO

A REVIEW OF SOCIETAL RESPONSES TO THE ALCOHOL-CRASH PROBLEM

THE ALCOHOL SAFETY COMMUNITY IN RELATION TO THE PROBLEM

Ideally, the Alcohol Safety Community consists of a group of individuals with a shared mission--reducing the magnitude of the alcohol-crash problem. As a community, they work together in a complementary and coordinated manner to achieve that end. Unfortunately, an Alcohol Safety Community with these attributes does not exist. Individuals active in the field divide sharply along certain lines and form multiple (and largely independent) communities. The activities of the various communities become counterproductive rather than complementary, despite a common cause.

The Two-Communities Model

Like other problem-solving groups, the Alcohol Safety Community can be said to consist of two units, distinguished by their respective role or function--research and countermeasures. Although lines of demarcation are not always precise, this division is readily apparent in virtually every review of the literature on alcohol and traffic safety. Neither community, however, seems to have a clear mandate for providing the requisite research that will facilitate the development of effective solutions. Moreover, the very existence of a Countermeasures Community

strengthens the belief that solutions do exist. Thus, programs have been implemented in the absence of the appropriate problem-solving research. Predictably, the results have been unimpressive. Since the antagonism of these two communities leads to the perpetuation of ineffective (or, at best, highly inefficient) responses to the alcohol-crash problem, each community justifiably views the activities of the other as a major impediment to the development and implementation of more effective solutions.

To date, the Research Community has produced literally hundreds of epidemiological studies documenting the extent of alcohol use among drivers on the road. Similarly, hundreds of "experimental/laboratory" studies have been conducted, demonstrating the effects of alcohol on psychomotor, behavioural, and other skills related to driving. While sampling and measurement procedures have become increasingly refined, one cannot help but question the contribution of much of this effort to substantive knowledge--particularly knowledge relevant to solving the problem.

Even if one considers the setting (or resetting) of legal BAC limits as a countermeasure based on research, it is clear that little of the more recent research effort has been devoted to an active search for solutions to the alcohol-crash problem. Little, if anything, is known at present about the most basic of questions, such as why some people choose to drive while impaired and others (presumably) refrain. The overwhelming amount of research seems to have done little more than provide on-going reaffirmation of the existence of the problem and the need for effective action. Relatively little, if any, research has focused on determining what the effective action might be.

The virtual absence of such research may be, paradoxically, attributable to the very existence of a separate Countermeasures Community. Because there is no shortage of proposed solutions to the alcohol crash problem, only very limited resources are devoted to a search for more solutions. Perhaps less than 0.5% of the preventive effort in Canada is devoted to research, with the remaining 99.5% directed to implementation of solutions.

The generally negative results of evaluations that assess the outcome of various programs have tended not to refine knowledge about how best to deal with the problem, but rather to feed general skepticism about the effectiveness of the overall effort. Members of the Countermeasures Community, who are paid to produce solutions that work, argue that the alcohol-crash problem persists in spite of their valiant efforts and their effective (albeit, underfunded) programs. Indeed, the only reason progress hasn't been more rapid is that their programs have not received the necessary level of financial support. On the other hand, when members of the Countermeasures Community are asked for new, more effective solutions to the alcohol-crash problem, proposals abound.

Members of the Countermeasures Community do not often promote the notion that no further research is required. On the contrary, they are very willing to acknowledge the desirability of further information. They do point out, however, the need for immediate action to ensure that the situation does not continue to deteriorate while they await new research breakthroughs. Thus, it is difficult for members of the Countermeasures Community not to view research-based criticisms of the effectiveness of the overall effort as detrimental to the common cause.

From Two Communities to Multiple Communities

A variety of agencies--for example, those active in addiction treatment, education, traffic safety, and law enforcement--have a shared responsibility for dealing with elements of the alcohol-crash problem. Each agency approaches the problem in a qualitatively different manner with the array of tools at its disposal--concepts and methods initially devised to deal with problems that are, in varying degrees, similar in their nature and characteristics.

Individuals working in each of these areas consider that their own efforts provide THE solution to the problem. At the extreme, each of these approaches does hold the promise of effectiveness. Accordingly, there is no general consensus in the Countermeasures Community on how best to proceed, nor are there any clear criteria for choices among alternatives. Finite resources preclude doing everything all at once. The lack of consensus combined with limited resources makes it unlikely

that any one approach will achieve the level of support required for a meaningful impact on the problem. This also results in a level of funding insufficient to mount a program capable of achieving a favourable empirical evaluation.

The Decision-maker's Dilemma

The Alcohol Safety Community approaches the decision-maker with a relatively united front--researchers and practitioners together acknowledge that the alcohol-crash problem still exists, that it persists at an intolerable level, and that further action is required. This unified demand for action places the problem on the "agenda of political controversy" and initiates the search for alternatives. The decision-maker solicits input from experts regarding what can or should be done. At this point, the complications begin.

When decision-makers ask why, given the magnitude of the current effort, the problem remains at an intolerable level, they receive two different responses. Researchers argue that the problem persists because past responses have been misdirected and futile, citing some 50 or more individual evaluations of informational, educational, rehabilitative, and law-based measures. In contrast, practitioners argue that the problem persists in spite of their best efforts, noting how much larger the problem would be in their absence.

A similar disagreement arises when decision-makers ask what can be done to alleviate the problem. The Countermeasures Community deluge decision-makers with solutions. Researchers repeat their contention that none of the available solutions can be expected to produce a sustained reduction in the alcohol-crash problem.

The decision-maker, convinced that the problem persists and that efforts to reduce it have priority, realizes that action, not research, will "do something", at least in the short term. Moreover, by the time needed research has been done, the problem itself may have reached crisis proportions--or, alternatively, the crisis may have long since passed. The decision-maker may also realize that the two (or more) communities agree on one point: Although nothing seems to work, this does not mean that present programs are necessarily ineffective. Therefore, until

"better", "more effective" tactics become available, existing programs should be maintained, or improved, "to keep the lid on the problem". To curtail programs with the problem at "intolerable" levels might engender unwelcome criticism at the very least.

Thus, due in part to the pronounced lack of direction from the Alcohol Safety Community and in part to the absence of criteria for choosing alternative directions, current policies and programs continue, maintaining the status quo. If history best predicts the future, this scenario will likely describe the overall societal response to the alcohol-crash problem for years to come.

EFFECTIVENESS OF THE EFFORT AS A WHOLE: ALTERNATIVE PERSPECTIVES

Slow but steady progress, or no progress at all in dealing with the alcohol-crash problem? This issue underlies the consideration of future initiatives and the choice among alternative directions. The resolution of the issue depends greatly on one's perspective.

Expectations concerning the effectiveness of future efforts--if defined as increasing the scope or intensity of present efforts--are guided to some extent by the past success or failure of similar activity. To the degree that programs have produced a slow but steady decrease in the magnitude of the problem, expansion of activities would predict continued progress. To the degree that past efforts have failed to produce results, questions about why efforts should continue as before, and whether or not increased activity will produce any benefit, seem appropriate. In assessing the effectiveness of past or ongoing efforts, lack of clear evidence, however, can still be interpreted as failure (that is, "no effect") or success (that is, "keeping the lid on the problem").

Those accepting the no-effect hypothesis frequently cite such data as the lack of change over time in the rate of alcohol-involvement in fatal traffic crashes; the lack of change over time in the rate of impairment among drivers on the road; the present high rate of alcohol-involvement in serious traffic crashes; the negative or equivocal results of program evaluations; or the short-lived effects associated with very substantial changes in the level of effort, for example, the experience of various countries in introducing breath-testing enforcement programs. This

dismal track record is generally attributed to an inadequate knowledge base for countermeasure efforts, or the inappropriate expectations derived from an emphasis on alcohol as a causal variable, rather than as an indicator variable identifying groups of risk-taking drivers.

There are few who would deny that driver impairment contributes to the likelihood of serious crash involvement. Many would argue, however, that impairment is neither a necessary nor a sufficient condition for collision occurrence. Rather, drivers with high BACs may have a marked predisposition towards risk-taking. This willingness to take excessive risk while driving, rather than the impairment itself, may account for a substantial proportion of the overrepresentation of impaired drivers in serious crashes.

This perspective has greater applicability to the problem than more narrow theoretical formulations that underlie programmatic responses. As a model, it equally "explains" the same phenomena; it is equally consistent with existing empirical evidence; and it overcomes existing anomalies that contraindicate narrower models. It also applies to a broader range of phenomena and a broader range of alcohol-related damage. Finally, it provides reasonable support for predictions precluded by narrower frameworks of thought.

This alternative approach suggests that even if countermeasures are successful in substantially reducing driver impairment, the impact of this change on actual crashes may be considerably less. Furthermore, to the extent that driver impairment serves to identify groups of drivers who differ markedly from the norm in terms of their tendency to take risks, existing countermeasure strategies--which concentrate largely upon warning drivers about the risks involved--are likely to have limited effectiveness. There is an increasing recognition that such drivers may be largely impervious to legal and other threats.

On the other hand, there are other data to support the hypothesis of slow-but-steady progress. For example, per capita alcohol consumption has increased over time; therefore, the observation that alcohol involvement in crashes has not increased becomes a sign of success. Similarly, liberalization of alcohol control policies has correlated with the increased number of alcohol-related crashes. Therefore, a

constant level of alcohol-related fatalities would be a sign that successful inroads have been achieved. There is some reason to believe, then, that slow but steady progress has been the norm rather than the exception. Continued progress--or at least no further deterioration in the problem--can be expected as long as increases in program resources keep pace with increases in countervailing forces.

Based on the foregoing, it is apparent that the issue is not likely to be the effectiveness of the overall effort, but rather its cost-effectiveness or lack thereof. Even the most optimistic assessments reveal current approaches to be a very costly route to loss reduction. Thus, to the extent that meaningful reductions are to be the objective of future efforts, serious questions must be raised regarding the level of increase in future efforts that will be required to prevent the problem from deteriorating further, or to produce meaningful reductions in the absolute magnitude of the problem. It will also be important to assess whether each additional unit of prevention will prove increasingly costly, and whether the existing effort can be made more cost-effective than it appears at present.

EXISTING COUNTERMEASURES REVISITED

Programs to reduce the alcohol-crash problem proceed, at least implicitly, from some underlying theory about:

- o why people choose to drive while impaired (DWI);
- o why persons who choose to DWI have disproportionate rates of crash involvement; and
- o the relationship between the planned "intervention" and underlying "causal links".

Many "contending theories" can be articulated, but most are poorly explicated, limited in their applicability to the problem, and occasionally contradictory. Each of nine contending theories reviewed has (1) an "irrefutable core" (or definitional truism) referring to some determinant of the alcohol-crash problem; and (2) an implicit series of causal links between planned actions and desired outcome.

1. The "Problem-drinker" Treatment Paradigm: Reducing the alcohol-crash problem by reducing the frequency of excessive alcohol consumption.

2. The Problem-driver Paradigm: Reducing the alcohol-crash problem by reducing the frequency of DWI decisions, given the occasion for decision.
3. Automotive-safety (Ergonomics) Paradigm: Reducing the alcohol-crash problem by removing the decision to DWI.
4. Passive-technology Paradigm: Reducing alcohol-crash damage by reducing the likelihood or severity of crashes for impaired drivers.
5. The Public Information/Education Paradigm: Reducing the alcohol-crash problem by providing knowledge required for informed decision-making.
6. The Alcohol-availability Paradigm: Reducing the alcohol-crash problem by reducing the availability of alcohol.
7. Removal of Driving Privileges: Reducing the alcohol-crash problem by removing the decision to drive.
8. Sobering Remedies (And Other Alternatives to DWI): Reducing the alcohol-crash problem by increasing the possibility or desirability of non-DWI alternatives.
9. Enforcement and Punishment: Reducing alcohol-crash losses by increasing the perceived risk (or disutility) of the decision to DWI.

The theories represent largely independent ways of thinking about the problem. Programs based on them reflect the fragmented nature of the overall societal response to the alcohol-crash problem. Because the theories are largely incapable of producing reliable predictions of loss reduction, they offer little guidance for choice among alternative courses of action. The weak theoretic basis of the overall societal response, unless remedied, will hinder well-intentioned efforts to increase the effectiveness of present programs.

This analysis suggests the need for a comprehensive, research-based, theoretic foundation for the overall societal response to the problem. The known complexity of the problem indicates the need for a systematic, integrated approach. The separate theories underpinning numerous and diverse programs do not provide the broad base required for the evolution of the societal response to the alcohol-crash problem.

EVALUATION: THE ELUSIVE MISSING LINK

Evaluation is a process whereby the outcomes of a program or intervention can be compared to the aims or objectives of that program. Historically, and for that matter continuing today, evaluation is usually revered by the Research Community and feared by the Countermeasures Community. This is so largely because most attempts to evaluate the effectiveness of programs have been zero-sum (all or nothing)--the program achieves the bottom line or it does not. It should, however, be evident by now that it is most unlikely a single program will show unequivocal reductions in the alcohol-crash problem. Indeed, most evaluations of alcohol countermeasures have shown little discernable impact, leading the Research Community to recommend their abandonment. On the other side, the Countermeasures Community has been equally adamant in its claims that such evaluations were methodologically weak, measured inappropriate outcomes, or suffered in other ways, or that the program itself could not be expected to achieve significant effects given its limited resources. Much unproductive debate and hostility has been generated as a result of evaluations. Much heat but not much light.

In fact, if one were to produce the appropriate "box scores", the Countermeasures Communities would be ahead comfortably. Very few programs have been discontinued because of the negative results of evaluation. Nonetheless, the perpetuation of efforts that have questionable value is decidedly difficult to justify.

It is argued here that part of the problem has been an inappropriate use of (or, at least, perception of) the role and function of evaluation. Rather than using it as a tool for eliminating or "wrecking", evaluation can provide constructive information both for the Research Community and the Countermeasures Community, not to mention decision-makers.

For the Countermeasures Community, even if an evaluation fails to yield evidence of overall impact, more detailed appraisals may show that the overall effect masked specific ones--perhaps under some conditions or for some target groups the impact was there. Even if such analyses fail to provide evidence of effectiveness, the results should not be wasted by simply recommending the program be discontinued. The results must be

viewed as heuristic--providing evidence for insights into why the program results were not achieved. If the process is viewed in this way, as an exercise in improvement, then evaluation will be seen as less threatening.

For the Research Community, evaluation can be viewed as more than simply a tool to check on the performance of the Countermeasures Community. Inasmuch as programs can often be viewed as experiments--tests of propositions or hypotheses--the results of these experiments should provide valuable data for the formulation or refinement of theory.

It is suggested here that to enhance the constructive use of evaluation, it should not be treated as an element or tool that is "owned" by the Research Community or the Countermeasures Community. Rather, the functions of evaluation should be stressed--its purpose is to generate information about the implementation of action programs and about their effect. As such, its functions are clearly integrated with those of both Communities and should serve to enhance their respective and shared goals.

PART THREE

FUTURE STRATEGIES AND PRIORITIES

This review of research and countermeasures related to the alcohol-crash problem has addressed two basic questions:

1. What do we know?
2. Where do we go from here?

Both questions tend to lead more to debate than to consensus. The need for more information or for increased understanding often depends on the countermeasure or action program favoured by those concerned. Each individual, group, or agency seems to have a particular point of view and a separate agenda for consideration. The general issue of future strategies and priorities thus becomes one of "either-or" rather than a search for common ground.

Recent developments in the field--loosely termed alcohol and road accidents--indicate that discussion of future strategies and priorities is not only appropriate but also necessary. No blueprint for effective

social action to end the alcohol-crash problem yet exists. Nonetheless, requirements, preconditions, and courses of action to reduce drinking-driving problems have become clearer.

Lessons from past experience guide the choice of options for future directions.

- o The demand for action to which decision-makers respond comes less from research than from the people. Public support of--and involvement in--social and political action at the grassroots level is a critical (and hitherto missing) factor in the overall societal response to the alcohol-crash problem.
- o Ownership of the alcohol-crash problem (in the social and political sense) now extends far beyond those who study the problem (Research Community) and those who deal with it (Countermeasures Community). Special interests (e.g., industry, citizen activist groups) have become intimately involved.
- o Alcohol-impaired driving and alcohol-related road accidents as social problems have broad health, safety, and legal implications. The problem transcends narrower definitions of "alcohol and traffic safety" common to the past. A broader perspective has become essential.
- o Given the nature and complexity of the problem, specific measures advocated in the name of reducing alcohol-crash losses require careful assessment for their broader social impact and costs. More complete definitions of "the problem" are needed. Beyond the use of motor vehicles and alcohol, the very structure of society and culture-based social practices contribute to the magnitude and persistence of the problem. Separating drinking from driving, or driving from drinking, admits to no simple solution, even in the abstract. Strategic (not just tactical) considerations become paramount.
- o Increased concern about "drinking-driving" problems has attracted many groups, organizations, and agencies into the field. To avoid "reinventing the wheel" and the traditional fragmentation of effort, two lessons from past experience have to receive greater acceptance: (1) law-based, punitive measures alone cannot produce large, sustained reductions in the magnitude of the problem; and (2) any and all "solutions" to the problem have a role to play in the overall societal effort to deal with drinking-driving problems.

- o The central issue becomes: How can the many agencies, organizations, and individuals--which represent specialized interests, different disciplines, and separate areas of responsibility--evolve into the type of networks required to develop and implement comprehensive strategic approaches to the problem?
- o A fundamental, philosophic issue underlies the question of future strategies and priorities: responsibility for the alcohol-crash problem. One view assigns full blame to the "drunk driver". Another points to society, political structures, and culture-based social practices. Synthesis and integration of these polar views are much needed.

These lessons from past experience--not all of which have received universal acceptance--provide a starting point from which to consider options for future action.

As recommended by experts in the field, fundamental to future action are major, coordinated, long-term efforts. A strategic approach combining many tactics--unified by a comprehensive, operational plan--best satisfies the many needs critical to this area. Of primary importance is a detailed and implementable strategic plan, one that combines and integrates action, evaluation, and research components. Commitment, leadership, and support of governments (Federal, Provincial, and local) are essential prerequisites to the development of strategic approaches to the problem. Such approaches, however, represent a process, not a panacea.

Development as well as implementation of strategic approaches become "next steps" toward an effective societal response to drinking-driving problems.

Further efforts--beyond the idea of a strategic approach and its general outline and philosophy--involve the following:

- o continue the process of strategic planning, at national, provincial, regional, and local levels;
- o increase communication among key actors and stakeholders in the field;
- o facilitate and encourage interagency cooperation and collaboration, with emphasis on networking; and

- o confront and resolve the issue of funding, to ensure that resources commensurate with the magnitude of the problem will adequately support effective action in the future.

Failure to support comprehensive, long-term initiatives will (with future hindsight) reflect more on society than on the importance of the problem.

Unfortunately, a component regarded by many as critical to the overall societal response to the alcohol-crash problem--namely, research--is still perceived as "doing nothing" or "studying the problem to death". In contrast to areas in Medicine, the function and role of research in dealing with drinking-driving problems is often questioned and nearly always relegated to very low priority. This perception of research and its consequences stems partly from the belief that present knowledge is adequate for immediate action. To a limited extent, this belief seems reasonable. However, the almost imperceptible growth in knowledge; the remarkable persistence (and consistency) of the problem; and the many unanswered questions raised by experts in the field raise serious doubt about the adequacy of present knowledge.

Concepts and beliefs about the function and role of research also contribute to the low priority of understanding the problem with which we hope to deal effectively. Research does not simply measure the magnitude of the problem and describe drinking drivers. Research as an integral, functional component of comprehensive programs dealing with the problem involves creating, processing, and communicating information. Information about the nature and antecedents of drinking-driving problems is critical to the evolution of policy, plans, and programs. Policy analysis and program development are only two activities that intimately involve "research". Greater acceptance of the need for research and greater appreciation of its value are crucial steps toward reducing alcohol-crash losses. In the absence of greater understanding of the problem, effective control seems unlikely.

A new, emerging perspective has accompanied the grassroots movement to reduce alcohol-crash losses. This perspective does not deny the role of law-based, punitive measures; it does, however, emphasize the need for people taking responsibility for the problem on an individual and

personal basis. Taking action, therefore, not only involves lobbying government but also participating actively in community-based initiatives.

The concept of "community-based initiatives" identifies concerned members of communities as principal agents for change of social norms and practices related to drinking, driving, and drinking-driving. This general approach, however, avoids the "us-versus-them" orientation that characterizes the thrust of most citizen activist groups. Comprehensive efforts in, by, and for the community, therefore, would also avoid sole reliance on punitive measures. Rather, what is called for is a broad-based, multifaceted program to change the social climate and to decrease the acceptance (and necessity) of driving after drinking too much. Essential to this approach are greater understanding, cooperation, and communication among individuals, groups, and organizations in the community. For a community as a whole to undertake a strategic approach to shift (local) social norms and to influence individual choice-behaviour will require a great firmness of commitment--and a strong conviction that "behaviourmaking" is not the same as "lawmaking".