
Article

Women and Men Admitted for Alcohol Intoxication at an Emergency Department: Alcohol Use Disorders, Substance Use and Health and Social Status 7 Years Later

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Abstract

Aims: To assess the prevalence of alcohol use disorder (AUD), substance use, mental health and social status 7 years following an Emergency Department (ED) admission for alcohol intoxication. To assess gender differences in these prevalences.

Methods: Cohort of 631 patients aged 18–30 years admitted for alcohol intoxication in 2006–2007 at a tertiary referral hospital in Switzerland, contacted for an interview in 2014. Assessment consisted of demography, Alcohol Use Disorders Identification Test-Consumption, Mini International Neuropsychiatric Interview for AUD, Patient Health Questionnaire (depression, anxiety) and lifetime/past year use of tobacco/illegal drugs. Gender differences were assessed with Chi-square tests, *t*-tests and Wilcoxon tests.

Results: In 2014, 318/631 (50.4%) completed the interview. Study completers were not different from non-completers on baseline characteristics (all $P > 0.2$). Of study completers, 36.8% were unemployed, 56.9% reported hazardous alcohol use, 15.1% alcohol dependence, 13.2% harmful use, 18.6% depression, 15.4% anxiety disorder. Prevalence of any use (lifetime/past year) was 93.4%/80.2% for tobacco, 86.6%/53.1% for cannabis, 54.7%/22.6% for cocaine, 25.6%/13.5% for sedatives, 40.9%/11.0% for stimulants, 21.7%/7.2% for opioids. Men reported significantly more binge drinking, AUD, cannabis use (past year) and more lifetime cannabis, cocaine and stimulants use (all $P < 0.05$). There was no gender difference in the prevalence of hazardous alcohol use and tobacco use. The prevalence of psychiatric disorders was significantly higher in women ($P < 0.05$).

Conclusions: Seven years after being admitted for alcohol intoxication, young patients are likely to present substance misuse, mental health disorders and social problems, suggesting that they should be offered secondary prevention measures while in the ED.

Short summary: We studied a cohort of patients aged 18–30 and admitted for alcohol intoxication in 2006–2007 at a tertiary hospital. Participants were interviewed in 2014. Seven years after an admission for alcohol intoxication, patients are likely to present AUDs, substance misuse, mental health disorders and social problems.

INTRODUCTION

Alcohol use is one of the leading health risk factors among young adults and has a significant impact on morbidity and mortality (Marmet *et al.*, 2014). According to the 2011 World Health Organization global status report on alcohol and health, alcohol use is a leading cause of mortality in young adults (WHO, 2011). Alcohol use also leads to numerous hospital admissions in young adults (WHO, 2011; Shield *et al.*, 2012), including in Switzerland (Bertholet *et al.*, 2014). In recent years, several studies conducted in Switzerland and in France have shown increases in alcohol intoxication admissions, especially for those aged 16–25 (Haberker *et al.*, 2010; Menecier *et al.*, 2012; Bertholet *et al.*, 2014).

Young adults admitted to the Emergency Department (ED) with alcohol intoxication may present comorbid medical diagnoses or social problems (Matali Costa *et al.*, 2012). Alcohol problems are present in 60–90% of all adults admitted with an alcohol intoxication (Reynaud *et al.*, 2001; Menecier *et al.*, 2009; Verelst *et al.*, 2012). Among adults admitted for alcohol intoxication, the prevalence of mental health disorders (60%) (Verelst *et al.*, 2012) and social problems (60%) is elevated (Neves *et al.*, 2011).

It is not clear whether young adults hospitalized with alcohol intoxication will develop alcohol use disorder (AUD) in the future or if they will maintain their unhealthy use of alcohol over time. The link between alcohol intoxication and dependence has been studied indirectly by focusing on binge drinking patterns. Binge drinking among adolescents is associated with an increased risk of developing alcohol dependence (Andreasson *et al.*, 1993; Stenbacka, 2003; Wells *et al.*, 2004, 2006; Viner and Taylor, 2007; McCambridge *et al.*, 2011), illicit drugs use, psychiatric co-morbidities and social difficulties by the age of 30 (Viner and Taylor, 2007). In a recent study, Gross *et al.*, (2016) showed a high prevalence of alcohol dependence among adolescents 5–13 years after an alcohol-related hospitalization.

Currently, there is a gap of knowledge about the medium- to long-term clinical outcomes in young adults admitted to the ED for alcohol intoxication. ED admissions represent an opportunity to assess and address unhealthy alcohol use among young adults, but very few of these patients seek specialized help (Ogborne and DeWit, 1999; Cunningham and Breslin, 2004). Therefore, determining the clinical course of individuals admitted with alcohol intoxication will help clinicians to more accurately assess associated health risk factors and to provide preventive counsels.

In addition, the difference between gender in alcohol and psychiatric problems is well known: the prevalence of AUD is higher among men (Zilberman *et al.*, 2003; McLean *et al.*, 2011). Moreover, the clinical course may differ across genders (Zilberman *et al.*, 2003; Mendrek, 2014). The prevalence of depressive syndrome is higher among women (Weissman *et al.*, 1996).

Therefore, we conducted a cohort study to assess the clinical course (and potential gender differences) of young individuals admitted for alcohol intoxication at the ED 7 years following this admission.

The aims of the study were to assess the prevalence of alcohol and other substance use, the prevalence of AUD, the psychosocial status, the health care utilization and the recollections of the admission. In addition, we aimed at assessing gender differences in health outcomes.

METHODS

The study was conducted at the Lausanne University Hospital, a tertiary care and referral hospital serving the Canton de Vaud in the

French part of Switzerland. In 2014, we retrospectively identified all 18–30-year-old patients admitted with alcohol intoxication at the ED from 1 January 2006 to 31 December 2007. Patients had to be current residents of the Canton de Vaud at admission and were identified through centralized records of all blood alcohol content (BAC) tests performed at admission. From a previous study, we know that in 2006, 6.5% of all admissions had a BAC test, and that 73% of those tests were positive. In 2007, 7.6% of all admissions had a BAC test, and 74% of those tests were positive (Bertholet *et al.*, 2014). If patients were admitted for alcohol intoxication more than once during the target period, only the first admission was considered. Intoxication was defined as BAC >11.5 mmol/l of ethanol (0.5%). This threshold was chosen *a priori* because it corresponds to the appearance of neuropsychological dysfunction that can lead to complications (Daepfen, 2003).

In 2014, all identified patients were contacted by mail and offered participation in a follow-up interview. A 7-year interval following admission was chosen because it is known that alcohol dependence typically takes ~5–7 years to develop after regular use (Schuckit *et al.*, 1998). This design provided a sufficient time period in which to assess the possible development of alcohol dependence.

The recruitment strategy started with mailing up to four letters at 10–15 day intervals, inviting individuals to participate in the study. Between each letter, research assistants tried to contact the participants by phone at varied times on week days and weekends. Cash compensation of 50 Swiss francs (equivalent to ~50 USD or 41€ at the time of the study) was offered to each participant after they completed a questionnaire. The fourth letter informed individuals that this was the last opportunity to join the study, and offered an additional 20 Swiss francs if they agreed to enroll.

Each willing participant received a written description of the study and an informed consent form to sign and mail back. An appointment was then scheduled with a research assistant for an interview lasting ~45 minutes. The interview was preferably conducted face to face, but could be done over the phone at the participant's request. All research assistants received instructions and supervision by a psychologist and by the principal investigator while recruiting participants and conducting the interview, in order to follow the protocol and to treat all participants courteously. The research was approved by the Ethics Committee for Clinical Research in the Canton de Vaud, 8 July 2013 (Protocol 265/2013).

The study outcomes and assessment instruments were as follows:

- (a) *Prevalence of hazardous alcohol use and AUD*: hazardous use was assessed with the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C), with cut-offs ≥ 5 for males and ≥ 4 for females, with respective sensitivity, specificity: 82%, 69%; and 88%, 75% (Foxcroft *et al.*, 2015). The Mini International Neuropsychiatric Interview (MINI) detected alcohol dependence and harmful use (Sheehan *et al.*, 1998).
- (b) *Current alcohol use and consequences related*: mean number of drinks/week (past 12 months) and prevalence of binge drinking in past 30 days (defined as >4 drinks/day for males and >3 drinks /day for females). Short Inventory of Problems (SIP-2R) (Project MATCH Research Group, 1993).
- (c) *Prevalence of mental health disorders*: the Patient Health Questionnaire (PHQ) (Spitzer *et al.*, 1999) was used to screen the most frequent mental health disorders associated with AUDs (Thonney and Gammeter, 2004). For lifetime occurrence of mental health disorders, participants were asked whether they had ever suffered from a mental or psychological

illness, or whether a medical doctor had ever told them that they suffered from a mental or psychological illness.

- (d) Modified patient reported outcome questionnaire of the Charlson Comorbidity Index (CCI) (Habbous *et al.*, 2013). We used three categories (i.e. 0;1–2;3+) as described by Vest-Hansen *et al.* (2014). The Charlson Index allows us to estimate the risk of death (Charlson *et al.*, 1987).
- (e) *Quality of life*: SF-12 mental component summary score (MCS) and physical component summary score (PCS) (Ware *et al.*, 1995).
- (f) *Exposure to violence*: self-reported exposure to physical and/or psychological violence before the age of 15 and over the past 12 months.
- (g) *Socio-demographic characteristics*: gender, age, nationality, family situation, education, employment, household income and housing.
- (h) *Medical and social services utilization*: lifetime and past 12 months medical and social services utilization (visits to primary care physician, psychiatrist, addiction specialist, social services used and any general or psychiatric hospitalizations).
- (i) Recollection of ED admission for alcohol intoxication (closed question, yes/no) and possible ED discussion regarding alcohol use (closed question, yes/no/I do not know).
- (j) *Perceived impact of ED admission on alcohol use*: 'Did the ED admission encouraged you to reduce your drinking', closed question, yes/no.
- (k) *Prevalence of tobacco and illegal drugs use*: lifetime (any use) and past 12 months (any use, regular use, use while drinking alcohol) for tobacco, cannabis and other illicit drugs.

Analyses

We determined the prevalence of study outcomes for the full sample and broken down by gender. We assessed gender differences for each outcome with Chi-squares for categorical variables, *t*-tests for continuous variables and Wilcoxon test for continuous variable that did not have a normal distribution. We used a 0.05 significance level for all tests.

In order to determine whether those who completed the questionnaire were similar to those who did not, medical records data were obtained for all patients admitted for alcohol intoxication from 2006 to 2007, extracting only the records of the patient's first admission during the target period. Information documenting the following characteristics was recorded: age, gender, level of alcohol intoxication (BAC), the presence of disruptive behavior in the ED, the presence of AUD diagnosis based on ICD-10 hospital codes for harmful alcohol use (F10.1x) and alcohol dependence (F10.2x) (WHO, 2010) and the presence of an admission for alcohol intoxication prior to 2006.

RESULTS

From 1 January 2006 to 31 December 2007, 631 patients (aged 18–30) were admitted with BAC ≥ 11.5 mmol/l; of these, 13 had died by 2014. The study flow chart is presented in Fig. 1. The final sample was 318 or 50.4% of all those admitted in 2006–2007, 216 (67.9%) were male.

Table 1 displays the comparison of participants who completed the questionnaire and those who did not. No significant differences were found between those who completed the questionnaire and those who did not, using the 2006–2007 alcohol intoxication data

at admission (age, gender, blood alcohol concentration, ICD-10 AUD diagnosis and the presence of disruptive behavior in the ED).

Table 2 displays the characteristics of the participants. On average 7 years after admission, the mean (SD) age was 30.7 (3.9%). The majority (186, 58.5%) lived in self-financed housing and 206 (64.8%) completed only obligatory schooling (i.e. 9 years or less education), 57 (17.9%) were unemployed (i.e. unemployment or welfare insurance) and 60 (18.9%) were beneficiaries of disablement insurance.

At the time of the interview, the mean (SD) number of drinks/week reported was 14.2 (34.9%), 205 (64.5%) had at least one binge drinking episode over the past 30 days, 181 (56.9%) reported hazardous alcohol use. The prevalence of harmful alcohol use was 13.2% ($n = 42$) and the prevalence of alcohol dependence was 15.1% ($n = 48$).

Among those with a harmful alcohol use diagnosis at admission (6%), the prevalence of harmful alcohol use was 10.5% at the time of the interview (i.e. 7 years later). Among those without the diagnosis at admission, the prevalence was 13.4%. Among those with alcohol dependence at admission (2.8%), the prevalence of alcohol dependence was 55.6% at the time of the interview. Among those without the diagnosis at the admission, the prevalence of dependence was 13.9%. Among those with an AUD diagnosis (harmful use or alcohol dependence) at admission (8.8%), the prevalence of AUD was 35.7% at the time of the interview. Among those without the AUD diagnosis at admission, the prevalence of AUD was 27.6%.

Fifty-nine participants (18.6%) suffered from depression and 49 (15.4%) had an anxiety disorder. The prevalence of high CCI score (>2) was 28 (8.8%) (predicting 23% of mortality at 10 years), while 62 (19.5%) had moderate CCI score (1–2) which predicting 4–10% of mortality at 10 years (Charlson *et al.*, 1987). Mean (SD) SF-12 component summary scores were 42.7 (11.2%) for mental and 52.2 (10.3%) for physical. Physical and psychological violence in the last 12 months were reported, respectively, by 52 (16.4%) and 46 (14.5%) of the participants.

In the past year, 189 (59.4%) had seen a primary care physician and 97 (30.5%) a psychiatrist. Hospitalizations in the past year were 63 (19.8%) at a general hospital and 22 (6.9%) at a psychiatric facility. For alcohol misuse, 70 (22%) reported ever seeing an addiction specialist (38 (12%) over the past 12 months). Among the participants who were identified with AUD, 40 (44.4%) reported ever seeing an addiction specialist (23 (26.7%) in the past year).

Most participants (234 (73.6%)) remembered the admission and 110 (34.6%) remembered discussing their drinking. Nearly half (148 (46.5%)) reported that the ED experience encouraged them to decrease their drinking.

Table 3 displays the prevalence of lifetime and past year substance use. Drugs used (past year) while drinking alcohol were 225 (70.8%) for tobacco, 143 (45%) for cannabis, 64 (20.1%) for cocaine, 26 (8.2%) for stimulants, 33 (10.4%) for sedatives, 21 (6.6%) for opioids and 9 (2.8%) for other drugs. The mean (SD) number of substances used while drinking was 1.6 (1.5).

Analyses by gender

Details of gender differences are found in Tables 2 and 3. There were no significant gender differences across socio-demographic characteristics. Compared to women, men engaged in significantly more binge drinking (68.5% vs. 55.9%, $P = 0.03$) and had significantly more AUDs (31.9% vs. 20.6%, $P = 0.36$), and had a 4-fold difference in alcohol dependence (19.9% vs. 4.9%, $P < 0.0001$), but there was no difference in (AUDIT-C) hazardous use ($P = 0.99$).

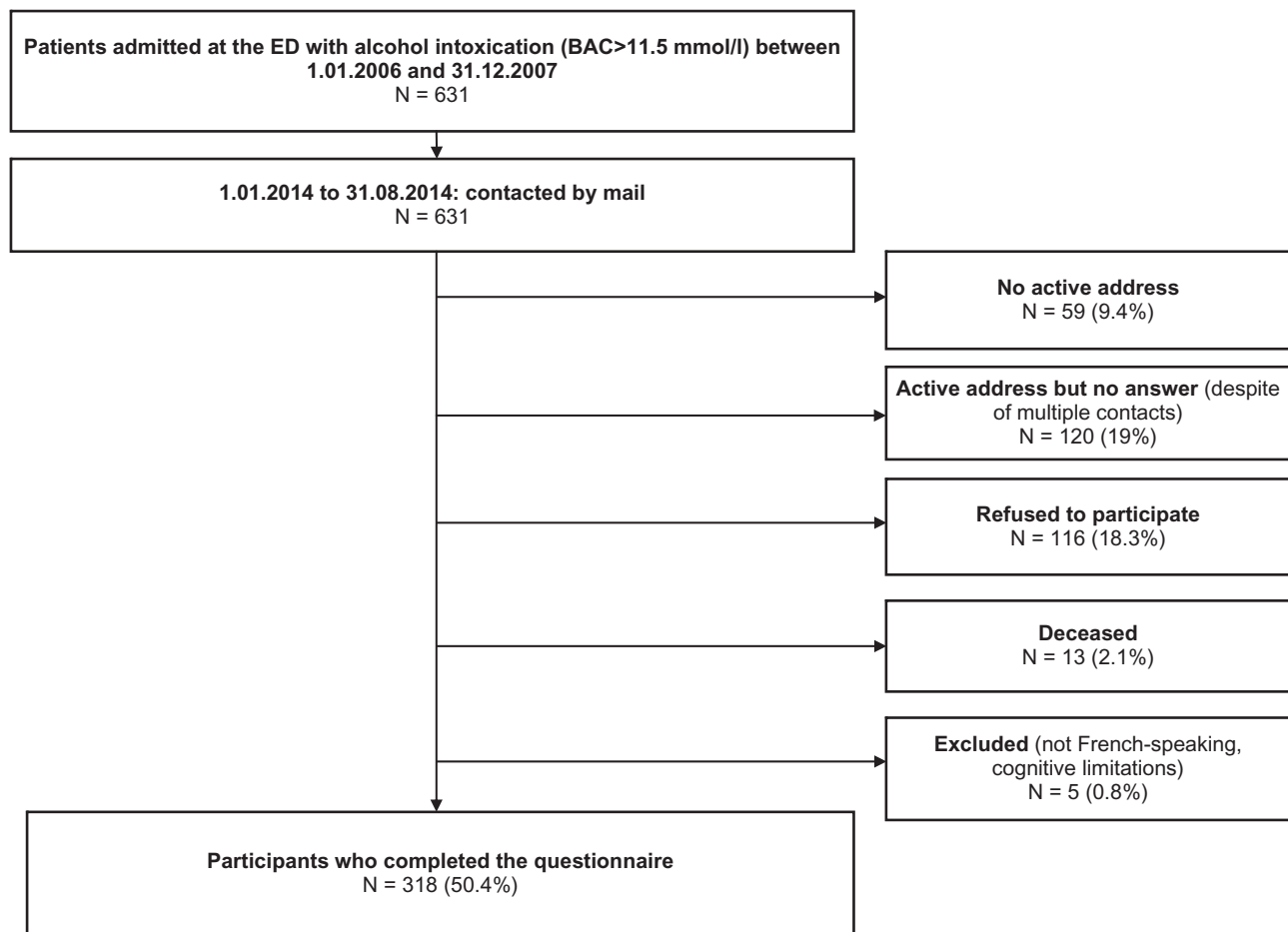


Fig. 1. Study flow chart.

Table 1. Comparison of individuals who completed the questionnaire and those who did not on characteristics collected at the time of admission for acute alcohol intoxication (2006–2007)

	Individuals admitted for an acute alcohol intoxication in 2006–2007 (<i>n</i> = 631)	Individuals who completed the questionnaire (i.e. study sample) (<i>n</i> = 318)	Individuals who did not complete the questionnaire (<i>n</i> = 313)	Gender differences, <i>P</i> -value
Age, mean (SD)/median (iqr)	23.6 (3.8)	23.4 (3.8)	23.7 (3.7)	0.27
Male, <i>n</i> (%)	418 (66.2)	245 (67.7)	203 (65.1)	0.35
BAC (mmol of ethanol/l of blood), mean (SD)	42.7 (17.4)	42.5 (17.3)	42.3 (17.3)	0.54
Disruptive behavior, <i>n</i> (%)	135 (24.3)	72 (22.6)	81 (25.9)	0.34
Harmful alcohol use diagnosis (ICD-10, F10.1 × codes), <i>n</i> (%)	38 (6.0)	19 (6.0)	19 (6.1)	0.96
Alcohol dependence diagnosis (ICD-10, F10.2 × codes), <i>n</i> (%)	24 (3.8)	9 (2.8)	15 (4.8)	0.20
Admission with alcohol intoxication prior to 2006, <i>n</i> (%)	110 (17.4)	59 (18.6)	51 (16.3)	0.45

SD, standard deviation; Iqr, interquartile range.

Men had higher mean scores on the SIP-2R than did women (5.0% vs. 2.9%, $P = 0.01$), along with more frequent cannabis use while drinking (49.1% vs. 36.3%, $P = 0.03$) and more often had ever seen an addiction specialist (25.5% vs. 14.7%, $P = 0.03$). Men also reported higher lifetime use of cocaine (59.3% vs. 45.1%,

$P = 0.02$), stimulants (45.4% vs. 31.4%, $P = 0.02$), solvents (9.3% vs. 2.0%, $P = 0.02$) and hallucinogens (36.1% vs. 17.7%, $P < 0.0001$). In the past year, cannabis use was the only substance that was more frequent in men than in women (58.8% vs. 41.2%, $P = 0.003$). More women than men reported suffering from anxiety

Table 2. Use of tobacco and other drugs in 2014^a

	Lifelong use, n (%)				Past 12 months use, n (%)				Regular use, n (%)				Use while drinking alcohol, n (%)				
	Total (n = 318)		Female (n = 102)		Total (n = 318)		Male (n = 216)		Female (n = 102)		Total (n = 318)		Male (n = 216)		Female (n = 102)		
	Total (n = 318)	Male (n = 216)	Female (n = 102)	Male (n = 216)	Female (n = 102)	Total (n = 318)	Male (n = 216)	Female (n = 102)	Total (n = 318)	Male (n = 216)	Female (n = 102)	Total (n = 318)	Male (n = 216)	Female (n = 102)	Total (n = 318)	Male (n = 216)	Female (n = 102)
Tobacco	297 (93.4)	204 (94.4)	93 (91.2)	176 (81.5)	79 (77.5)	255 (80.2)	176 (81.5)	79 (77.5)	208 (65.4)	140 (64.8)	68 (66.7)	225 (70.8)	152 (70.4)	73 (71.6)	225 (70.8)	152 (70.4)	73 (71.6)
Cannabis	276 (86.8)	192 (88.9)	84 (82.4)	127 (58.8)**	42 (41.2)**	169 (53.1)	127 (58.8)**	42 (41.2)**	81 (25.5)	68 (31.5)**	13 (12.8)**	143 (45.0)	106 (49.1)*	37 (36.3)*	143 (45.0)	106 (49.1)*	37 (36.3)*
Cocaine	174 (54.7)	128 (59.3)*	46 (45.1)*	51 (23.6)	21 (20.6)	72 (22.6)	51 (23.6)	21 (20.6)	12 (3.8)	9 (4.2)	3 (2.9)	64 (20.1)	46 (21.3)	18 (17.7)	64 (20.1)	46 (21.3)	18 (17.7)
Stimulants	130 (40.9)	98 (45.4)*	32 (31.4)*	26 (12.0)	9 (8.8)	35 (11)	26 (12.0)	9 (8.8)	3 (0.9)	3 (1.4)	0 (0.0)	26 (8.2)	21 (9.7)	5 (4.9)	26 (8.2)	21 (9.7)	5 (4.9)
Solvents	22 (6.9)	20 (9.3)*	2 (2.0)*	1 (0.5)	0 (0.0)	1 (0.3)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Sedatives	81 (25.6)	50 (23.2)	31 (30.4)	43 (13.5)	18 (17.7)	43 (13.5)	25 (11.6)	18 (17.7)	23 (7.2)	12 (5.6)	11 (10.8)	33 (10.4)	19 (8.8)	14 (13.7)	33 (10.4)	19 (8.8)	14 (13.7)
Hallucinogens	96 (30.2)	78 (36.1)**	18 (17.7)**	19 (6.0)	15 (7.0)	19 (6.0)	15 (7.0)	4 (3.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Opioids	69 (21.7)	50 (23.2)	19 (18.6)	23 (7.2)	15 (6.9)	23 (7.2)	15 (6.9)	8 (7.8)	12 (3.8)	7 (3.2)	5 (4.9)	21 (6.6)	14 (6.5)	7 (6.9)	21 (6.6)	14 (6.5)	7 (6.9)
Other drugs	15 (4.7)	10 (4.6)	5 (4.9)	6 (1.9)	4 (1.9)	6 (1.9)	4 (1.9)	2 (2.0)	3 (0.9)	2 (0.9)	1 (1.0)	9 (2.8)	8 (3.7)	1 (1.0)	9 (2.8)	8 (3.7)	1 (1.0)

Asterisks indicate significant gender difference; *P < 0.05; **P < 0.01; ***P < 0.001 (Chi-square tests).
^aRegular use was defined as weekly use or more.

disorders (23.5% vs. 11.6%, $P = 0.01$) and from mental health disorders in general (35.3% vs. 25.0%), although the difference was not statistically significant ($P = 0.06$) and had a lower quality of mental health (SF-12, $P = 0.0008$). Regarding lifetime presence of mental health disorders, women also reported a higher prevalence than men (53.9% vs. 33.8%, $P = 0.001$). Women reported more often having seen a psychiatrist than did men (lifetime: 69.6% vs. 52.3%, $P = 0.007$ and past year 43.1% vs. 24.5%, $P = 0.05$). Women also had higher mean CCI score compared to men (0.52% vs. 1.0%, $P = 0.01$) (Charlson *et al.*, 1987) and reported more exposure to violence before the age of 15 (46.1% vs. 33.8%, $P = 0.04$).

DISCUSSION

We assessed the health status of young adults 7 years following an ED admission for alcohol intoxication. Using Swiss national data (Gmel *et al.*, 2014; State Secretariat for Economic Affairs, 2015), we can compare our results to alcohol use, AUDs prevalence, substance use and prevalence of social problems observed in individuals aged 25–35 years old in the general population. For mental health disorders, Swiss general population data (no age restriction) can be used (Schuler and Burla, 2012; Baer *et al.*, 2013; Maercker *et al.*, 2013).

The prevalence of binge drinking (at least 1x/month) for those aged 25–44 in the Swiss population is estimated to be between 12.0% and 13.4% (Gmel *et al.*, 2014), which is significantly lower than that observed in our study (56.9%). Alcohol dependence (defined by AUDIT scores >16 or CAGE >2) in the same Swiss age group is estimated at 1.1–8% (Gmel *et al.*, 2012); we found a considerably higher rate (15.1%). Gross *et al.* (2016) obtained similar results among German adolescents who were admitted with alcohol intoxication before they were 17 years old; the prevalence of harmful use and alcohol dependence was 12.6% and had increased to 19.9% by the age of 20. Even though different measures were used to assess prevalence of dependence in the Swiss population, we do not think our observed differences are due solely to the use of different instruments. AUDIT-C scores in our study tended to indicate higher prevalence of AUDs, and the AUDIT-C measure has been shown to reflect full AUDIT scores (Bush *et al.*, 1998). Concomitant use of other substances while drinking was usual for tobacco, cannabis and cocaine. The use of other substances in our research was also quite high, compared to Swiss national data (Gmel *et al.*, 2014) and to adolescents in the German study (Gross *et al.*, 2016). In 2013, cannabis use in Swiss adults (aged 25–44) was 37–48% (lifetime) and 3–11% (past year), whereas participants in our study reported usage that was 2–5 times higher (lifetime, 86.8% and past year, 53.1%). Overall, cocaine and other drug use were also more prevalent in our sample than in Swiss counterparts (e.g. cocaine in the past year, 22.6% vs. 1.4%) (Gmel *et al.*, 2014).

Seven years after an ED admission, a substantial portion of our patients presented mental health problems in addition to substance use disorders. This is consistent with reports that link binge drinking to the later development of mental health disorders (Viner and Taylor, 2007). Compared to data from other European countries (Gandek *et al.*, 1998), the mental and physical health quality of life in our sample seems to be poorer, especially among women, and is consistent with other measures of health status in our research. Major depressive episodes were seen more often in our sample (11.3%) than in counterparts (5.2% in 2007) (Baer *et al.*, 2013), and compared to the Swiss and European population, anxiety syndromes [13.4% (Swiss data), 12.7% (European data) vs. 15.4% (Study sample)] and bulimia [0.3% (Swiss and European data) vs. 1.9%

Table 3. Socio-demographics characteristics, alcohol use and psychiatric disorders in 2014

	Total (n = 318)	Male (n = 216)	Female (n = 102)
<i>Socio-demographic characteristics and social situation</i>			
Age, mean (SD) / median (iqr)	30.7 (3.9) / 30.3 (6.9)	30.9 (3.9) / 30.7 (6.8)	30.2 (3.9) / 30.1 (6.4)
Swiss nationality, n (%)	231 (72.6)	153 (70.8)	78 (76.5)
<i>Family situation, n (%)</i>			
Married	43 (13.5)	27 (12.5)	16 (15.7)
With children	89 (28.0)	56 (25.9)	33 (32.4)
<i>Education, n (%)</i>			
More than obligatory school (>9 years of education),	112 (35.2)	78 (36.1)	34 (33.3)
<i>Employment, n (%)</i>			
Employed	182 (57.2)	125 (57.9)	57 (55.9)
Student	19 (6.0)	12 (5.5)	7 (6.9)
Unemployed insurance or welfare benefits	57 (17.9)	39 (18.1)	18 (17.6)
Disablement insurance benefits	60 (18.9)	40 (18.5)	20 (19.6)
<i>Household income, n (%)</i>			
<2000 CHF	84 (26.75)	58 (27.1)	26 (26.0)
2001–4000 CHF	75 (23.9)	51 (23.8)	24 (24.0)
4001–6000 CHF	67 (21.3)	44 (20.6)	23 (23.0)
>6000 CHF	88 (28.0)	61 (28.5)	27 (27.0)
<i>Housing, n (%)</i>			
Housing, self-financed	186 (58.5)	131 (60.7)	55 (53.9)
Housing with financial help	101 (31.8)	61 (28.2)	40 (39.2)
Institutional housing	22 (6.9)	15 (6.9)	7 (6.9)
Homeless	6 (1.9)	6 (2.8)	0 (0.0)
Jail	3 (0.9)	3 (1.4)	0 (0.0)
<i>Alcohol use</i>			
Number of drinks per week, mean (SD) / median (iqr)	14.2 (34.9) / 4.0 (10.8)	17 (40.6) / 6.0 (14.9)**	8.2 (16.5) / 2.5 (7.3)**
At least one binge drinking episode over the past 30 days ^a , n (%)	205 (64.5)	148 (68.5)*	57 (55.9)*
Hazardous use (AUDIT-C ≥5 for male/≥4 for women), n (%)	181 (56.9)	123 (56.9)	58 (56.9)
Harmful use of alcohol (MINI), n (%)	42 (13.2)	26 (12.0)	16 (15.7)
Alcohol Dependence (MINI), n (%)	48 (15.1)	43 (19.9)***	5 (4.9)***
SIP-2R, mean (SD) / median (iqr)	4.3 (7.7) / 1.0 (5.0)	5.0 (8.5) / 2.0 (6.0)*	2.9 (5.5) / 0.0 (4.0)*
<i>Mental and physical health</i>			
Past 12 months mental health disorder (PHQ) ^b , n (%)	90 (28.3)	54 (25.0)	36 (35.3)
Major depressive syndrome	36 (11.3)	23 (10.6)	13 (12.8)
Other depressive syndrome	23 (7.3)	14 (6.5)	9 (8.8)
Anxiety syndrome (total)	49 (15.4)	25 (11.6)*	24 (23.5)*
Panic syndrome	38 (12.0)	21 (9.8)	17 (16.7)
Other anxiety syndrome	26 (8.2)	13 (6.1)*	13 (12.8)*
Bulimia nervosa	6 (1.9)	5 (2.3)	1 (1.0)
Binge eating disorder	15 (4.7)	10 (4.7)	5 (4.9)
Lifetime mental health disorder ^c , n (%)	128 (40.3)	73 (33.8)**	55 (53.9)**
Charlson index comorbidity score ^d , mean (SD) / median (iqr)	0.67 (1.32) / 0.0 (1.0)	0.52 (1.1) / 0.0 (0.0)*	1.0 (1.7) / 0.0 (2.0)*
Low score (CCI = 0), n (%)	228 (71.7)	164 (75.9)	64 (62.8)
Moderate score (CCI = 1–2), n (%)	62 (19.5)	40 (18.5)	22 (21.6)
High score (CCI > 2), n (%)	28 (8.8)	12 (5.6)	16 (15.7)
<i>Quality of life (SF-12)</i>			
PCS, mean (SD) / median (iqr)	52.2 (10.3) / 55.2 (10.4)	52.9 (8.6) / 55.8 (9.1)	50.8 (10.3) / 53.3 (12.5)
MCS, mean (SD) / median (iqr)	42.7 (11.2) / 44.7 (14.6)	44.0 (11.2) / 45.9 (14.5)***	39.9 (10.7) / 41.1 (14.1)***
<i>Violence^e, n (%)</i>			
Exposed to physical or psychological violence before age 15	120 (37.9)	73 (33.8)*	47 (46.1)*
Exposed to physical violence, past 12 months	52 (16.4)	37 (17.2)	15 (14.7)
Exposed to psychological violence, past 12 months	46 (14.5)	27 (12.6)	19 (18.6)
<i>Health care and social services utilization</i>			
<i>Lifetime medical care, n (%)</i>			
Ever seen a primary care physician	275 (86.4)	184 (85.2)	91 (89.2)
Ever seen a psychiatrist	184 (57.9)	113 (52.3)**	71 (69.6)**
Ever seen an addiction specialist (for alcohol use)	70 (22.0)	55 (25.5)*	15 (14.7)*
<i>Past 12 months medical care, n (%)</i>			
Seen a primary care physician	189 (59.4)	122 (56.5)	67 (65.7)
Seen a psychiatrist	97 (30.5)	53 (24.5)	44 (43.1)
Seen an addiction specialist (for alcohol use)	38 (12.0)	31 (14.4)	7 (6.9)

Continued

Table 3. Continued

	Total (n = 318)	Male (n = 216)	Female (n = 102)
<i>Past 12 months Hospitalization, n (%)</i>			
General hospital	63 (19.8)	44 (20.4)	19 (18.6)
Psychiatric hospital	22 (6.9)	13 (6.0)	9 (8.8)
<i>Social services utilization, n (%)</i>			
Lifetime	131 (41.2)	87 (40.3)	44 (43.1)
Past 12 months	85 (26.7)	61 (28.2)	24 (23.5)
<i>Recollections of ED admission^f, n (%)</i>			
Remembered the ED admission for acute alcohol intoxication	234 (73.6)	161 (74.5)	73 (71.6)
Remembered discussing alcohol use at the ED admission	110 (34.6)	78 (36.1)*	32 (31.4)*
Perceived an impact of the ED admission on alcohol use	148 (46.5)	101 (46.8)	47 (46.1)

SD, standard deviation; iqr, interquartile range.

Asterisks indicate significant gender difference; * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$ (T -tests for continuous variables with normal distribution, Chi-squares for categorical variables, Wilcoxon test for continuous variables without normal distribution).

^aMale: >4 drinks/day and women: >3 drinks/day.

^bPsychiatric diseases consist in the presence of any psychiatric diseases screened by PHQ among the participants: major and other depressive syndrome, Panic and other anxiety syndrome, Bulimia nervosa and other eating disorder.

^cFor lifetime occurrence of mental health disorders, participants were asked whether they had ever suffered from a mental or psychological illness, or whether a medical doctor told them that they ever suffered from a mental or psychological illness.

^dThe scores from this validated self-questionnaire (range [0;21] were distributed in low (CCI = 0), moderate (CCI = 1–2) and high (CCI > 2) categories.

^eAssessed by the questions ‘Have you experienced physical or psychological violence in/out of your family before the age of 15?’, ‘Has anyone beaten you (by punching or kicking or other blows) in the past 12 months?’ and ‘Has anyone threatened or forced you in the past 12 months?’.

^fAssessed by the questions ‘Do you remember your hospitalization at the ED of Lausanne University Hospital for acute alcohol intoxication in 2006/2007?’, ‘Have you had a discussion about your alcohol use while you were hospitalized at the ED in 2006/2007?’ and ‘Did the hospitalization at the ED encourage you to decrease your drinking?’

(Study sample)] were also more prevalent (Schuler and Burla, 2012; Maercker *et al.*, 2013). However, among patients who were admitted to medical departments in Denmark and had a mean age of 64 (Vest-Hansen *et al.*, 2014), 45.1% had moderate and high CCI scores compared to our rate of 28.3%.

Unemployment in our study was higher than in the Swiss general population. Swiss unemployment and welfare insurance are estimated at 10.4% (region of Vaud, 2013–2014) (Goldberg *et al.*, 2013; State Secretariat for Economic Affairs, 2015), as compared to 17.9% in our sample, and Swiss disablement insurance among 20–39 year olds (Schmid and Buri, 2015) is 3.3% versus 18.9%.

Regarding gender differences within our study, the results are consistent with general population observations. Binge drinking and AUDs are more frequent among men (Zilberman *et al.*, 2003) as are cannabis, cocaine, stimulants and hallucinogens use (Gmel *et al.*, 2014), but there was no difference between our men and women regarding hazardous use (AUDIT-C ≥ 5 for male/ ≥ 4 for women), and tobacco use. Women in our sample are more hazardous alcohol users and much heavier smokers as compared to general Swiss data (alcohol: 56.9% vs. 2.8%/ tobacco: 77.5% vs. 20.6%) (Gmel *et al.*, 2014). The prevalence of anxiety syndrome is higher among women in many studies (Kessler *et al.*, 2005; McLean *et al.*, 2011), yet is still lower in Swiss women (Schuler and Burla, 2012) than in our cohort (13.5% vs. 23.5%). According to the observed CCI scores, women in our study have a higher risk of mortality at 10 years than men. Women generally have limited access and seek specialized addiction treatment less often than do men (Alvanzo *et al.*, 2014). This difference in utilization should be seen in the context of higher rates of AUD among men. However, access to specialized care remains low for both men and women, especially when taking into account that the hospital at which the study was conducted has a specialized care unit for alcohol and other drugs.

Surprisingly, many participants remembered the admission and almost half reported that it had an impact on their drinking. Whether

these recollections reflect reality (knowing that responses of this nature are susceptible to recall bias), the argument can be made that an admission for alcohol intoxication may be an opportune, or ‘teachable’ moment (McQueen *et al.*, 2011; Merz *et al.*, 2015). Nevertheless, the willingness to participate in the study, in comparison with those who did not, may have induced a selection bias in favor of the patients with a better memory of the index admission.

The present study has some limitations. First, it was based solely on self-report. Even though participants were assured of confidentiality and encouraged to respond as accurately as possible, over or underreporting cannot be ruled out. Second, the sample consisted of individuals who had been admitted to a single hospital. Generalizability is, therefore, limited. In addition, we used ICD-10 hospital codes to identify people with harmful alcohol use or dependence at admission while we used the MINI to assess the presence of an AUD 7 years later. Therefore, differences in the prevalence of AUD between admission and time of interview should be interpreted with caution.

Nevertheless, we think the study has some notable strong points. We were able to identify all patients admitted for alcohol intoxication in 2006–2007 as our source population, allowing us to compare those who completed the questionnaire and participated in the study to those who did not. Since the two groups were similar, the results appear not to be the result of self-selection bias. In addition, we were able to obtain detailed reports on the health of a large sample of individuals who were admitted for alcohol intoxication 7 years earlier, then interview more than half of these patients in this recent research.

CONCLUSIONS

Young patients admitted for alcohol intoxication are likely to present substance misuse, mental health disorders and social problems 7 years after an admission for alcohol intoxication. This population appears to suffer from multiple health and social problems over

time, suggesting they should be offered secondary prevention measures and receive specific attention while admitted for alcohol intoxication. Men appear to be more vulnerable to present substance misuse, while women appear to be especially susceptible to present mental health disorders.

AUTHORS CONTRIBUTION

Angéline Adam, Nicolas Bertholet, Jean-Bernard Daepfen, Patrick Bodenmann, Mohamed Faouzi and Bertrand Yersin designed the study. Angéline Adam, Nicolas Bertholet and Jean-Bernard Daepfen conducted the study. Angéline Adam, Nicolas Bertholet and Mohamed Faouzi designed the analyses. Angéline Adam, Nicolas Bertholet, Jean-Bernard Daepfen and Bertrand Yersin secured funding for the study. Angéline Adam and Mohamed Faouzi conducted the analyses. All authors interpreted the study results. Angéline Adam wrote the first draft of the manuscript. All authors edited the paper and contributed significant intellectual content to the manuscript.

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CONFLICT OF INTEREST STATEMENTS

Angéline Adam, Mohamed Faouzi, Prof. Bertrand Yersin and Dr Patrick Bodenmann have no conflict of interest to report.

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