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NEW FINDINGS IN ALCOHOL EPIDEMIOLOGY

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The last five years have seen important changes in our understanding of alcohol's impact on health. The two most important changes can be summarized as:

- (1) a new focus on alcohol's effects on health at the population level, and a recognition that individual-level studies may provide a poor indication of effects at the population level;
- (2) a new recognition that pattern of drinking, as well as level of drinking, is important in the links between alcohol and health.

The strongest evidence in both of these lines of thinking comes from research on the European experience. Two main bodies of research have contributed this evidence. One of these is the developing literature on what is often called the demographic crisis in eastern Europe -- and in particular on developments in the countries of the former Soviet Union in the years since 1984. The other is a new series of studies of the role of alcohol in various causes of death over the last 50 years in the countries of western Europe.

DRINKING AND THE MORTALITY EXPERIENCE IN THE FORMER SOVIET UNION

The story of the development of mortality in the newly independent states is one of the most dramatic and indeed tragic of our time. After 1960 or so, mortality in Russia and other parts of eastern Europe had stagnated or increased, while in western Europe it had gradually improved. Then, in the period from 1985 to 1988, mortality in Russia and other parts of the Soviet Union took a sudden sharp turn for the better. The trend then reversed, and in the period from 1990 to 1995 mortality dramatically increased, to an extent never seen before in peacetime in industrialized societies. Since 1995, the rates appear to have stabilized and even improved a little, but life expectancy in Russia still remains worse than it had been at any time in the preceding half-century.

The improving trend in mortality corresponds to the period of the anti-alcohol campaign of the Gorbachev era. The declining trend corresponds to the period of the dissolution of the Soviet Union, and the state's subsequent loss of control of the alcohol market. But many other changes were happening in the period after 1989, besides what was happening to the availability of alcohol and to drinking patterns, and it is likely that alcohol bears only part of the responsibility for the dramatic mortality crisis of the early 1990s.

From the point of view of understanding the role of alcohol in health, it is what happened in the period 1984-1988 that is most important. This was the period of *glasnost* and *perestroika*, and one can argue that there was a new spirit of hope in the Soviet Union at the time. But it was not

a time of great social changes: the political and economic system was still intact and functioning much as it had earlier in the decade. The main obvious change in 1985 in a health risk factor was the advent of the anti-alcohol campaign. What happened in those years in the republics of the Soviet Union, then, offers an unusually well-developed picture of what can happen to a population's health when there is a substantial change in the amount of alcohol in the society.

The changes were quite dramatic. Between 1984 and 1987, age-standardized deaths fell among males by 12% and among females by 7%, according to the data reported by Leon et al. (1997). There was quite a specific pattern in terms of which causes of death were affected. Cancer deaths did not follow the general trend at all -- they actually rose slightly. Deaths from alcohol-specific causes were the most affected: according to the data of Leon et al. (1997), they fell among males by 56%. Among males, deaths from accidents and violence fell by 36%. Deaths from pneumonia (40%), other respiratory diseases (20%), and infectious diseases (25%) also fell. And deaths from circulatory diseases, which accounted for over half of all deaths, also fell among males by 9%. The trends were similar among females, but the changes were less dramatic.

It was only in the latter part of the 1990s that these data began to come into the public arena. Though mortality statistics appear to have been recorded quite carefully in the last years of the Soviet Union (Wasserman and Värnik, 1998), they were a state secret. And it was only in the wake of the disastrous trend in general mortality of the early 1990s that epidemiologists everywhere turned their attention to understanding what had gone on.

The fact that the anti-alcohol campaign rapidly became highly unpopular in the Soviet Union also turned attention away. Many in the Russian intelligentsia still have difficulty believing that anything the Politburo did could have any beneficial effects at all. And it was obvious that a primary response to the severe restrictions of the campaign was a growth in the production and marketing of illicit alcohol. Without access to careful statistics, it was easy to believe the claims of some that the total consumption of alcohol actually grew during the anti-alcohol campaign.

By now, more than a decade later, it is clear that this perception was wrong. Nemtsov's careful estimates of the actual alcohol consumption (Shkolnikov & Nemtsov, 1997) show total ethanol consumption, combining legal and illegal sources, to have declined from 14.2 litres per capita in 1984 to 10.7 litres per capita in 1987-- much less than decline in officially-recorded sales, of course, but still a decline of about 25%.

THE LESSONS OF THE EXPERIENCE

The experience of the Soviet Union in the latter half of the 1980s, then, suggests that a substantial cut in the alcohol supply can produce dramatic beneficial effects on the population's health. For each litre of ethanol by which per-capita consumption dropped in Russia, the age-standardized mortality dropped by 2.7%.

This is an important and indeed startling figure. From this experience, we have learned first of all that, given appropriate circumstances, alcohol can have a much greater net impact on a population's health than we had thought.

But there are also other lessons from the experience. In the first place, this figure is considerably higher than the estimate from pooled western European experience of a 1.3% net decrease in mortality from a one-litre drop in per-capita consumption (Her and Rehm, 1998; see also Norström, 1996). This discrepancy illustrates another major realization of the last five years: that the effects of a given volume of alcohol on health and disease can vary from one society to

another. Among the factors which can have a major effect on this relationship, it seems, are the dominant patterns of drinking in a society. In Russia and a number of other newly independent states, there is a longstanding tradition of repeated heavy binge drinking, particularly among males. This pattern of drinking seems to be strongly implicated in the finding that a litre of ethanol has about twice the effect on mortality in Russia that it does in western Europe. We will return in a minute to other evidence of the importance to health of characteristic patterns of drinking, this time looking within western Europe.

The second major lesson the experience of the former Soviet Union is giving us is about the relation of drinking and heart disease. A major item of news from medical epidemiology in the years before 1995 was the idea that alcohol can have a protective effect against heart disease. This finding from a variety of prospective epidemiological studies became an important argument for increased availability of alcohol. It was an important justification, for instance, for the increased British “sensible drinking” limits, announced at the same time as the WHO-Euro Ministerial conference in 1995.

The majority of the epidemiological studies at the individual level still show the same result, although there are some exceptions. But a number of things have in the meantime become apparent. First, most of the protective effects can apparently be gained with very little drinking – as little as a drink every second day. Second, any protective effects are only important for men past age 45 or women past menopause; for most younger people, heart disease is not an important problem. Third, we still do not know to what extent the alcohol effect overlaps with, and could be replaced by, other protective behaviours. Fourth, it remains true that the prospective epidemiological studies are drawn from a relatively narrow range of societies. Fifth, as we shall shortly discuss, the effects of increased drinking on heart disease at the aggregate level may often be quite different from the effects at the individual level.

The experience of the former Soviet Union added a sixth point to this list: again, that drinking pattern matters. I mentioned to you in passing that deaths from heart disease actually declined in Russia during the anti-alcohol campaign of the 1980s, before rising again dramatically in the early 1990s. The medical epidemiological literature was so committed to the idea that alcohol had predominantly protective effects for the heart that at first this finding was interpreted as showing that alcohol could not be playing a role in the improvement in Soviet mortality in the late 1980s and the deterioration in the early 1990s. It has taken some time to get to the point where it is clear that, in cultural contexts like the former Soviet Union, alcohol is detrimental rather than beneficial for the mature heart. The exact mechanisms by which intoxication can cause heart disease are still a matter of some discussion (Kupari and Koskonen, 1998; McKee and Britton, 1998), but by now there is a developing consensus that the data from the former Soviet Union, as well as from elsewhere (e.g., Kuhanen et al., 1997) shows that, given a common cultural pattern of repeated binge drinking, alcohol can be very bad for the heart indeed.

DRINKING AND MORTALITY IN WESTERN EUROPE

In terms of the mortality experience, there was nothing in western Europe in the last half of the 20th century to match the dramatic changes in eastern Europe in the last two decades. Throughout the region, national rates of mortality dropped gradually in the period. There were substantial divergences in national experiences with alcohol consumption levels. Broadly speaking, alcohol consumption fell in the traditional wine-cultures of southern Europe, starting in the 1950s in

France and somewhat later in the other wine-cultures. On the other hand, alcohol consumption rose in the central and northern states of the region, so that the overall picture is of a convergence in alcohol consumption levels.

Over a half-century, of course, many other factors besides alcohol consumption affected what happened to mortality rates. Analyzing the overall trends thus tells us little about the specific effects of alcohol. Instead, a better approach is to set aside the overall trends and examine what happens in terms of changes year by year. If alcohol consumption goes up from one year to another, for instance, how much does the rate of a specific cause of death go up or down? Looking at the sum of these year-by-year changes in what is called an ARIMA time-series analysis is one of the most convincing ways of studying relations between a possible cause and its potential effects. In a project funded by the European Union, a team of Nordic researchers has recently been doing this for the countries of the EU (minus Luxembourg and Greece and plus Norway).

Such analyses are of course looking at relationships in the population as a whole. Recently it has been re-emphasized that such aggregate-level analyses will not necessarily give the same result as individual-level studies, such as the prospective studies common in medical epidemiology. In fact, findings from the individual-level studies may not offer much guidance on what to expect at the level of the population. If the level of alcohol consumption has a J-shaped relation to general mortality at the individual level, for instance, what does this imply about whether mortality will rise or fall if the average alcohol consumption level rises in a population?

An article by Ole-Jorgen Skog considered this question in 1996. Skog's argument was that, because people tend to influence each other in their drinking patterns, so that in aggregate their consumption levels tend to rise and fall together, the shape of the J-curve implied that the optimum average drinking level for a whole population would be lower than the optimum drinking level for the average individual member of that population. In fact, he concluded, the current per-capita consumption level in every western European country was greater than the likely optimum drinking level for a population. An increase in consumption in such countries, therefore, should bring an increase in general mortality.

THE EXPERIENCE AND ITS LESSONS

One of the ARIMA analyses examined Skog's hypothesis empirically, looking at the relationship between changes in alcohol consumption level and in overall male mortality (Norström, 2000). Norström found that the relation between alcohol consumption and increased mortality was nearly always positive, although the relation was often not significant at the level of individual countries. Pooling the experience of the different countries, there was a significant positive relation between change in alcohol consumption and change in overall mortality for each age-segment of the adult male population. In general, then, the results supported Skog's hypothesis: in none of these European countries would an increase in alcohol consumption bring a reduction of mortality.

A number of other analyses examined the relation of changes in alcohol consumption with changes in specific causes of death. Looking at the relation with deaths from cardiovascular disease (CVD), Hemström (2000) found no support for the idea that increased alcohol consumption would be cardioprotective at the population level. There did not appear to be any typical relationship between changes in consumption and changes in CVD mortality, although increased consumption tended to bring more male CVD deaths in the southern wine-culture countries. Even looking specifically at heart disease deaths, then, it appears that there is no added benefit from added

consumption in societies with consumption patterns at western European levels.

Other analyses looked at the relation of changes in alcohol consumption to liver cirrhosis (Ramstedt, 2000b), accident mortality (Skog, 2000), homicide (Rossow, 2000) and suicide (Ramstedt, 2000a). For cirrhosis, accidents and homicide, a rise in alcohol consumption predicted a rise in that cause of death in each of the northern, middle and southern tiers of countries in western Europe. For suicide, the relationship was generally significant only in northern Europe.

However, the findings of the cirrhosis, accident and homicide analyses shared one feature in common. In each, the relationship was stronger in northern Europe than in southern Europe. Since consumption levels are higher in southern Europe, the actual number of deaths of these kinds attributable to alcohol are roughly equal in the northern and southern regions. But in terms of the effect of an extra litre of alcohol per capita, there were marked differences: Rossow's results suggest this would result in a 12.4% increase in homicides in the northern tier of Norway, Sweden and Finland, but only a 5.5% increase in the southern tier of Italy, France, Spain and Portugal (Room and Rossow, 2000). The greater effect of an added litre of alcohol also showed up in the results for general mortality (Norström, 2000).

The most likely explanation of these different relationships, again, is in terms of different patterns of drinking. Drinking to complete intoxication seems to be a traditional component of the drinking patterns of the northern tier of countries. It seems that the adverse effect of an added or subtracted litre of ethanol per capita is affected by the predominant patterns of drinking in a population.

SOME CONCLUSIONS

We may sum up the lessons from the new alcohol epidemiology as follows:

1. The level of alcohol consumption matters for the health of a population as a whole.
2. Within the current range of per-capita consumption levels in Europe, an increase in consumption will produce net adverse effects on the health of the population as a whole. It is not likely to produce any net cardiovascular mortality benefit.
3. The predominant pattern of drinking in a population can make a big difference in the extent of damage from extra alcohol consumption. Patterns which seem to add to the damage are drinking to intoxication, and recurrent binge drinking.

We have focussed in this discussion on the level of whole populations, rather than on the level of the individual drinker or abstainer. From a public health perspective, it is the population level which matters in terms of societal policies and programs. The general implications of the new findings for alcohol policies are twofold:

1. In a European context, any policy which reduces general levels of consumption will have a net benefit for health.
2. Given that the effect of a given amount of alcohol varies from one society to another, there is good public health justification for national differences in alcohol policies. In this perspective, there is a basis in concerns about public health and order for the more restrictive traditions of stringent alcohol controls in northern and eastern Europe.

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