



# Do alcohol-attributable diagnoses reflect current hazardous drinking patterns in Norwegian hospital patients?

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## Abstract

**Background** In everyday life, hospital staff complies poorly with alcohol screening programs, and may be concerned about patients' drinking patterns only when they consider alcohol abuse clinically relevant. An unknown proportion of patients with hazardous drinking patterns may thereby miss the opportunity to take part in successful alcohol intervention programmes. A strategy for improving hospital staff's motivation and compliance with alcohol screening programs may be to identify the patients most likely to be at risk, and thus select only these patients for further alcohol screening. The aim of this study was therefore to assess the potential for screening, using alcohol-attributable conditions to predict current hazardous drinking among hospital patients.

**Methods** A multi-centre cross-sectional study was carried out at three university hospitals. 1515 patients were asked about quantity and frequency of alcohol intake. Hazardous drinking was defined by exceeding the weekly limits and/or binge drinking. Alcohol-attributable conditions were collected from patient diagnoses in the discharge reports. Diagnostic tests were used to determine if alcohol-attributable conditions were good predictors for current hazardous drinking.

**Results** Alcohol-attributable diagnoses at discharge were poor predictors of current hazardous drinking (18% sensitivity and 16% positive predictive value). The positive predictive values were 15% for binge drinking in the previous month and 10% for exceeding the weekly limits, but binge drinking was also more prevalent (22% vs. 9%).

**Conclusion** We found no evidence to support screening for current hazardous drinking by the use of alcohol-attributable diagnoses.

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## Introduction

Current hazardous drinking is associated with increased risk of hospital admission due to stroke, liver disease and respiratory diseases (1,2). Overall 1 in 16 of all hospital admissions are alcohol-related, and 1 in 5 patients admitted to hospitals for other reasons have a hazardous drinking pattern (3). These patients may be at increased risk for poor clinical outcomes including more postoperative complications as well as prolonged hospital stay (4). In everyday life hospital staff may be concerned about patients drinking patterns only when they consider alcohol abuse clinically relevant. A consequence of this approach may be that hazardous drinking patterns remain unidentified, even though there is a potential for alcohol interventions to improve clinical outcomes.

Several screening tools have been developed and tested to identify different types of alcohol abuse including hazard-

ous drinking (5), and alcohol screening questionnaires have also been found useful for predicting subsequent hospital admissions for alcohol-related conditions (6). However, many hospitals lack sufficient resources to undertake widespread screening programs (7).

In Europe, the average adult drinks 13 litre of alcohol per year but with considerable variation between countries. Nordic countries such as Norway and Sweden have some of the lowest levels of alcohol consumption per capita (< 8 litre per adult per year), whereas the consumption in other Nordic is comparable to the European average (Finland; 11 litres and Denmark; 13 litres per adult per year, respectively) (8). In cultures where the prevalence of hazardous drinkers is relatively low, the low detection rate may per se discourage hospital staff from complying with the screening programs, thus the detection rates will be even lower in the long run.



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A strategy to improve hospital staff compliance with screening programs may be to identify the patients most likely to be at risk by other means, and thus select these patients for further screening by a validated tool (semi-systematic screening). If this strategy is to be successful, we must ensure that the selected patients are in the target groups of the interventions.

The aim of this study was therefore to assess the potential of screening by using alcohol-attributable conditions to predict current hazardous drinking in a Norwegian hospital population.

### Material and methods

A multi-centre cross-sectional survey was carried out at all non-psychiatric wards and outpatient clinics at Haukeland University Hospital, Stavanger University Hospital, and Haraldsplass University Hospital, with the exception of intensive care units and paediatrics departments. These hospitals serve approximately one million inhabitants in the western region of Norway, and comprise 80 wards and 49 outpatient clinics. Inclusion took place during a 24-h assessment period in April 2009, which did not include the weekend. Due to organisational issues, five wards and four outpatient clinics did not wish to take part in the study.

The inclusion criteria were being admitted to or treated at an outpatient clinic, being at least 18 years old, and giving informed consent to participate. The exclusion criteria were reduced ability or lack of competence to provide consent, and inability to answer the questions in Norwegian due to inadequate language skills.

The eligible patients were interviewed and examined by 350 specially trained nursing students using a modified version of the WHO-Data model (9). The questionnaire covered different health risk factors including current drinking patterns: weekly alcohol consumption (number of drinking days pr week x number of AU (alcohol units) consumed on a normal drinking day) as well as the frequency of binge drinking (drinking five or more AU on one drinking day) episodes during the previous month. Current hazardous drinking was defined by exceeding the weekly limits ( $\geq 9$  AU/week for women and  $\geq 14$  AU per week for men) and/or binge drinking (10) during the previous month. One AU was defined as a drink containing 12 g of ethanol.

For each patient we obtained the discharge diagnosis from the medical records. Alcohol-attributable conditions were reported for 13 conditions wholly attributable to alcohol, such as alcoholic liver disease and gastritis, and for 21 conditions partly attributable to alcohol in-

cluding different types of cancer (11).

A reliability test was carried out based on twenty patient interviews that were recorded and transcribed. Twenty randomly drawn nursing students read all of the transcriptions and scored hazardous drinking patterns for each of the twenty patient interviews.

### Statistics

Analyses of sensitivity, specificity, and positive and negative predictive values were calculated to determine if alcohol-attributable conditions could predict current hazardous drinking.

Kappa statistics (multirater version) was used to describe the interrater reliability in the twenty selected patient interviews. A kappa of 0.7 or higher indicated adequate interrater agreement. CI values were calculated for each kappa statistic. Analyses were carried out using SPSS 17.0.

### Ethics

The study protocol was in accordance with the Declaration of Helsinki II and was approved by the Regional Committee for Medical Research Ethics for Western Norway (no. 2009/106-ØYSV) and the Norwegian Social Science Data Services (no. 20985). Informed consent was obtained from all study participants.

### Results

In total, we assessed 2932 patients for eligibility. Altogether, 2350 patients fulfilled the inclusion criteria. In total, 1515 patients (65%) were included in the analyses. Seven patients were excluded due to missing data. Forty-six percent of the included patients were women. The mean age was 58 years (Std Deviation (SD) 18 years), with women being slightly but not significantly ( $p=0.063$ ,  $t$ -test) older than men (60 years versus 57 years). See figure 1 for study profile, and table 1 for characteristics of the study population.

### Interrater reliability

Based on twenty interviews the interrater reliability among the nursing students was more than adequate for scoring both drinking patterns (0.90 (CI 0.81–1.00) for exceeding the weekly limits, 0.90 (CI 0.78–1.00) for binge drinking).

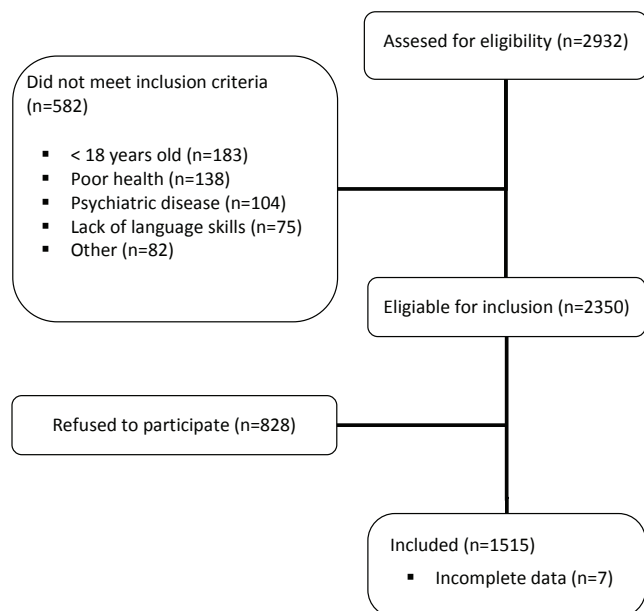
### Alcohol-attributable conditions as predictor of current hazardous drinking

In total 395 patients were discharged with 575 diagnosis wholly or partly attributable to alcohol. Table 2 shows the distribution of alcohol-attributable conditions (not number of patients). Among all patients, having an al-



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**Figure 1** Study profile



**Table 1** Characteristics of included patients

		%	N=1515
<b>Sex</b>	Women	46%	(n=700)
	Men	54%	(n=815)
<b>Drinking pattern</b>	Exceeding the weekly limits	9%	(n=129)
	Binge drinking	22%	(n=334)
<b>Inpatient/outpatient</b>	Inpatients	50%	(n=761)
	Outpatients	48%	(n=730)
	Unknown	2%	(n=24)
<b>Department</b>	Surgical disciplines	37%	(n=561)
	Internal medicine and Neurology	43%	(n=652)
	Obstetrics and gynaecology	2%	(n=28)
	Emergency room	6%	(n=92)
	Other	11%	(n=165)
	Unknown	1%	(n=17)

cohol-attributable diagnosis was a poor predictor of current hazardous drinking with 18% sensitivity and 16% positive predictive value. The positive predictive values were a little better for binge drinking (15%) than for exceeding the weekly limits (10%), but binge drinking was also more prevalent (22% vs. 9%). Both sensitivity and positive predictive values for current hazardous drinking were a little better for men than women; 20% and 23% versus 13% and 7%, respectively (see all values in table 3).

## Discussion

Although alcohol-attributable conditions may be useful in order to estimate the disease burden of alcohol at a

**Table 2** Distributions of alcohol-attributable conditions (ICD10 codes) among 395 patients (given in numbers = N)

Conditions wholly attributable to alcohol		N
Alcohol-induced pseudo-Cushing's syndrome	E24.4	-
Mental and behavioural disorders due to alcohol	F10	6
Degeneration of nervous system due to alcohol	G31.2	1
Alcoholic polyneuropathy	G62.1	1
Alcoholic myopathy	G72.1	-
Alcoholic cardiomyopathy	I42.6	-
Alcoholic gastritis	K29.2	-
Alcoholic liver disease	K70	-
Alcohol-induced chronic pancreatitis	K86.0	-
Ethanol poisoning	T51.0	-
Methanol poisoning	T51.1	-
Toxic effect of alcohol, unspecified	T51.9	-
Accidental poisoning by exposure to alcohol	X45	-
<b>Sum</b>		<b>8</b>
Conditions partly attributable to alcohol		N
Malignant neoplasm of lip, oral cavity or pharynx	C00-C14	12
Malignant neoplasm of oesophagus	C15	11
Malignant neoplasm of colon	C18	24
Malignant neoplasm of rectum	C20	15
Malignant neoplasm of liver or intrahepatic bile ducts	C22	-
Malignant neoplasm of larynx	C32	3
Malignant neoplasm of breast	C50	30
Diabetes mellitus (type II)	E11	63
Epilepsy or status epilepticus	G40 or G41	7
Hypertensive diseases	I10-I15	152
Ischaemic heart disease	I20-I25	116
Cardiac arrhythmias	I47-I49	88
Haemorrhagic stroke	I60-I62, I69.0-I69.2	2
Ischaemic stroke	I63-I66, I69.3 or I69.4	10
Oesophageal varices	I85	2
Gastro-oesophageal laceration-haemorrhage syndrome	K22.6	1
Unspecified liver disease	K73, K74	5
Cholelithiasis	K80	4
Acute and chronic pancreatitis	K85, K86.1	4
Psoriasis	L40 excluding L40.5	28
Spontaneous abortion	O03	2
<b>Sum</b>		<b>575</b>



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**Table 3** Alcohol-attributable conditions as predictors of current hazardous drinking

	Sensitivity	Specificity	Positive predictive value	Negative predictive value
<b>All patients</b>				
> 9/14 AU/week (w/m)	21%	70%	10%	85%
> 1 binge day/month	18%	72%	15%	76%
> 9/14 AU/week (w/m) and/or > 1 binge day/month	18%	71%	16%	74%
<b>Men</b>				
> 14 AU/week	23%	73%	10%	88%
> 1 binge day/month	21%	71%	22%	69%
> 14 AU/week and/or > 1 binge day/month	20%	70%	23%	66%
<b>Women</b>				
> 9 AU/week	15%	73%	3%	93%
> 1 binge day/month	12%	73%	7%	84%
> 9 AU/week and/or > 1 binge day/month	13%	72%	7%	83%

AU = Alcohol Units w/m = women/men

community or national level (11), our findings indicate that they are not useful in order to identify individual hospital patients to be prioritised for screening.

This may have several explanations, including considerable variation of the etiological fraction of alcohol for the different alcohol-attributable conditions (11).

In addition, a list of alcohol-attributable conditions will never be complete. This is likely to be the case also in this particular study, as it did not include a number of facial injuries and other accidents, often related to excessive alcohol consumption (12).

Huntley et al. reported alcohol-attributable conditions to be more successful in identifying hazardous drinkers admitted to accident and emergency department (13). They identified the ten most common categories of complains among the alcohol-attributable conditions. This top 10 list was arranged as follows (in falling order); fall, collapse, head injury, assault, non-specific gastrointestinal problem, being unwell, psychiatric complain (including depression, overdose and confusion), cardiac complain (including palpitations and chest pain), self neglect, and repeated attendance (13). Our study does not evaluate whether such a list could be successful for Norwegian hospital patients characterised by a lower prevalence of hazardous drinkers compared to the UK (14,15).

Several conditions may have a negative impact on the use of alcohol-attributable conditions as a clinical screening tool to identify hazardous drinkers. For example, ab-

stainers can be characterised by either former drinking or lifetime abstinence, and thereby differ substantially regarding the risk of developing an alcohol-attributable condition (11). It is also possible that an unknown proportion of the patients with alcohol-attributable conditions stopped or reduced their alcohol intake after developing such a condition. In addition, some alcohol-attributable conditions may still exist after several years of abstinence (16). Furthermore, It is also possible that a proportion of the patients in the study may not yet have developed an alcohol-attributable condition, though they have a hazardously intake. This time delay, both from introducing/quitting hazardous alcohol intake, until onset/recovery of alcohol-attributable condition will have a negative impact.

Hospital staff may, however, still find alcohol-attributable conditions useful when performing semi-systematic or non-systematic screening when combining them with other clinical and psychosocial factors not necessarily present in discharge reports. These factors may include for example caput medusa, spider nevi, ascites, insomnia, legal and family problems, patient demography, socio-economic factors etc. However, there is still lack of evidence that such a semi-systematic approach can substitute systematic screening in terms of numbers of risky drinkers detected (17).

In conclusion, we found no evidence to support semi-systematic screening of Norwegian hospital patients by using alcohol-attributable conditions to predict hazardous drinking. Other strategies including validated alco-



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hol use disorder questionnaires, patient interviews and biological markers may be more successful in order to identify hazardous drinkers. The potential of alcohol interventions is substantial, and may include reduced morbidity and length of stay. Therefore there is an urgent need for more knowledge on how to better identify current hazardous drinkers in hospitals.

**Competing interest:** None declared.

### References

- Hart CL, Smith GD. Alcohol consumption and mortality and hospital admissions in men from the Midspan collaborative cohort study. *Addiction*. 2008;103:1979-86.
- McDonald SA, Hutchinson SJ, Bird SM, Graham L, Robertson C, Mills PR, et al. Association of self-reported alcohol use and hospitalization for an alcohol-related cause in Scotland: a record-linkage study of 23,183 individuals. *Addiction*. 2009;104:593-602.
- Institute of Alcohol Studies. IAS Factsheet - The Impact of Alcohol on the NHS. St Ives: Institute of Alcohol Studies 2009.
- Tønnesen H, Nielsen PR, Lauritzen JB, Møller AM. Smoking and alcohol intervention before surgery: evidence for best practice. *Br J Anaesth*. 2009;102:297-306.
- Pedersen B, Oppedal K, Egund L, Tønnesen H. Will emergency and surgical patients participate in and complete alcohol interventions? A systematic review. *BMC Surg*. 2011;11:26.
- Au DH, Kivlahan DR, Bryson CL, Blough D, Bradley KA. Alcohol screening scores and risk of hospitalizations for GI conditions in men. *Alcohol Clin Exp Res*. 2007;31:443-51.
- Roche AM, Freeman T, Skinner N. From data to evidence, to action: findings from a systematic review of hospital screening studies for high risk alcohol consumption. *Drug Alcohol Depend*. 2006;83:1-14.
- Anderson P, Baumberg B. *Alcohol in Europe*. London: Institute of Alcohol Studies; 2006.
- Tønnesen H, Christensen ME, Groene O, O'Riordan A, Simonelli F, Suurorg L, et al. An evaluation of a model for the systematic documentation of hospital based health promotion activities: results from a multicentre study. *BMC Health Serv Res*. 2007;7:145.
- Deutsche Hauptstelle für Suchtfragen e.V. (DHS). *Binge Drinking and Europe*. Hamm: DHS; 2008.
- Jones L, Bellis MA, Dedman D, Sumnall H, Tocque K. Alcohol-attributable fractions for England: Alcohol-attributable mortality and hospital admissions. Liverpool: Centre for Public Health, Faculty of Health and Applied Social Sciences, John Moores University; 2008.
- Goodall CA, Ayoub AF, Crawford A, Smith I, Bowman A, Koppel D, et al. Nurse-delivered brief interventions for hazardous drinkers with alcohol-related facial trauma: a prospective randomised controlled trial. *Br J Oral Maxillofac Surg*. 2008;46:96-101.
- Huntley JS, Blain C, Hood S, Touquet R. Improving detection of alcohol misuse in patients presenting to an accident and emergency department. *Emerg Med J*. 2001;18:99-104.
- Oppedal K, Nesvag S, Pedersen B, Skjotskift S, Aarstad AK, Ullaland S, et al. Health and the need for health promotion in hospital patients. *Eur J Public Health*. 2010;21-744,9.
- Waller S, Thom B, Harris S, Kelly M. Perceptions of alcohol-related attendances in accident and emergency departments in England: a national survey. *Alcohol Alcohol*. 1998;33:354-61.
- Jarl J, Gerdtham U-G. Time pattern of reduction in risk of oesophageal cancer following alcohol cessation - A meta-analysis. *Addiction*. 2011 Dec 16 [Epub ahead of print]
- Reinholdz HK, Bendtsen P, Spak F. Different Methods of Early Identification of Risky Drinking: A Review of Clinical Signs. *Alcohol and Alcoholism*. 2011;46:283-91.