



What are the most effective and cost-effective interventions in alcohol control?

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ABSTRACT

This is a Health Evidence Network (HEN) synthesis report on the most effective and cost-effective interventions in alcohol control. Evidence shows the most effective approach is to implement a combination of: increases in alcohol prices, reduction in the availability of alcohol, and measures against drunk driving and underage drinking. A report from the Health Evidence Network reviews the evidence on effective and cost-effective interventions in alcohol control and outlines considerations for policy-making.

This report is HEN's response to a question from a decision-maker. It provides a synthesis of the best available evidence, including a summary of the main findings and policy options related to the issue.

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Summary

The issue

Europe plays a significant role in the production, trade and consumption of alcoholic beverages; it also carries a heavy social and economic burden of alcohol-related problems. Alcohol consumption is estimated to be responsible for about 10% of the total disease burden, increasing the risk of liver cirrhosis, certain cancers, high blood pressure, stroke and congenital malfunctions, among other problems. Furthermore, it increases the risk of many social problems such as family disintegration, absenteeism, poor productivity, financial hardships, unintentional injuries, traffic accidents, criminal behaviour, violence, homicide and suicide.

Findings

There is substantial evidence showing that an increase in alcohol prices reduces consumption and the level of alcohol-related problems. In most countries and especially in countries with low alcohol tax rates, tax-induced price increases on alcohol beverages lead to increases in state tax revenues and decreases in state expenses related to alcohol-related harms. The effects of price increases, like the effects of other alcohol control measures, differ among countries, depending on such factors as the prevailing alcohol culture and public support for stricter alcohol controls. However, the effects on alcohol-related harms are definite and the costs low, making it a cost-effective measure.

In addition, stricter controls on the availability of alcohol, especially via a minimum legal purchasing age, government monopoly of retail sales, restrictions on sales times and regulations of the number of distribution outlets are effective interventions. Given the broad reach of all these measures, and the relatively low expense of implementing them, they all are highly cost-effective.

Furthermore, most measures against drunk-driving, such as sobriety check points, random breath testing, lowered blood alcohol concentration limits, suspension of driver's licenses, graduated licensing for novice drivers, and brief interventions for hazardous drinkers also receive high effectiveness ratings. There is good research support for these drunk-driving interventions. Thus these interventions are applicable in most countries and are relatively inexpensive to implement and sustain.

Server liability and enforcement of on-premise regulations combined with community mobilization seem to be strategies with some impact without being too costly. However, they do not reach off-premise drinking. Server training in responsible beverage service is unlikely to have an effect if it is not backed by the threat of suspending the licenses of those who continue to serve underage drinkers or intoxicated patrons.

If youthful drinking is seen as a specific alcohol policy problem, increasing the legal age limit for purchasing or selling alcoholic beverages is the most immediate and effective measure. Various educational approaches have been developed to reduce alcohol consumption. Although they are growing in popularity, there is little evidence of their effectiveness. Similarly, current research findings only show limited effects both on advertising and advertising bans.

Policy considerations

Most of the interventions mentioned are highly cost-effective, in that they are associated with considerable benefit at a generally low money cost. The most effective approach is to implement multiple policies of the following strategies: increase in alcohol prices, reducing the availability of alcohol, and measures against drunk driving and underage drinking.

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Introduction

Alcohol has significant adverse effects on the physical, psychological and social health of individuals, families and communities (1). Alcohol is a dependence-producing drug and an intoxicant. In European countries, alcohol is the most common intoxicant (2). Given the problems associated with alcohol use and abuse, there is growing interest in alcohol control measures.

Alcoholic beverages are legally sold and used in all European countries. The amount of alcohol consumption, drinking patterns and the culture of drinking, however, differ greatly in various countries (2, 3, 4, 5). For instance, in Iceland and Norway, former spirits-preferring countries, yearly total alcohol consumption, both recorded and unrecorded, is still less than six litres (counted as 100% alcohol) per capita, whereas the corresponding figure in wine-preferring France and Portugal or in beer-preferring Czech Republic, Germany and Ireland is over 11 litres of pure alcohol per capita (4, 6). In Romania, the per capita alcohol consumption is over 11 litres, almost half in the form of distilled spirits.

Alcoholic beverages are valued for many reasons. For many Europeans, alcohol use is mostly occasional or celebratory in nature, but in some countries it plays an important part in the everyday diet or as part of customary social intercourse. It is consumed in Europe mainly with meals, as a thirst quencher, as a means of socializing, as instruments of hospitality, and as an intoxicant (2, 7). In earlier times, alcoholic beverages were frequently also used as medicine. Today, it is known that there are cardio protective effects of regular light and moderate drinking (8). Consequently, drinking alcohol can bring both benefit and harm to individuals, families and communities, in both the short and long terms.

Sources for this review

The most important sources for this synthesis is the monograph *Alcohol Policy and the Public Good* by Griffith Edwards and his colleagues, published in 1994 (10), and later translated into eight languages, and its update materials, and the updated monograph under the title *Alcohol: No Ordinary Commodity; Research and Public Policy*, produced in collaboration with the World Health Organization (8), as well as databases such as the Cochrane Library, Econlit and the Alcohol and Alcohol Problems Science Database (ETOH) maintained by the National Institute on Alcohol Abuse and Alcoholism (NIAA), which were searched for relevant systematic reviews and important articles.

The issue

Alcohol consumption is associated with several somatic problems, such as liver cirrhosis, certain cancers, elevated blood pressure, stroke and congenital malfunctions. Heavy intoxication is related to several other kinds of problems, such as violence or accidental death. Furthermore, alcohol consumption increases the risk of many family, work and social problems such as financial hardship,

absenteeism, poor productivity and criminal behaviour (8). In Europe, alcohol consumption is estimated to be responsible for about 10% of the total disease burden (9).

A population's general level and pattern of drinking affect the prevalence of drinking problems. It is important to realize, though, that average consumption figures hide wide variation in individual levels of alcohol consumption and drinking habits. For instance, in any population there are people who abstain totally from drinking alcohol; the majority of the drinking population is composed of moderate or light drinkers; and heavy drinkers, even if a minority, consume quite a large part of the total alcohol intake. Adverse effects of drinking alcohol are diffuse and costly and they are not confined to a minority of easily identified heavy or problem drinkers or alcoholics (3, 8, 10). Many moderate or occasional drinkers also suffer from alcohol-related problems, especially when alcoholic beverages are used as intoxicants. On the other hand, most alcohol consumers must see drinking alcohol as beneficial, since they are willing to use part of their scarce economic resources to buy it. Just as alcohol consumption patterns and the culture of drinking varies greatly in different societies, the incidence and character of alcohol-related benefits and problems also vary (3, 8, 11).

Findings from research and other evidence

Policies dealing with alcohol

Formal alcohol control, that is authoritative decisions through laws, rules and regulations to control economic and physical factors bearing on the availability of alcohol, seeks to reduce the harmful effects of its use while recognizing its real and perceived benefits (8). It is directed at populations, organizations, health care systems and individual drinkers. Informal alcohol control takes the form of social norms or traditional customs. In many countries informal alcohol control has a stronger impact on drinking than formal policies (7).

All European countries have some form of legislation dealing with the production and sale of alcoholic beverages (7, 24), with differing rationale. Public health or social policy considerations or the elimination of private profit interest underlie these efforts in some countries. For instance, in the Nordic countries, social policy and public health considerations coupled with the elimination of private profit interest have been the leading motive for alcohol control for many decades. In Mediterranean countries, on the other hand, these kinds of motives have been unimportant, and control measures have instead stemmed from a need to increase the quality of alcoholic beverages, guarantee exports or ensure a fair standard of living for grape farmers and winemakers, as well as to secure the supply of wine to consumers at reasonable prices (7). Since alcohol is taxed in all European countries, it is a source of government revenues. Since Europe is an important producer of alcoholic beverages, private economic interests in alcohol production and trade affect the extent and scope of the prevailing alcohol control policies.

Policies aimed at reducing alcohol-related problems include imposing high taxation, restrictions by age on purchasing alcohol or limiting the availability of alcoholic beverages. Other strategies include drunk-driving countermeasures, altering the drinking context, education and persuasion, regulating alcohol promotion, and early interventions or the treatment of problem drinkers and alcoholics (8).

Alcohol prices

The effects of changes in alcohol prices have been extensively studied, most commonly by econometric methods. There are, however, also panel studies, observational studies and analyses of major changes in alcohol prices (8, 12, 13, 14). Almost all of the econometric studies have shown that a rise in the price of alcoholic beverages leads to a fall in alcohol consumption, and a decrease in prices generally leads to a rise in alcohol consumption. This has been shown both with regard to total

alcohol consumption and the consumption of different beverage categories (8, 13, 14). Therefore, it can be concluded that alcoholic beverages appear to behave on the market like most other consumer goods.

In studies dealing with different regions and time periods, different values of the sensitivity of quantity demanded to changes in prices have been found both with regard to total consumption and consumption of different categories of alcohol beverages (15). These variations stem from the social, cultural and economic circumstances prevailing in different places and times, and also reflect the many different uses of alcoholic beverages. Consequently, there are no consistent responses to changes in alcohol prices throughout the whole of Europe or in one specific country over time. For instance, wine consumers in the Mediterranean countries react to changes in wine prices differently from drinkers in the Nordic countries as wine in the Mediterranean countries is more like ordinary food and in the Nordic countries more like a luxury commodity.

The results of most econometric studies reveal the average reactions of consumers to changes in prices. There are, however, also studies that directly reflect the differential effects of alcohol price changes on various groups of consumers or examine the relationship between alcohol prices and alcohol problems (8). These kinds of studies strongly indicate that heavy and dependent drinkers are at least as responsive to alcohol price increases as are more moderate consumers, and furthermore, that price increases via excise duties on alcohol beverages have a particular effect in reducing youthful drinking (8). Alcohol prices can also be affected by restrictions on price-related alcohol promotions, such as happy-hour discounts, as well as regulating the minimum price level and setting limits on price discrimination at the wholesale level.

Because all alcoholic beverages include ethyl alcohol, they can be expected to be interchangeable. It is also evident that alcoholic beverages can serve as substitutes for, and can be replaced by, other commodities. The substitution of one type of beverage for another has, however, usually been found to be within a modest range (10). There is, for example, no clear research evidence that increases in alcohol taxes and prices have a special effect on illegal drug consumption. However, higher alcohol prices in one country than in neighbouring countries can lead to smuggling or increased border trade. The border trade in alcoholic beverages is especially serious as the regulations restricting travellers' alcohol import quotas have loosened in the more integrated European economy of recent years (7).

In designing alcohol tax policies, potential effects of changes in alcohol prices on consumption, both recorded and unrecorded, should be carefully monitored as substitution of other goods as replacement for alcoholic beverages is not always easy to predict. A rise in the price of wine, for instance, may result in replacement of wine by soft drinks, a switch to home-produced wine, increased travellers' imports of wine or to use of dangerous illicit alcohol. If prices of legally produced alcohol are kept constant or lowered because of a worry over a potential replacement by illicit alcohol, the harmful effects of the legitimate alcohol may exceed the feared dangers of the latter. Nonetheless, the evidence of alcohol prices suggests that they do have an independent effect on the level of consumption and alcohol-related problems (8, 10). A population's consumption of alcohol is generally influenced by prices and there is likely to be a connection between prices and population level experience of alcohol-related problems. Especially in countries with low alcohol tax rates, the increase in alcohol tax levels almost inevitably leads to increase in state tax revenues. In all countries the decrease in alcohol problem rates lowers the expenses of alcohol-related harms or makes funds available to increase the quality or quantity of services.

Availability of alcohol

There are several ways of limiting the availability of alcoholic beverages. Total prohibition of alcoholic beverages was enforced in some Western industrialized countries in the first half of the twentieth century and it is still a practice in many Islamic countries. Very short prohibition periods - a day, for example - are also common in some countries; for instance, during days of general feasting and rejoicing, general elections, market days or important football games. Restrictions regarding hours

or days of alcohol sale vary greatly among countries; in some countries the regulations are very complicated and far-reaching, whereas in some other the hours of alcohol sale may not be controlled at all. The location of outlets selling alcoholic beverages may also be regulated, for example, no outlets near schools, kindergartens or churches or along motorways, and alcohol sale may be forbidden in outlets located in certain places like hospitals, gasoline stations or work-place canteens. There may also be regulations establishing limits on the number of outlets per population. In some countries alcohol sale is forbidden in kiosks or vending machines. In many countries, any company or person involved with alcoholic beverages at any level from production to retail sale has to be specifically licensed or trained (7).

Most countries prescribe a legal minimum age for purchasing or consuming alcoholic beverages; the legal age may differ with the strength of the beverages, or whether it is purchased for on-premise or off-premise consumption. In certain countries, the sale of alcoholic beverages to intoxicated persons is forbidden. There have also been systems of alcohol rationing and laws stipulating how much alcohol might be purchased at one time, that alcohol could not be sold on credit, that men and women could not be served alcohol together in the same establishment or that alcoholic beverages could only be served with meals (7).

Not all interventions have been evaluated, partly because the interventions have taken place in countries not interested in their effect and partly because of the difficulties to evaluate the effects. In some cases alcohol control interventions have been evaluated, but the research evidence goes so far back in history that it is not relevant for current alcohol policy discussions in Europe. This is the case, for instance, with regard to the effects of prohibition laws between the World Wars or to individual rationing of alcoholic beverages like the Bratt system in Sweden which was discontinued in 1955.

Partial elimination of the retail monopoly

Partial elimination of off-premise alcohol retail monopolies has been studied in many countries. In the Nordic countries these studies have dealt with the introduction of the so-called medium beer - previously only sold in monopoly liquor stores - into ordinary grocery stores. A related case is the ending of the beer prohibition in Iceland in 1989. In Finland, the sale of medium beer in ordinary groceries was allowed from 1969. Total alcohol consumption increased in that year by 46% entirely due to the rise in consumption of medium beer (16, 17). The availability of beer also decreased in Sweden by banning the sale of medium beer in groceries in 1977, and in Norway by discontinuing the sale of strong beer in groceries in 1993. In both cases moving the medium beer or strong beer back to the alcohol retail monopoly led to decreases in both beer and total alcohol consumption (10). It has been estimated that during the time medium beer was available in groceries in Sweden, total alcohol consumption was 15% higher than it would otherwise have been (18).

The sale of wine, an increasingly popular beverage in non-wine-growing countries, has been shown to be sensitive to increases in retail availability. Wine consumption as well as total alcohol consumption increased when retail monopolies on wine were eliminated. This kind of evidence comes mainly from the United States, Canada and New Zealand, where public monopolies on the sales of wine and fortified wine have been eliminated, except in a few states (19, 20). Consequently, the research evidence is quite strong that off-premise monopoly systems limit alcohol consumption and alcohol-related problems, and that partial elimination of government off-premise monopolies increases total alcohol consumption. In addition to a greater number of outlets for off-premise sale, privatization of alcohol sale has usually resulted in longer available hours for purchase and other kinds of increases in alcohol availability.

Business hours, days and number of outlets

Controlling opening days and business hours for alcohol outlets has been a common regulatory measure (8, 10). Most studies have demonstrated increased drinking or rate of harmful effects with

increased sales times, and decreased drinking when they are shortened (8, 10). Curbs on the number of alcohol outlets and their location have been implemented in various countries. Early studies of liquor outlet density suggested that this factor had little effect on alcohol consumption. However, more recent studies utilizing multivariate econometric techniques, including pooled cross-series analysis approaches, have demonstrated that geographical density does have an effect on alcohol sale (8, 10).

Minimum drinking age

A minimum drinking age makes it more difficult for youngsters to acquire alcoholic beverages. Minimum drinking ages are in some cases set quite low; in other cases, higher age limits are set but loosely enforced (7). The highest age limit in the industrialized world, 21 years, has been set nationwide in the United States (10). These changes, as well as similar changes in Canada and Australia, have led to a number of studies on the effects of the legal age of purchase. They have generally found that a lowered age limit produced more alcohol-involved traffic accidents for the affected age groups, while increased age limits reduced such crashes (8, 21, 22).

Generalizability of evidence on availability

Generally speaking, studies have found that when alcohol is less available, less convenient to purchase, or less accessible, consumption and related problems are lower. As these research findings are confirmed for more than one country, one can conclude that they are not culturally specific. On the other hand, the effectiveness of any of these strategies is related to many interacting factors, including, in the first place, public support and compliance. Without sufficient popular support, enforcement and maintenance of any restriction may be circumvented.

Epidemiological studies on the impact of changes in alcohol availability often report the aggregate outcome only. There are, however, some data on the differential impact on heavy consumers. For instance, the so-called alcohol strike studies show that reductions in public disturbances, crimes of violence, and alcohol-related hospital admissions have often been much more marked than the decrease in overall alcohol consumption (23). In sum, it is reasonable to conclude that a variety of ecological measures influence the behaviour of heavy or problematic drinkers. In one form or another, this finding is repeatedly confirmed (8).

Interventions in drunk-driving

The relation between alcohol and traffic can be affected by strategies to alter the behaviour of the drinker within a particular context. In the European Charter on Alcohol one of these strategies is expressed as follows: "Establish and enforce laws that effectively discourage drunk-driving" (3). A more general consideration of issues bearing on the same type of harm minimization approach could include boating, civil aviation, and drinking in streets.

Alcohol affects motor skills, the sense of balance, visual acuity, and reasoning. The level of impairment caused by alcohol varies, particularly at low levels of blood-alcohol concentration (BAC). Laboratory tests have demonstrated repeatedly that most people show a lowered performance for response time and technical tasks as their BAC increases, sometimes even with the equivalent of only one drink, and that the impairment will continue to increase as the BAC-level increases.

A legal limit on BAC has been set in almost all European countries for drivers of motor vehicles, defining when a driver is presumed to be dangerously impaired, even if no accident has occurred. Any designated level is based on objective evidence on the risk of impairment at different BAC levels, but also inevitably reflects a compromise between perceived public convenience and acceptability on the one hand, and public safety on the other. The BAC limit can in Europe be as low as zero or as high as 0.08%, the most usual limit being 0.05% (3). Some European countries use two kinds of legal limits, one for drunk-driving and another for severe drunk-driving. As research has continued to demonstrate, alcohol involvement in traffic crashes as well as public awareness about this have increased, the BAC

levels are being established in countries that previously lacked them, while in countries that already have them, the limits are being lowered (3, 7).

Young drinkers who drive are at risk due to their inexperience at both driving and drinking, and have been identified as a special problem in some countries. One logical countermeasure is therefore to establish lower BAC levels for young drivers, sometimes called zero tolerance (3). Analyses of the effects of zero tolerance laws come from the United States, and show that they have had an effect on fatal night-time, single vehicle crashes, as well as other crashes and injuries, and they reduce the number of young drivers with positive BAC-levels (8).

The level of alcohol impairment for commercial drivers is also a specific concern in many industrialized nations. Professional drivers are expected to drink little if any alcohol in conjunction with their driving. In the United States, for instance, the BAC limit for commercial truck drivers is below the level for non-commercial drivers. This is also the case in some European countries (7).

A primary approach preventing drinking in a risky situation is deterrence. If there is a high likelihood that a drunk driver will be caught and quickly penalized, the drinker is more likely to avoid driving after drinking (10). There is now strong evidence for the success of general deterrence - that is, deterring people who have not previously been caught - from a number of countries. The most effective approach is for the police to engage in frequent, widespread, and visible checks along the roadway, with drivers randomly stopped and asked to provide a breath sample (8).

The perception of risk of detection is not dependent simply on the number of police officers devoted to enforcement, but also on the technology they employ. Checking the BAC of a driver through the use of a portable breath analyser is seen as an effective means of detecting alcohol-impaired drivers. If the police only rely on observational clues, such as slurred speech, glazed eyes, or smell of alcohol, the detection of drunk drivers can be unreliable and deterrence therefore not so effective (8).

Another important part of the deterrence strategy is the severity of punishment. In many countries over the past 20 years, punishment for drunk-driving has been made more severe, and the likelihood of conviction for drunk-driving has increased. There is no compelling evidence that imprisonment produces lower rates of re-arrest for convicted drunk drivers. Some studies have, however, shown a deterrent effect for brief mandatory jail sentences for first-time drunk-driving offenders (10). The punishment strategy generally found most effective is the loss of the driving license (8).

Responses to drunk-driving constitute an at least partial success story in many countries. Drunk-driving legislation, when energetically enforced, is a highly effective public health policy in terms of injuries averted and lives saved. However, these advances have come slowly and have been guided and supported by a sustained research effort. Such an approach is only feasible with public support and awareness of the risk of detection and possible arrest. It could be argued that the drunk-driving experience points to the fact that specific interventions targeted at specific types of drinking problems can produce benefits, as can overall strategies like general restrictions in alcohol availability.

On-premise interventions

Interventions focusing on reducing the harm from alcohol during the actual drinking phase are increasingly being developed and implemented. As this approach is relatively new, many of the interventions currently in practice have not been adequately evaluated. Thus far, training programmes for bar personnel have demonstrated modest reductions in high-risk drinking and drinking problems. Increased surveillance has reduced alcohol sales to minors. Making licensed premises safer has been associated with lower levels of intoxication and problems (8). Therefore, it seems likely that strategies in this area will have some impact without being too costly.

Community mobilization can be used to raise awareness of problems related to on-premise drinking. Evaluation suggests that such activities can reduce aggression and other drinking-related problems in

on-premise settings. These harm reduction strategies are, however, primarily applicable to on-premise drinking which somewhat limits their public health significance because in most European countries only a small part of drinking is done on the premises (2). However, with regard to some problems, such as alcohol-induced night-time fights in the streets or drunk-driving, on-premise alcohol consumption is more important than its share of the total consumption. On the other hand, on-premise drinking is said to happen in more controlled surroundings than off-premise drinking.

Alcohol education, persuasion and promotion

Education and persuasion are among the most popular approaches to the prevention of alcohol-related problems. These strategies have multiple aims, such as increasing the knowledge of drinking-related risks, trying to lower the risks by influencing drinking habits, or trying to increase the support for alcohol control policies. Education and persuasion strategies include public service messages and counter-advertisements, warning labels, low-drinking guidelines, school and university-based alcohol education programmes.

The number of informational and educational programmes is growing, but many of them have not been well-evaluated and they appear to have little effect on alcohol consumption levels and drinking-related problems. Alcohol education strategies are also relatively costly, which reflects the expense of training and implementation for a full education programme. From the point of view of a state, the cost may seem low in some instances if the teaching costs are charged locally or if the education programme is viewed as an extension of existing commitments. The reach and feasibility of educational programmes may be good, but the population impact is poor and probably not cost-effective (8).

Alcohol advertising and other forms of alcohol promotion have increased greatly during recent decades. The promotion of alcohol is an enormously well-funded, ingenious and pervasive aspect of modern life, trying to recruit new generations of drinkers and speaking for pro-drinking attitudes, and heavy alcohol consumption. Self-regulation of alcohol advertising and marketing has been shown to be fragile and largely ineffective (8), but evaluations of the effects of restrictions on alcohol advertising do not show clear reductions in consumption and related harms. Therefore, as with alcohol education and persuasion, there is still great controversy with regard to the effects of alcohol advertising and sponsorship, and the effects of measures to control them.

Early identification and treatment

In addition to its value in the reduction of human suffering, treatment can be considered a form of prevention. As one of the first societal responses to alcohol problems, treatment interventions have not been critically examined. Early intervention strategies and treatment have, at best, medium effectiveness as alcohol control measures. At the population level their impact is limited, since full treatment for alcohol problems can only benefit the relatively small fraction of the population who come to treatment. Even brief interventions are restricted to those who use the services offered and who are willing to accept the intervention. While providing treatment is an obligation of a humane society, its effect on drinking is limited (8).

Conclusions

This review has demonstrated that there are a number of effective and cost-effective strategies for reducing alcohol consumption, focusing on price increases and stricter controls on availability. Also, most drunk-driving countermeasures are supported by research, seem to be applicable in most countries and are relatively inexpensive to implement and sustain. These control measures can be implemented individually or in different combinations. Other control interventions such as altering the

drinking context, education and persuasion, regulating alcohol promotion, and regulating the premises for alcohol consumption are limited in their impact.

Alcohol policies rarely operate independently of other measures. Research on local prevention efforts suggest that local strategies have the greatest potential to be effective when prior scientific evidence is utilized and multiple policies are implemented in a systematic way. Complementary system strategies that seek to restructure the total drinking environment are more likely to be effective than single strategies. Also, prevention strategies for long-term institutionalization should be favoured over those that are only in place for the life of the project. Full-spectrum interventions are needed to achieve the greatest population impact.

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