

Article

Prevalence, Clinical Characteristics, and Risk Factors for Non-recording of Alcohol Use in Hospitals across Europe: The ALCHIMIE Study

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Abstract

Aim: To determine the detection rates, clinical features, and risk factors for lack of registration of alcohol use in medical patients admitted in European hospitals.

Methods: A point-prevalence, cross-sectional, multicenter survey involving 2100 medical inpatients from 43 hospitals from 8 European countries. Patients were screened for current alcohol use, using standardized questionnaires. Alcohol use recording in medical records was assessed.

Results: Of the 2100, more than a half reported alcohol use. Significant differences were shown in the prevalence of drinking and the recording rates of alcohol use among the hospitals and countries involved. Overall, 346 patients (16%) fulfilled criteria for alcohol use disorder. Alcohol use was registered in 909 (43%) of medical records, with quantification in 143 (7%). Multivariate analysis showed that women (OR 1.49), older age patients (OR 1.23), patients from the Northern European countries (OR 4.79) and from hospitals with high local alcohol prevalence (OR 1.59) were more likely to have lack of alcohol use registration in their medical files.

Conclusions: A considerable proportion of medical patients admitted in European hospitals fulfill criteria for alcohol use disorders. These patients are frequently overlooked during hospitalization and not appropriately registered in medical records. Women, older patients, and inpatients from European areas with high local alcohol use prevalence are at higher risk associated with a non-recording of alcohol use.

INTRODUCTION

Due to the relationship of hazardous and harmful alcohol consumption to medical illnesses as well as to accident injuries and violence, it is presumed that people with alcohol-related problems are over-represented in health care settings, particularly in emergency wards and hospitals. Although data are still scarce, when reported, the prevalence of alcohol use disorders in hospitalized patients has been consistently higher than in the general population (Moore *et al.*, 1989; Smothers *et al.*, 2004; Roche *et al.*, 2006; Rosón *et al.*, 2010; Youmans *et al.*, 2010).

Although evidence supporting screening, brief intervention and referral to treatment for alcohol use disorders (SBIRT) in the general hospital is not as robust relative to primary care settings and the emergency department (Saitz *et al.*, 2007; McQueen *et al.*, 2009; Bischof *et al.*, 2010), there is increasing emphasis and recommendation for it, and the Joint Commission on Accreditation for Health Care Organizations, has advanced SBIRT as a quality indicator for general hospital care (JCAHCO, 2014). Therefore, detection of alcohol use disorders during hospitalization is important and has a twofold relevance: firstly, to avoid and prevent medical complications following abrupt cessation in consumption, such as the withdrawal syndrome and, secondly, and equally important, because hospitalization may be an opportunity for intervention and for initiating an integrated approach where there is dependence.

Despite having the highest rates of morbidity and mortality due to alcohol use disorders within the WHO European Region (Murray and Lopez, 1996; European Status Report on Alcohol and Health, 2010), not much is known about the rates of detection of alcohol use among hospitalized patients across Europe. Unfortunately, most of the few studies published to date have been geographically circumscribed to a single hospital or region, and showed important methodological differences either in the study populations, the type of physicians involved (psychiatrists, internists, or other specialties), the sampling methods or the instruments used for detection (Seppa and Makela, 1993; Sharkey *et al.*, 1996; Reynaud *et al.*, 2000; Rumpf *et al.*, 2001; Schneckloth *et al.*, 2001; Saitz *et al.*, 2006; Rehm *et al.*, 2015a,b). Therefore, the task of integrating the data from these studies to assess the actual prevalence of alcohol use disorders in the European inpatient population has been particularly difficult.

Bearing in mind the limitations mentioned above, there seemed to be a gap in the literature between the presence of alcohol-related problems and their recognition and treatment among hospitalized patients in Europe, prompting the European Federation of Internal Medicine (EFIM) to perform the ALCHIMIE study—a collaborative, multicenter and international investigation.

More specifically, the aims of this study were:

- (a) to determine the prevalence and characteristics of alcohol use disorders among representative samples from patients hospitalized in general hospitals across Europe;
- (b) to evaluate differences shown in alcohol use identification rates among the European regions and countries involved.

METHODS

Setting and study design

Recruitment of participating hospitals across Europe was performed through the European Federation of Internal Medicine (EFIM) Administrative Council, by direct contact with the Internal Medicine

National Societies of member countries and the Young Internists Network. There was a mailing to the 42 National Societies, 14 of them answered back, 6 National Societies denied participation and 8 agreed to participate. After evaluating the project, a national coordinator contacted all hospitals with active EFIM members harboring inpatient clinics in a country. In these 8 countries, 66 hospitals responded: 23 denied participation and 43 agreed. In order to participate, hospitals had to be able to include at least 50 inpatients admitted at medical departments, and provide a questionnaire including hospital size, type of population served (urban or rural), type of hospital (university, referral, community), knowledge of local prevalence of alcohol use disorders (whether the prevalence of alcohol use disorders in the hospital was known previous to the present study), whether the hospital had a current resident training program, type of institutional medical files (paper or electronic), and whether alcohol use was an obligatory item registered in medical records or not. All hospitals that applied and fulfilled the above mentioned criteria participated in the study. There were no financial incentives for collaborating in the study. In total, the study was conducted in 43 hospitals from eight different countries across Europe, divided into three main regions: 12 hospitals from Northern Europe (Latvia, Estonia and Russia), 9 from Central Europe (Austria and the Czech Republic), and 22 from Southern Europe (France, Portugal and Spain). The study was approved by the Ethics Committees of all 43 participating centers.

The study was a point-prevalence, observational, and cross-sectional study which involved a 1-day survey, and was carried out on 7 April 2011 in all participating centers, except in French hospitals, where the survey was conducted on 16 February 2011. All adult patients aged 18 years or older, hospitalized at 8 a.m. on the day of survey, were eligible for the ALCHIMIE study. Patients who were confused, cognitively impaired or not available on the day of the survey, were excluded. Interviews with surrogates (relatives or other caregivers) were not allowed. As shown in Fig. 1, the investigation team subsequently evaluated all patients who were able to manage to complete the interview.

Measurements

After providing informed consent, the following question was put by the investigators to all patients: 'Do you sometimes drink alcoholic beverages?'. If the answer was NO, the screening was completed and the patient classified as an 'abstainer'. If the patient's answer was YES, the investigators proceeded to ask the first three questions of the Alcohol Use Disorders Identification Test (AUDIT), also called AUDIT-C. The AUDIT-C is scored on a scale of 0–12, in which a score of 0 reflects no alcohol use, and a positive score (≥ 4 in men or ≥ 3 in women) means the patient is at increased risk for alcohol use disorders. The higher the AUDIT-C score, the more likely is the risk of alcohol negatively affecting the patient's health and safety.

In order to standardize direct questions about alcohol consumption, the Systematic Inventory of Alcohol Consumption (SIAC) questionnaire was also administered (Gual *et al.*, 2001). This test has three questions on quantity and frequency of alcohol use. To generate a total weekly consumption of 'standard drinks per week' the number of days in which alcohol was consumed during the week was multiplied by the amounts of alcohol consumed measured in grams. A specific distinction was made between alcohol consumption on workdays as opposed to holidays. A 'standard drink' was defined as in the PHEPA guidelines (Anderson *et al.*, 2005), which set hazardous consumption at 280 grams per week for men, and at 140 grams for women (28 and 14 standard drinks, respectively).

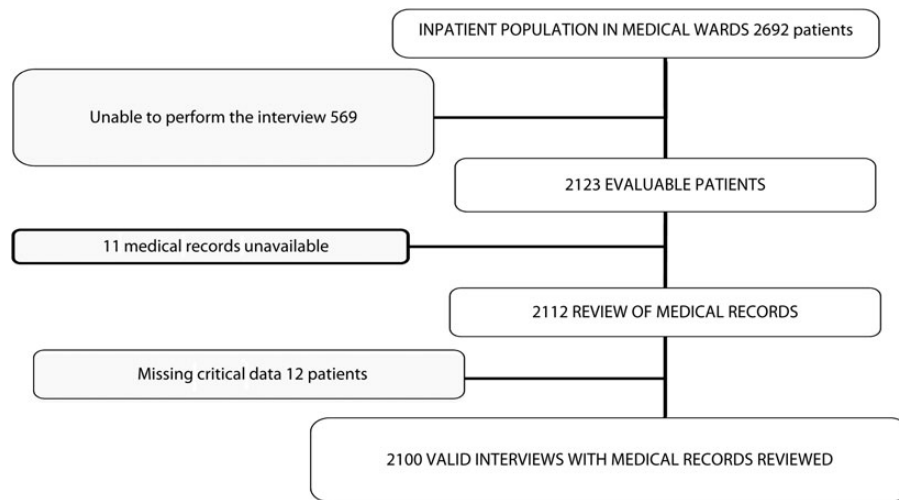


Fig. 1. Study flow.

All men and women with positive AUDIT-C or as ‘hazardous drinkers’ with SIAC scores were subsequently screened by the full version of AUDIT, which was found by [Saunders *et al.* \(1993\)](#) to show 92% sensitivity and 94% specificity for detecting hazardous and harmful drinking. In the present study, the cut-off point of 8 for men and 6 for women was applied. Clinical evaluation included a complete clinical history exploring all aspects of alcohol use and its consequences, in which assessment of the established criteria for the alcohol use diagnoses was performed.

Definitions of alcohol drinking patterns

Alcohol use diagnoses were made by investigators: abstainers, hazardous, harmful and dependent drinkers, according to the results of the AUDIT and the clinical evaluation. Patients with negative AUDIT-C and SIAC scores and with a positive response to the first question were classified as low-risk drinkers. Patients with positive AUDIT-C or SIAC and a negative full AUDIT were considered hazardous drinkers. We used the ICD-10 criteria for the diagnosis of alcohol dependence ([World Health Organisation, Geneva, 1992](#)) Patients in whom criteria for dependence and harmful drinking were not met but had a positive full AUDIT were classified as hazardous drinkers. Harmful drinking was diagnosed in patients drinking above risk limits but without criteria for alcohol dependence, yet with a current or past history of alcohol-related disease obtained by medical history and clinical record review. Patients were defined as ‘dependent in remission’ when, following a diagnosis of alcohol dependence, they reported abstaining during the previous 12 months (as noted measured by the AUDIT-C). Those patients were identified after reviewing clinical records.

Evaluation of clinical records

After completing the interviews, all medical records referring to the current admission were reviewed by one researcher. Data collected included: (a) *demographic data*: age and gender; (b) *reason for admission*, which was classified by investigators into the following five categories: non-alcohol-related disease, acute alcohol-related disease, acute exacerbation of a chronic alcohol-related disease (a list of alcohol-related diseases was included in the protocol), acute intoxication, and alcohol withdrawal syndrome; (c) *type of admission*: scheduled or emergency; and (d) *type of alcohol consumption evaluation*,

which was considered ‘lack of alcohol use recording’ when no mention of alcohol use was found in the medical record, ‘qualitative’ when the patient was only considered to be an alcohol drinker or non-drinker but there was no mention of the quantity or severity of alcohol use, ‘semi-quantitative’ when alcohol use was graded as light, moderate or severe, and ‘quantitative’ when it was recorded in standard drinks or grams per day/week.

Ethical considerations and data safety

Data were entered on a standard case report form with identifying number only and submitted to the coordinating center via Internet through a secure website.

Statistical analysis

Descriptive statistics were used to summarize data. Age groups were classified according to percentile distributions: percentile 25 (<65 years), percentile 25–75 (range from 65 to 83 years), and percentile 75 (>83 years). The hospital size was classified according to the total number of inpatient beds: *large size* (>600 beds), *medium size* (200–600 beds) and *small size* (<200 beds). To compare results by geographical location, European countries involved were divided into three main regions: Northern Europe (Russian Federation, Latvia, Estonia), Central Europe (Czech Republic, Austria), and Southern Europe (France, Portugal, Spain). Inpatient prevalence of alcohol use disorders at participating hospitals was categorized as: *low prevalence* [percentile 25 (<11%)], *intermediate* [percentile 25 to 75 (11 to <22%)] and *high* [percentile 75 (≥22%)].

To examine differences between groups, we used the χ^2 test with continuity correction for categorical variables, and the Student’s *t*-test for continuous variables. The multivariable analysis of factors potentially associated with alcohol use disorders and a lack of evaluation of alcohol use in medical records included all significant variables in univariate analysis and all clinically important variables, whether they were significant or not. It was performed using the manual step-wise by step Enter method with the logistic-regression model in the SPSS software package 13.0 (SPSS, Chicago). Subsequently, to build the most simple and parsimonious model and avoid multicollinearity ([Hosmer *et al.*, 2013](#)), variables without a significant association were removed one by one, performing each step manually until

a model with all significant variables was built. Associations were considered statistically significant if the *P*-value was <0.05 using a two-sided test.

RESULTS

A total of 2692 patients admitted for medical disorders in 43 hospitals and from 8 European countries were included: Austria, 79; Czech Republic, 335; Estonia, 192; Latvia, 63; Russia, 267; France, 772; Portugal, 329; Spain, 655. Figure 1 shows that 569 patients (21%) were not evaluable according to the study protocol; in most cases, this was due to the presence of communication problems such as dementia or confusion preventing proper interview (see Table 1 and Fig. 1).

Of the 2100 patients finally interviewed, the mean age was 68.8 ± 17.3 years (range 18.1–101.3) and 52% were male. Most (88%) were admitted via the emergency department; 179 (17%) were hospitalized in small hospitals, 374 (36%) in medium-sized hospitals, and 486 (47%) in large hospitals. The main reason for inpatient admission was a medical disorder not related to alcohol use (2015 of the 2100; 96%); 33 (1.6%) presented with an acute medical disease

related to alcohol use, 29 (1.4%) showed acute decompensation of an alcohol-related chronic disease, 16 (0.8%) an alcohol withdrawal syndrome, and 7 (0.3%) were hospitalized due to acute alcohol intoxication. Overall, 1237 (59%) admitted any alcohol use.

Of the 2,100 patients 984 (47%) were classified by investigators as abstainers; 770 (37%) as low-risk drinkers; 162 (8%) as hazardous drinkers; 63 (3%) as harmful drinkers; 75 (4%) as alcohol dependent; and 46 (2%) as dependent in remission. Hence, in 346 cases (16%), there were current or past alcohol use disorders. Table 2 shows the clinical characteristics of the 2,100 patients interviewed: patients aged <65 years and male patients were more likely to have alcohol use disorders, and there were the expected gender differences in prevalence; AUD were more frequently found in patients admitted to hospitals from Southern Europe (18%), than from Central (14%) or Northern Europe (13%). As shown in Fig. 2, there were significant differences among European countries in the prevalence of alcohol use disorders in the general population, the prevalence of alcohol use disorders recorded in the medical records of those hospitalized patients included in the study, and in the global percentage of quantification of alcohol use recorded in the medical records of such patients. In all countries, the prevalence of alcohol use disorders in hospitalized patients was higher than the average among the general European population (denoted in Fig. 2 by the dashed line), provided by the WHO-European Status Report on alcohol and health in 2010. No homogeneity was observed across Europe, with dissimilar percentages of recording in countries from the same region: northern Europe (Russia 25%; Estonia 26%; and Latvia 7%; *P* = 0.005), Central (Austria 47%; the Czech Republic 76%; *P* < 0.001), and Southern (France 31%; Spain 53%; and Portugal 55%; *P* < 0.001).

Alcohol use was recorded in 909 (43%) of medical files; 455 (22%) of patients were noted as abstainers. Of the remaining 454 in whom alcohol use was recorded, alcohol consumption was quantitatively evaluated in 143 (31%) [113 in standard drinks, and 30 in grams per day], semi-quantitatively in 211 (46%) [152 were 'light drinkers', 33 'moderate', 26 'heavy'], and qualitatively in 62 (14%).

Table 1. Patients excluded from the ALCHIMIE study

Causes of exclusion	No. of patients
Dementia or cognitive impairment (<i>includes delirium and confusion</i>)	316
Denied consent	56
Dyspnea or respiratory failure	43
Agonic state	38
Language barrier (<i>includes aphasia and severe dysarthria</i>)	27
Other medical reasons	73
Cause not listed	16
Total	569

Table 2. Characteristics of included patients according to alcohol use

Characteristics	Total (<i>N</i> = 2100) <i>N</i> (%)	Abstainers and low-risk drinkers (<i>N</i> = 1754) <i>N</i> (%)	Alcohol use disorders (<i>N</i> = 346) <i>N</i> (%)	<i>P</i> -value	Odds ratio	95% confidence intervals
Age (years ± SD)	67.8 ± 17.3	69.2 ± 17.2	61.0 ± 16.6	<0.001	–	–
Age groups						
<65 years	528 (25)	391 (22)	137 (40)	<0.001	3.84	2.68–5.24
65–83 years	1033 (49)	869 (50)	163 (47)		2.06	1.46–2.92
>83 years	539 (26)	494 (28)	45 (13)		–	–
Gender						
Male	1094 (52)	825 (47)	269 (78)	<0.001	3.93	3.00–5.15
Female	1006 (48)	929 (53)	77 (22)		–	–
Type of admission						
Scheduled	604 (29)	525 (30)	79 (23)	0.008	0.69	0.53–0.91
Emergency	1496 (71)	1228 (70)	267 (77)		–	–
Size of hospital (beds)						
Small (<200)	274 (13)	243 (14)	31 (9)	0.019	0.57	0.38–0.86
Medium (200–600)	721 (34)	607 (35)	114 (33)		0.84	0.66–1.09
Large (>600)	1105 (53)	904 (52)	201 (58)		–	–
European region ^a						
Southern	1259 (60)	1027 (58)	232 (67)	0.010	1.53	1.14–2.07
Central	350 (17)	299 (17)	51 (15)		1.60	0.78–1.72
Northern	491 (23)	428 (24)	63 (18)		–	–

^aSouthern: France, Spain and Portugal; Central: Czech Republic and Austria; Northern: Latvia, Russian Federation and Estonia.

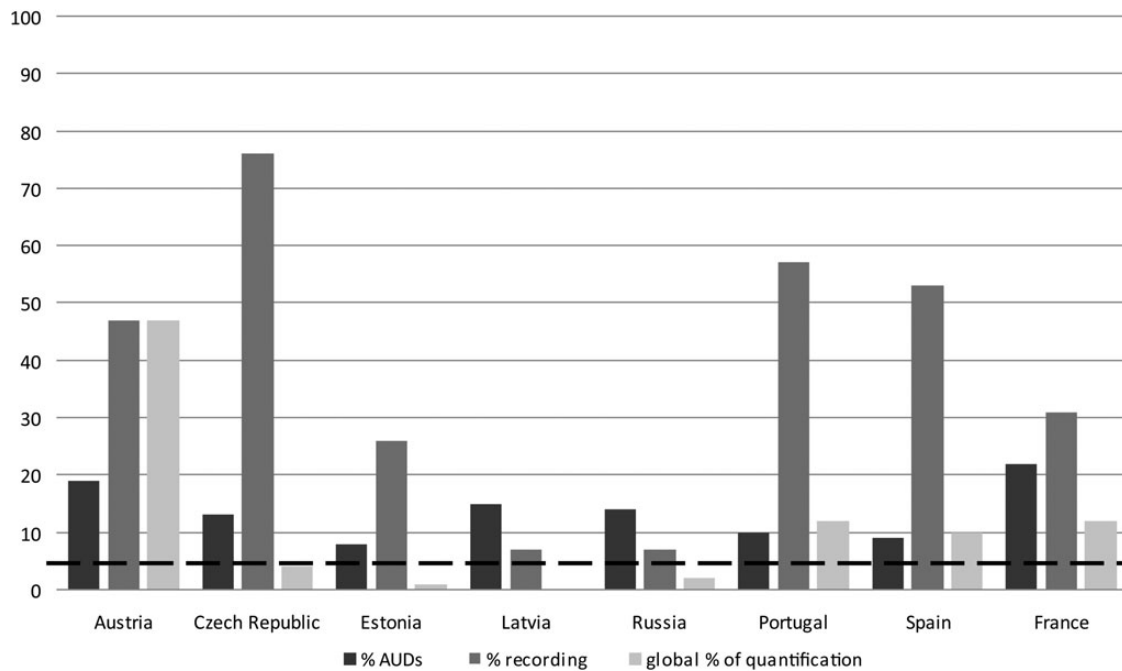


Fig. 2. Prevalence of alcohol use disorders (AUDs), alcohol use recording, and alcohol use quantification in the participating countries. % AUDs = prevalence of alcohol use disorders (AUDs) in general population (the dashed line denotes the level of AUDs in general population in Europe); % recording = percentage of patients hospitalized in medical wards with alcohol use disorders documented in their medical records; global % of quantification = % of patients hospitalized in medical wards with adequate quantification of alcohol use in their medical records.

Thirty-eight patients (9%) had a diagnosis of alcohol use disorder in their medical records but no specific method of evaluation could be found during the revision. Percentage of alcohol use quantification was low: among 1237 patients who admitted any alcohol use in the researchers' interview, 558 (45%) had a mention of alcohol in their medical records; of the 346 patients with alcohol use disorders, there was quantification in 67 (28%), and no reference to alcohol consumption was found in 139 (40%). Moreover, in 24 (32%) of the 75 whom investigators classed as alcohol dependent, no evaluation of the amount drunk were found in their medical records.

Tables 3 and 4 show those factors associated with the lack of alcohol use recording. These include being a woman, being over 83 years old, being in a Northern European hospital, and being admitted in a hospital from an area with high local alcohol use prevalence. By contrast, medical inpatients from urban hospitals, where an obligatory record of alcohol use is required in their medical files, who are admitted for an alcohol-related cause, and whose attending physicians have knowledge of local alcohol use prevalence are more likely to have recording of alcohol use. The statistical model provided a good fit for the data (Hosmer–Lemeshow test $P = 0.148$).

DISCUSSION

The ALCHIMIE study was an international point-prevalence, observational, and cross-sectional investigation. We used the definition of alcohol use disorders provided by WHO which includes hazardous and harmful drinkers, that were not properly identified by the DSM-IV alcohol abuse and dependence categories. The new DSM-5, which was not available when planning and performing the study, integrates the two DSM-IV disorders, alcohol abuse and alcohol dependence, into a single disorder called alcohol use disorder (AUD)

with mild, moderate, and severe sub-classifications (NIH, 2015). DSM-5 has been intensely criticized because it is considered to over-diagnose alcohol use disorders. We do not know if using the current DSM-5 classification would have change the prevalence of AUDs in our study.

Results from the ALCHIMIE study showed that while 59% of medical inpatients admitted any alcohol use as assessed by investigators, attending physicians recorded alcohol use only in 47% of them. Prevalence of alcohol use in hospitalized patients showed significant differences among the European hospitals and countries involved in the present study. Worryingly, a substantial proportion of patients (16%) fulfilled the criteria for alcohol use disorders (including hazardous, harmful and dependent drinkers), which was higher than the 9% described in the WHO-European Region general population (European Status Report on Alcohol and Health, 2010). The group of hospitalized patients aged <65 years old were almost three times as likely to present alcohol use disorders than the general European population of a similar age range. Of major concern, in most of the hospitals involved was that alcohol use disorders were frequently overlooked during hospitalization and consequently, not registered in medical records.

These data were consistent, in part, with the sparse number of previously published reports performed in individual hospitals or countries (Moore *et al.*, 1989; Seppa and Makela, 1993; Sharkey *et al.*, 1996; Reynaud *et al.*, 1997; Schneekloth *et al.*, 2001; Hearne *et al.*, 2002; Smothers *et al.*, 2004; Saitz *et al.*, 2006; Rosón *et al.*, 2010; Youmans *et al.*, 2010). However, several considerations should be taken into account when comparing the results shown in the present investigation with those reported in previous studies. Differences might be due to a particular hospital's location (area, country, European region), patient characteristics, the age range of the population studied, the type of hospital wards where patients were studied

Table 3. Risk factors for lack of recording of alcohol use: univariate analysis

Factors	Total (N = 2100) N (%)	Not recorded (N = 1191) N (%)	Recorded (N = 909) N (%)	Univariate analysis		
				P-value	Odds ratio	95% confidence intervals
Patient factors						
Age groups						
<65 years	528 (25)	297 (25)	231 (25)	<0.001	R	
65–83 years	1031 (49)	547 (46)	484 (53)		0.88	0.71–1.09
>83 years	539 (26)	347 (29)	193 (21)		1.40	1.10–1.80
Gender						
Male	1094 (52)	565 (48)	529 (29)	<0.001		
Female	1006 (48)	626 (52)	380 (41)		1.54	1.29–1.84
Type of admission						
Scheduled	604 (29)	351 (29)	253 (28)	0.404		
Emergency	1195 (71)	839 (71)	656 (72)		1.08	0.76–1.11
Drinking patterns						
Abstainer	984 (47)	612 (51)	372 (41)	<0.001	R	
Low-risk drinker	770 (37)	440 (37)	330 (36)		0.81	0.67–0.98
Hazardous drinker	162 (8)	91 (8)	71 (8)		0.77	0.55–1.09
Harmful drinker	63 (3)	18 (1)	45 (5)		0.24	0.14–0.43
Alcohol dependence	75 (4)	17 (1)	58 (6)		0.18	0.10–0.31
Dependence in remission	46 (2)	13 (1)	33 (4)		0.24	0.12–0.46
Admission alcohol related						
No	2015 (96)	1177 (99)	838 (92)	<0.001		
Yes	85 (4)	14 (1)	71 (8)		0.14	0.08–0.251
Setting factors						
European region ^a						
Southern	1259 (60)	714 (60)	545 (60)	<0.001	R	
Central	350 (17)	100 (8)	250 (27)		0.30	0.24–0.39
Northern	491 (23)	377 (32)	114 (12)		2.52	1.99–3.20
Population served						
Mainly Urban	880 (42)	378 (32)	502 (55)	<0.001	0.38	0.31–0.45
Rural or mixed	1220 (58)	813 (68)	502 (55)			
Size of hospital						
Small (<200 beds)	274 (13)	157 (13)	117 (13)	0.006	R	
Medium (200–600 beds)	731 (34)	375 (31)	346 (38)		0.81	0.61–1.07
Large (>600 beds)	1105 (53)	659 (55)	446 (49)		1.10	0.84–1.44
Type of hospital						
University	945 (45)	449 (38)	496 (54)	<0.001	0.50	0.42–0.60
Other (referral, community)	1155 (55)	742 (62)	413 (45)			
Local alcohol use prevalence						
Low (<11%)	565 (26)	341 (29)	212 (23)	<0.001	R	
Intermediate (11–<22%)	1008 (48)	515 (43)	493 (54)		0.65	0.53–0.80
High (≥22%)	539 (28)	335 (28)	204 (22)		1.02	0.80–1.30
Electronic files						
No	982 (46)	677 (57)	305 (33)	<0.001		
Yes	1118 (53)	514 (43)	604 (67)		0.38	0.32–0.46
Physician factors						
Knowledge of local prevalence						
No	1841 (88)	1112 (93)	729 (80)	<0.001		
Yes	259 (12)	79 (7)	180 (20)		0.29	0.22–0.38
Resident training						
No	581 (28)	402 (34)	179 (20)	<0.001		
Yes	1519 (72)	789 (66)	730 (80)		0.48	0.39–0.59

^aSouthern: France, Spain and Portugal; Central: Czech Republic and Austria; Northern: Latvia, Russian Federation and Estonia.

(medical, surgical or trauma wards), and methods and tests used for alcohol use detection (Fink *et al.*, 1996; Hearne *et al.*, 2002; Bloomfield *et al.*, 2003; Giovanardi *et al.*, 2005; Roche *et al.*, 2006; Browne *et al.*, 2012; Friedmann, 2013).

Some study limitations might have led us to misestimate the real prevalence of alcohol use disorders in hospitalized patients across

Europe. First, despite the high number of hospitals involved, final selection bias could not be ruled out on the grounds that participating hospitals were probably those led by more motivated investigators. Enhanced recognition of alcohol use negative consequences might have influenced the found prevalence by promoting participation of hospitals with a more problematic population. Second, the high

Table 4. Risk factors for lack of recording of alcohol use: multivariate analysis

Factors	Multivariate analysis		
	Odds ratio (OR)	95% CI for OR	P
Women	1.49	1.22–1.82	<0.001
Older age (>83 years)	1.23	1.21–1.92	<0.001
Northern countries	4.79	3.65–6.29	<0.001
High local alcohol use prevalence	1.59	1.25–2.04	<0.001
Urban hospital	0.59	0.47–0.75	<0.001
Obligatory record of alcohol use	0.34	0.27–0.44	<0.001
Alcohol-related cause of hospital admission	0.10	0.05–0.19	<0.001
Knowledge of local alcohol use prevalence	0.41	0.30–0.56	<0.001

awareness of the negative social consequences of recognizing alcohol use disorders that still exists in some European areas might have hindered the involvement of other hospitals with similar or more problematic populations. Third, patients with delirium tremens and alcoholic dementia might have been disregarded if they presented confusion on hospital admission, since this was an exclusion criterion for entering the study.

However, other limitations might have led us to further underestimate the real prevalence of alcohol use disorders in hospitalized patients. In our study, diagnoses of less severe drinking patterns were established by the test results. It should be noted that two recently reported international overviews (Rehm *et al.*, 2015a,b) also highlighted that, even with the use of standardized instruments, the true prevalence of alcohol use disorders may be underestimated. These surveys were based, respectively, on community-dwelling general population from the primary care and patients from a broad spectrum of specialized treatment settings, either institutionalized or non-institutionalized. Finally, desirable responses given by self-report might have led researchers to misclassify patients with hidden alcohol dependence or episodic drinking as abstainers.

As for alcohol use identification which was determined by review of medical records, we found that despite a high actual prevalence of alcohol use disorders observed in European medical inpatients, alcohol consumption was recorded in less than 50% of such medical charts. We do not know this rate would change significantly if more than one researcher reviewed the medical records. However, what is of great concern is the fact that alcohol consumption was rarely appropriately quantified and adequately registered in most inpatients' medical records, either among patients showing dependence or those admitted due to alcohol-related diseases. It has been postulated that brief interventions in medical inpatients with non-dependent alcohol use disorders focused on alcohol-related illnesses, might be more effective than in more severe cases (McQueen *et al.*, 2011). This population of hazardous and harmful drinkers, which can be a target for brief intervention, represented 11% of the hospitalized patients in our study. The routine assessment of hospitalized patients might also help to reduce the treatment gap of alcohol abuse and dependence that has been reported to be 78.1% worldwide and 92% in the WHO European region (Kohn *et al.*, 2004). It has also been suggested that to implement brief interventions in these patients will require numerous different interventions at a variety of interlinked levels. These may range from interventions targeting individual health professionals'

knowledge, skills, attitudes and behaviors relating to alcohol issues, to efforts at organizational and societal levels (Nielsen, 2010). Significant differences observed among countries in rates of identification and quantification of alcohol use depended basically on physicians' performance, but may also reflect cultural differences in knowledge and awareness of alcohol harm on the part of not only doctors, but also patients.

Interestingly, the ALCHIMIE study identified several factors which were associated with a lack of alcohol use recording in patients admitted for medical reasons. Hospitalized patients of female gender, older age, admitted to hospitals in Northern Europe, or areas with a high local prevalence of alcohol use, were less frequently registered as alcohol users in their medical records. These data were in accordance with previously published data highlighting the difficulties in determining alcohol drinking habits among women (Dawson *et al.*, 1992), or older persons (Moore *et al.*, 1999). Inversely, patients from urban hospitals, admitted for alcohol-related diseases, attended by physicians knowing the local prevalence of alcohol use disorders, and having an obligatory field for registering the patient's alcohol use in their medical records were associated with a significantly higher and better record of alcohol use. Moreover, like other recent reported experiences (Lapham *et al.*, 2012; Mitchell *et al.*, 2012), the use of electronic records was associated with higher recording rates in our study.

In summary, a high proportion of European medical inpatients are not adequately identified for alcohol use during hospitalization, particularly women, older patients, and those hospitalized patients from areas of high local alcohol use prevalence. Furthermore, proper evaluation and registration of alcohol use and drinking patterns is seldom performed in most of the hospitals evaluated. When alcohol use is registered, few medical records show appropriate quantification of alcohol consumption. It is hoped that these results will prompt hospital-based clinicians and administrators, leading to improved detection and management of patients with alcohol use disorder.

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APPENDIX

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