Changes in Alcohol Drinking Patterns and Their Consequences among Norwegian Doctors from 2000 to 2010: A Longitudinal Study Based on National Samples

Judith Rosta1,* and Olaf G. Aasland1,2

1The Research Institute of the Norwegian Medical Association, PO Box 1152, Sentrum, 0107 Oslo, Norway and 2Department of Health Management and Health Economics, Institute of Health and Society, University of Oslo, Oslo, Norway

*Corresponding author: Tel: +47-23-10-90-62; Fax: +47-23-10-90-60; Email: judith.rosta@legeforeningen.no

(Received 9 January 2012; first review notified 27 February 2012; in revised form 28 June 2012; accepted 3 July 2012)

Abstract — Aims: To describe changes in the patterns and consequences of alcohol use among Norwegian doctors from 2000 to 2010. Methods: Longitudinal study based on data from nation-wide postal surveys in 2000 and 2010 among a representative sample of 682 doctors in Norway. The Alcohol Use Disorder Identification Test (AUDIT) was used to measure the changes in drinking patterns (frequency of drinking, frequency of heavy drinking and quantity of drinking), symptoms of alcohol dependence and adverse consequences of drinking. A score above 8 was defined as hazardous drinking. Results: From 2000 to 2010, the proportion of doctors who used alcohol twice a week or more significantly increased from 31.4 (27.9–34.9)% to 48.7 (44.9–48.7)% and the proportion of those who drank to intoxication weekly or more decreased significantly from 6.6 (4.7–8.6)% to 2.5 (1.3–1.7)%. The proportion who scored above 8 on the AUDIT decreased from 10.7 (8.4–13.0)% in 2000 to 8.2 (6.2–10.3)% in 2010. There was a significant increase in the partial AUDIT-score for drinking patterns (t=2.4; P=0.016), and a significant decrease in the partial AUDIT-score for adverse consequences of drinking (t=−3.6; P<0.001). The partial AUDIT-score for symptoms of alcohol dependence did not change significantly (t=−1.6; P=0.112). There were gender differences in drinking patterns. Females had less frequent alcohol consumption and fewer episodes of heavy and hazardous drinking in 2000 and 2010. Conclusion: The drinking pattern of Norwegian doctors has changed over the past decade towards more moderate alcohol consumption and less negative alcohol-related consequences. Changes in the attitude towards alcohol consumption may to a certain extent explain these findings.

INTRODUCTION

Since alcohol habits may change considerably over time, regular monitoring of drinking patterns is in itself an important intervention on the individual as well as on the aggregate level (Rehm and Gmel, 1999; Ramstedt, 2001; Simpura and Karlsson, 2001). Doctors’ alcohol use in Norway from 1985 to 2000 is well documented (Aasland et al., 1987; Gulbrandsen and Aasland, 2002), but the further development from 2000 to 2010 is so far not reported.

Excessive alcohol use among doctors may have adverse effects on their health and behaviour, and therefore also becomes a public health issue (BMA, 1993; Romeri et al., 2007). Furthermore, doctors play a key role in changing the interventions for alcohol problems among their patients (Nygaard, 2007). How much effort a doctor invests in counselling his patients on potential alcohol-related problems depends on several factors—and one is clearly the doctor’s own practice and experience with alcohol. Doctors with moderate drinking were found to be more likely to bring up drinking habits with their patients than those who did not drink at all, or those who drank a lot (Aasland et al., 1987; Frank et al., 2008). With regard to life-style, doctors serve as role models, consciously or unconsciously (Baker, 2008).

Since young people and people with higher education seem more likely to change their life styles (Rogers and Stanfield, 1968), including drinking habits (Hupkens et al., 1993), changes in doctors’ drinking patterns may be indicative of future trends in the whole population. This has proven to be the case with regard to smoking, where doctors have been among the first to quit (Aasland and Nylenna, 1997).

There is a need for longitudinal studies on doctors’ life habits. Most investigations use cross-sectional data from medical students, younger doctors (Kjobli et al., 2004; Biró et al., 2008; Frank et al., 2008; Grotmol et al., 2010), general practitioners (GPs) (Sebo et al., 2007), hospital doctors (Rosta, 2008), certain specialists (Rosta and Aasland, 2005; Abuissa et al., 2006; Oreskovich et al., 2012), male gender (Juntunen et al., 1988), doctors’ workforce (Nash et al., 2010) or health-care personnel in general (Kenna and Lewis, 2008). The findings in these studies are mixed. An increased risk for high alcohol consumption was related to male gender and age 40–45 years and older, and to some factors of work and lifestyle (Juntunen et al., 1988; Rosta and Aasland, 2005; Rosta, 2008; Nash et al., 2010). On the other hand, male US surgeons had lower risk of alcohol abuse or dependence than female surgeons (Oreskovich et al., 2012). Working in a surgical specialty was a risk factor for hazardous drinking among German and Norwegian doctors (Rosta and Aasland, 2005; Rosta, 2008), but not for Australian doctors (Nash et al., 2010). While alcohol abuse in male Finnish doctors (Juntunen et al., 1988) and Swiss GPs (Sebo et al., 2007) was more prevalent than in the general population, the prevalence of ‘binge drinking’ in German hospital doctors and ‘alcohol abuse’ in US surgeons was similar to what was found in the general population (Rosta, 2008; Oreskovich et al., 2012). Excessive drinking among US medical students and weekly alcohol consumption among Hungarian medical students were lower than in the same age-groups in the general population (Biró et al., 2008; Frank et al., 2008). One longitudinal study from England and Wales shows a decrease in alcohol-related mortality for male doctors from the 1960s to 2005 (Romeri et al., 2007).

In Norway, we have recorded the alcohol consumption patterns of doctors in 1985, 1993, 2000 and 2010. A study with data from 1985 showed that younger doctors drank less and were more conscious of alcohol as a public health problem than their older colleagues. Compared with other
academics, young doctors had a more moderate alcohol consumption (Aasland et al., 1987). Another study with data from 1993 to 2000 shows that the proportion of doctors with hazardous drinking increased from 0.6% in 1993 to 1.35% in 2000. The changes in drinking habits among Norwegian doctors were similar to the changes in the general population, where more frequent moderate alcohol consumption has not been accompanied by less frequent heavy drinking (Gulbrandsen and Aasland, 2002).

Hence, alcohol use among Norwegian doctors after 2000 remains to be documented.

Compared with other European countries Norway has the lowest per capita alcohol consumption, with 5.11 per person 15 years or older (5.7 l Sweden, 7.6 l Finland, 7.5 l UK and 10.4 l Austria in 2008) (SIRUS, 2011). However, along with Finland, Sweden and the UK, Norway also has a high frequency of episodic heavy drinkers (Hemström et al., 2002). A trend study on alcohol consumption between 1993 and 2000 showed that men drank more than women, and that consumption increased with income and level of education (Strand and Steiro, 2003). The most recent trend study in the Norwegian population shows that the number of drinking episodes per year, the amount of alcohol per occasion and the prevalence of intoxication in all drinking situations increased from 1973 to 2004 (Horverak and Bye, 2007). This picture is consistent with the observed increase in admissions to somatic hospitals for alcohol-related conditions between 2000 and 2009; for acute intoxications from 1091 to 1882 and for alcoholic liver diseases from 396 to 888 (NPR, 2010).

The aim of the present study was to describe changes in the patterns and consequences of alcohol use among Norwegian doctors from 2000 to 2010. Our outcome measure is the Alcohol Use Identification Test (AUDIT) (Saunders et al., 1993).

METHODS

Study design and population

Since 1993 the Research Institute of the Norwegian Medical Association has regularly surveyed a representative cohort of about 1200 active Norwegian doctors through postal questionnaires. The cohort was supplemented with ~400 randomly selected doctors in 2000, and with another 250 in 2008. Over the whole period, 436 doctors have left the cohort due to death, retirement or voluntary withdrawal. The present study is based on data from 2000 to 2010.

The response rate was 86% (1385/1616) in 2000 and 67% (1014/1520) in 2010. The number of respondents who answered all 10 AUDIT items was 1203 in 2000 and 959 in 2010. The number of respondents who responded, more worked as private practice specialists.

Measurements

The questionnaires in 2000 and 2010 contained items on working conditions, demography, health and life-style. Patterns and consequences of alcohol use were measured with the AUDIT (Saunders et al., 1993), see Supplementary data, Table A1. The AUDIT consists of 10 questions from three domains: drinking patterns (questions 1–3), dependence symptoms (questions 4–6) and harmful consequences of drinking (questions 7–10). Each question is scored from 0 to 4 and added, giving a mean score between 0 and 4, for the total AUDIT as well as for the three domains. For the purpose of this study, a total score larger than 8 is defined as hazardous drinking (Babor et al., 2001). The fact that the response levels of the Q1 and Q2 of the AUDIT had different categories in 2000 and 2010 is of concern. However, since the seven possible response levels in 2000 can easily be collapsed into the five levels used in 2010, direct comparisons between the two data sets should be feasible.

Analyses

In this study, we pay particular attention to changes in the three domains of AUDIT, frequency and intensity of drinking, dependence and harmful consequences. Differences are tested with Pearson’s chi-square test of proportions with 95% confidence intervals (CIs). Paired t-tests are used to test changes (total score and separate domains) from 2000 to 2010.

Most analyses were performed for females and males separately. The Predictive Analytics SoftWare Statistics (PASW), version 18 was used for the analyses.

RESULTS

Table 2 shows the changes in the frequency and intensity of drinking as well as hazardous drinking from 2000 to 2010. Respondents in 2000 (1203) and in 2010 (959) and the 682 who responded both in 2000 and 2010, show the same patterns in frequency of drinking, typical quantity of drinking, frequency of heavy drinking and hazardous drinking.

From 2000 to 2010, the proportion of the 682 doctors who used alcohol twice a week or more (Item 1) increased from 31.4 (27.9–34.9) % to 48.7 (44.9–48.7) %, and the proportion of those who drank to intoxication weekly or more (Item 2) decreased from 6.6 (4.7–8.6) % to 2.5 (1.3–1.7) %. The proportion of abstainers (Item 1) remained more or less the same. The proportion of hazardous drinkers, decreased from 10.7 (8.4–13.0) % in 2000 to 8.2 (6.2–10.3) % in 2010.

Compared with the males, the female doctors were less likely to drink twice a week or more, less likely to drink to intoxication and to have a mean AUDIT score above 8. Similarly to male doctors, the proportion of female doctors who used alcohol twice a week or more, and the proportion who never drank to intoxication increased significantly from 2000 to 2010. There was no significant change in the amount of alcohol per occasion, or in the frequency of hazardous drinking, either for women or men.

We also estimated the total weekly alcohol consumption in units using the frequency and quantity questions from the AUDIT among doctors who responded both in 2000 and 2010 (n = 682). One unit of alcohol is 10–15 g ethanol in both surveys (Supplementary data, Table A1). From 2000 to 2010, the mean number of units of alcohol consumed per week increased significantly among female doctors from 2.0
We have followed a representative cohort of Norwegian doctors from 2000 to 2010. We found that the doctors drank more, but with fewer episodes of heavy drinking and less alcohol-related problems. Comparisons with other studies

In line with the earlier observations (Aasland et al., 1987; Juntenen et al., 1988; Gulbrandsen and Aasland, 2002; Horverak and Bye, 2007; Sebo et al., 2007; Rosta, 2008; Nash et al., 2010), male doctors tend to drink more frequently, consume greater amounts of alcohol per occasion, and on a more hazardous level than the females. However, compared with studies of doctors from Switzerland (Sebo et al., 2007), Australia (Nash et al., 2010), Germany (Rosta, 2008) and the UK (Hitchins, 2008), the rates of heavy episodic or hazardous drinking were not higher among Norwegian doctors (Table 3).

We do not have specific data on drinking trends by occupational groups in Norway. Studies of the Norwegian general population suggest more frequent alcohol use combined with more frequent heavy episodic drinking than before. A national study indicates that drinking increased in all socioeconomic groups, and with level of education and income from 1993 to 2000 (Strand and Steiro, 2003). Two other studies, one with data from 1973 to 2004 (Horverak and Bye, 2007) and another with data from 2000 to 2009 (NPR, 2010), suggest a growing prevalence of alcohol intoxication in Norwegian population. This is attributed to the increasing availability and decreasing prices of alcoholic beverages in Norway over this period (Rossow, 2010). It is worth noting during this period may be partly due to the fact that they grew 10 years older, from 42.5 to 52.5 years (Table 1). However, if we compare all respondents in 2000 (n = 1203, mean age 44.3 years) with all respondents in 2010 (n = 959, mean age 48.6 years) (Table 2), we find a very similar pattern. Separate analyses within the younger (29–44 years) and older age groups (45–67 years) from 2000 to 2010 show similarly an increase in drinking frequency (e.g. ≥2/week; younger age: 23.2 vs. 31.1%; older age: 38.4 vs. 50.6%), no change in the amount of alcohol intake per occasion (e.g. 1–2 drinks; younger age: 63.5 vs. 65.9%; older age: 57.2 vs. 56.9%), and a decrease in heavy drinking (e.g. at least weekly; younger age: 3.9 vs. 0.9%; older age: 10.4 vs. 2.8) and hazardous drinking (younger age: 8.6 vs. 5.8%; older age: 10.1 vs. 7%) (significant differences are in cursive). Hence, the cohort effect in our sample seems negligible.

DISCUSSION

Principal findings

In this paper, we looked into the changes in patterns and negative consequences of alcohol use among Norwegian doctors from 2000 to 2010. We found that the doctors drank more, but with fewer episodes of heavy drinking and less alcohol-related problems.

Age effect

We have followed a representative cohort of Norwegian doctors for 10 years. Their moderation in drinking habits (1.6–2.3) to 2.9 (2.4–3.4) units, and among male doctors from 3.8 (3.5–4.3) to 5.9 (5.3–6.6) units. The increase among all doctors was from 3.3 (3.0–3.6) units in 2000 to 5.0 (4.5–4.4) units in 2010.

Figure 1 shows the mean differences between 2000 and 2010 in the 10 AUDIT items, the three domains and the AUDIT sum score for the 682 doctors who answered at both points in time. Judged by the 95% CIs, there was a significant increase in the frequency of heavy drinking (Q1) and a decrease in the frequency of heavy drinking (Q2), black-out (Q8) and injury (Q9). The score for the drinking pattern domain increased significantly, while the adverse consequences domain decreased significantly. The alcohol dependence domain and the AUDIT sum score decreased, but not statistically significantly.

The changes in AUDIT sum score from 2000 to 2010 were also analysed by gender. There was no significant increase in AUDIT sum score for female doctors (t = 0.247; P = 0.805) and no significant decrease in AUDIT sum score for male doctors (t = −1.360; P = 0.174) (data not shown).

Figure 2 illustrates how the groups of abstainers, moderate drinkers and hazardous drinkers changed from 2000 to 2010. The majority of moderate drinkers (94%, 541/574) and abstainers (71%, 25/35) continued their drinking patterns over time. Four percent (23/574) of the moderate drinkers in 2000 became hazardous drinkers in 2010, while 53% (39/73) of the hazardous drinkers in 2000 became abstainers or moderate drinkers in 2010.

Table 1. Characteristics of the respondents for whom the AUDIT could be calculated in 2000 and 2010, compared with all active doctors in Norway in 2000

<table>
<thead>
<tr>
<th>Gender, % (95% CI)</th>
<th>All active doctors in Norway 2000</th>
<th>Doctors who responded to all 10 items of AUDIT</th>
<th>Doctors who responded to all 10 items of AUDIT at two points in time</th>
</tr>
</thead>
<tbody>
<tr>
<td>All (n)</td>
<td>14,950</td>
<td>1203</td>
<td>682</td>
</tr>
<tr>
<td>Male</td>
<td>69.9</td>
<td>67.8 (65.2–70.4)</td>
<td>66.7 (64.4–71.4)</td>
</tr>
<tr>
<td>Female</td>
<td>30.1</td>
<td>32.2 (29.6–34.8)</td>
<td>32.1 (29.7–35.7)</td>
</tr>
<tr>
<td>Mean age, mean (95% CI)</td>
<td>45.0</td>
<td>44.3 (43.7–44.9)</td>
<td>42.5 (41.9–43.2)</td>
</tr>
<tr>
<td>Job situation, % (95% CI)</td>
<td>All</td>
<td>Hospital doctors</td>
<td>51.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General practitioners</td>
<td>23.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Specialists in private practice</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
<td>20.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Missing, n)</td>
<td>(−)</td>
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<tr>
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</tbody>
</table>

(Changes in drinking patterns of Norwegian doctors 101)
that the trend in drinking patterns for the doctors in our sample is opposite to that of the population, with fewer heavy episodic drinkers, hazardous drinkers and alcohol-related adverse consequences, indicating a possible change in the drinking culture of doctors.

**Explanation of the Norwegian trends**

The healthier drinking pattern among Norwegian doctors may stem from a number of factors. Cultural setting plays an important role (Room and Mäkelä, 2000; Simpura and Karlsson, 2001). It is shown that the workplace culture, including job conditions (Brook, 1996) and gender mix within medical specialties (Rosta and Aasland, 2005; Rosta, 2008) are closely connected with drinking habits. Thus, one reason for moving in a healthier direction may reflect a change of workplace culture. Indeed, several regulations of financial structures, the organization and management systems of health care have been implemented during the last decade in Norway (Aasland et al., 2010), as well as in many other European countries (Rosta et al., 2009). This process has also influenced the work conditions of the doctors. In Norway, the regulations were, at least in certain groups, often met with scepticism and fear of declining professional autonomy (Aasland and Forde, 2008; Aasland et al., 2010), but they did not seem to lead to worse working conditions, at least as shown in reports about doctors’ job satisfaction. Studies with data from the last decade show that Norwegian doctors have a stable and high level of life satisfaction (Nylenna et al., 2005; Nylenna and Aasland, 2010), and a high and increasing level of job satisfaction (Aasland et al., 2010; Nylenna and Aasland, 2010). It is possible that these trends are related to changes in the doctors’ drinking patterns (Cooper et al., 1989; Strine et al., 2008).

The possible association between working hours and alcohol consumption should also be noted. Present studies suggest stable working hours among consultants, junior doctors and GPs over the last decade (Aasland and Rosta, 2011a,b), while working hours in the general Norwegian population decreased over this period (Bjørnstad et al., 2008). Also, doctors, compared with other professionals, work longer hours and have frequent on-call duties (Aasland and Rosta, 2011a,b; Instrand et al., 2011). In this context, both reduced opportunity for alcohol drinking, as well as the professional obligation to stay sober in case of emergency, may be of importance. Also, long working weeks and on-call duties during the weekend reduce the time spent on social activities (Burke, 2006), and spending little time with friends is a predictor of less alcohol consumption (WHO, 2000). In fact, an Australian study found that doctors who worked long hours and had not taken a holiday during the previous year were less likely to drink hazardously (Nash et al., 2010).

Drinking norms may also be influenced by the gender composition at the workplace. It has been shown that male professionals have a culture that weakens the influence of female’ attitudes toward alcohol consumption, e.g. in predominantly male occupations both male and female employees are more likely to drink and have alcohol problems than employees of both genders in female-dominated occupations (Plant et al., 1991; Wilsnack and Wilsnack, 1992; Kraft...
A previous study among Norwegian doctors (Rosta and Aasland, 2005) demonstrated that both female and male doctors working in a specialty with a lower percentage of male doctors (non-surgical specialties vs. surgical specialties) were significantly less likely to use alcohol. Thus, it is possible that the increasing proportion of women in the medical profession in Norway—from 31% in 2000 to 43% in 2010 (Taraldset, 2011)—also may have a bearing on the decrease in hazardous and heavy drinking in our sample.

Another reason for healthier drinking patterns among doctors in Norway may be the new lifestyle trends. Especially people with higher education, and to some extent younger people, are prone to adopt new habits (Rogers and Stanfield, 1968), including those related to alcohol consumption (Hupkens et al., 1993). An analysis of French household data from 1960 to 1980 showed that the trend towards less heavy drinking sessions started in the educated upper and middle classes, followed by the lower classes. This change, where people follow fashion, often set by higher social classes, was called the ‘modernisation process’ (Sulkunen, 1989).

A considerable decrease in smoking among doctors in many Western countries, e.g. the UK (Doll et al., 2004) and Norway (Aasland et al., 2011) began earlier than in many other professional groups. A recent Norwegian study also reports that doctors have lower mortality from lifestyle-related diseases such as cardiovascular diseases, respiratory diseases and metabolic diseases (Aasland et al., 2011). A Scottish trend study from 1963 to 1987 (Harrison and Chick, 1994) that documents a lower risk of alcoholism among younger doctors, attributed it to an increased emphasis on the danger of alcohol by the younger. Trend data on alcohol-related deaths by occupations in England and Wales (Romeri et al., 2007) document a significant decrease for male doctors from 1960 to 2005. Investigations from Switzerland (Sebo et al., 2007), Finland (Juntunen et al., 1988), Australia (Nash et al., 2010) and the USA (McAuliffe et al., 1991) show that younger doctors are less likely to engage in harmful drinking. In the Norwegian data from 1985, young doctors were found to be more aware of the
dangers of alcohol use as a public health problem (Aasland et al., 1987). An increased risk-awareness concerning alcohol consumption in the last decade might be the case in our sample. We have shown that the majority of hazardous drinkers in 2000 became moderate drinkers or abstainers in 2010. In addition, there was a significant decline in negative consequences of alcohol use (guilt, blackout, injury, concern of others) and episodic heavy drinking. In Norway, where the general population reported an increase in the frequency of intoxication, with an increasing number of alcohol-related admissions to somatic hospitals (Horverak and Bye, 2007; NPR, 2010), these results become more than interesting. It is also remarkable that the prevalence of episodic heavy drinking among doctors in Norway and Germany were at the same low level (Table 3), while the Norwegians have one of the highest levels of episodic drinkers in the EU (Hemström et al., 2002). That the increase in frequency and amount of alcohol consumption in our sample did not show a corresponding increase in alcohol-related problems is noteworthy. It is possible that the drinking pattern of Norwegian doctors has been ‘modernised’ (Sulkunen, 1989) and follow a more Southern European style with less frequent drinking to intoxication and more frequent moderate drinking. A recent Swedish study also shows a decrease in reported alcohol-related problems, with more drinking during the workweek but less intoxication during the weekend (Gustafsson, 2010).

### Limitations and strengths

The main strength of our study lies in the prospective, longitudinal design. The high validity of the AUDIT should also not rule out the possibility of non-respondent bias. We know from other studies that non-respondents generally do not answer in 2010 (Aasland et al., 1987; Reinert and Allen, 2007) including doctors (Gulbrandsen and Aasland, 2002; Rosta, 2008; Nash et al., 2010). The response rates were fairly good, 86% in 2000 and 67% in 2010, but do not rule out the possibility of non-respondent bias. We know from other studies that non-respondents generally drink more and that alcohol misuse is more common in this group (Mäkelä et al., 1999). Thus, there is a possibility that non-responding doctors drink frequently and more. However, we also performed analyses showing that the alcohol consumption patterns and the share of hazardous drinkers in 2000 and 2010 for all respondents, not only the 682 who responded both times, follow the same patterns (Table 2). Among the respondents from 2000 we also compared those who answered in 2010 (n = 682, 32% females) with those who did not answer in 2010 (n = 521, 32% females). There were no significant differences in drinking patterns of responders and non-responders [e.g. drinking ≥2/week: 31.4 (27.9–34.9) % vs. 31.3 (27.4–35.1) %; hazardous drinking: 10.7 (8.4–13.0) % vs. 7.7 (5.4–10.0) %] suggesting no non-responders bias. The self-reported levels of alcohol consumption could also have an effect on the results. Taking the general underestimation of alcohol consumption into consideration, which is about 25–37% in Norway (Horverak, 2006), the proportion of heavy episodic drinkers and hazardous drinkers might be somewhat greater. Further limitations include a lack of some potentially mediating variables, such as personality traits, socioeconomic condition or work place hazards, which could influence both drinking patterns and consequences (Brook, 1996; Rosta and Aasland, 2005; Nash et al., 2010). Finally, a change towards a more favourable drinking pattern among Norwegian doctors might correlate with the increasing influx of foreign doctors with more restrictive attitudes towards alcohol consumption (Romeri et al., 2007). However, this does not seem to be the case in Norway where eighty percent of the immigrant doctors come from other Nordic or European countries (Taraldset, 2010).

### Supplementary data

Supplementary data are available at Alcohol and Alcoholism online.

Acknowledgements — The authors wish to thank all doctors who have supported this study by participating in the survey.

Conflict of interest statement. None declared.

### References


