Int J Public Health (2010) 55:637–643
DOI 10.1007/s00038-010-0122-y

ORIGINAL ARTICLE

Severity of unhealthy alcohol consumption in medical inpatients and the general population: is the general hospital a suitable place for brief interventions?

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Received: 3 September 2008 / Revised: 2 April 2009 / Accepted: 13 January 2010 / Published online: 9 February 2010

Abstract
Objectives Evidence for brief interventions in general hospital (GH) settings is scarce, probably due to higher rates of dependent drinkers. The present study aims to compare unhealthy drinking patterns in GH patients with the general population (GP).
Methods Sample 1 consisted of 4,075 individuals randomly drawn from registration office files, representing the non-institutionalised GP of a northern mixed rural–urban German area. Sample 2 consisted of 2,949 consecutively admitted patients from a GH covering the same area.
Results Compared to individuals from the GP, GH patients revealed higher prevalence rates of alcohol dependence (1.3 vs. 5.5%) and alcohol abuse (1.2 vs. 2.8%), but did not differ significantly concerning at-risk drinking (5.1 vs. 6.2%). Multinomial logistic regression analysis controlling for age, sex and smoking using unrisky alcohol consumption as reference category belonging to the GH group was predictive for alcohol use disorders but not for at-risk drinking.
Conclusion Data show that a substantial number of individuals with unhealthy drinking patterns without alcohol use disorders can easily be accessed in GH settings if appropriate screening measures are conducted.

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Keywords Prevalence · General hospital · Alcohol use disorder · Primary care · At-risk drinking

Schweregrad gesundheitsschädlichen Alkoholkonsums bei Krankenhauspatienten und in der Allgemeinbevölkerung: Ist das Allgemeinkrankenhaus ein geeigneter Ort für Kurzinterventionen?"

Zusammenfassung
Hintergrund Die Evidenz für die Wirksamkeit von Kurzinterventionen im Setting des Allgemeinkrankenhauses ist eingeschränkt, möglicherweise aufgrund des hohen Anteils Alkoholabhängiger. Die vorliegende Studie vergleicht riskante Trinkmuster bei Patienten eines Allgemeinkrankenhauses mit der Allgemeinbevölkerung.
Methoden Stichprobe 1 bestand aus 4075 anhand von Einwohnermeldeamtsdaten randomisiert ausgewählten Personen, welche die nicht-institutionalisierte Bevölkerung einer gemischten ländlich-städtischen Bevölkerung Norddeutschlands repräsentieren (GP). Stichprobe 2 bestand aus 2949 konsekutiv aufgenommenen Patienten eines Allgemeinkrankenhauses der selben Region (GH).
Ergebnisse Gegenüber Personen der GP, wiesen Personen der GH höhere Prävalenzen an Alkoholabhängigkeit (1,3% vs. 5,5%) und Alkoholmissbrauch (1,2% vs. 2,8%) auf, ohne dass sich die Stichproben in der Häufigkeit riskanten Alkoholkonsums unterschieden (5,1% vs. 6,1%). In einer multinomialen logistischen Regression war die Zugehörigkeit zur GH-Gruppe nach Kontrolle auf Alter, Geschlecht und Rauchstatus prädiktiv für das Vorliegen einer alkoholbezogenen Störung, jedoch nicht für riskanten Alkoholkonsum.
Schlussfolgerung Die Daten zeigen dass eine substanzielle Gruppe von Personen mit riskantem Alkoholkonsum

im Setting des Allgemeinkrankenhauses bei Verwendung geeigneter Screening-Instrumente erreicht werden kann.

Schlüsselwörter Prävalenz · Krankenhaus · Alkoholbezogene Störung · Medizinische Versorgung · Riskanter Alkoholkonsum

Introduction

Risky alcohol consumption is one of the major causes of elevated morbidity and mortality in the developed regions of the world (Ezzati et al. 2002). For problematic alcohol use, proactively conducted early interventions in medical settings are a promising task. Screening and brief intervention (BI) for unhealthy alcohol use has been proven successful in a series of meta-analyses in non-dependent outpatients (Wilk et al. 1997; Poikolainen 1999; Moyer et al. 2002; Bertholet et al. 2005). Although admission to a general hospital (GH) seems to be a "window of opportunity" with elevated motivation to change problematic alcohol use (Rumpf et al. 1999) and positive attitudes towards counselling in patients with unhealthy alcohol consumption (Freyer et al. 2006), the efficacy of BI in inpatient settings has been studied less extensively. According to a meta-analysis on BI in GH settings, most results are inconclusive, mainly due to methodological problems (Emmen et al. 2004). In part, lack of effectivity of BI in GH settings might be due to more severe patterns of unhealthy alcohol consumption in GH patients. Recently, published trials give evidence for the efficacy of BI in GH settings when alcohol-dependent individuals are excluded (Freyer et al. 2007; Holloway et al. 2007). However, only little is known about the proportion of non-dependent at-risk drinkers that can be reached in this setting.

From a public health perspective, interventions aiming to reduce health risk behaviours should be evaluated by their population impact. Population impact has been defined as efficacy times the participation rate (Velicer et al. 1999). Population impact depends on four main criteria: recruitment, retention, efficacy, and target behaviour prevalence (Thyrian and John 2007). The higher the proportion of recruited individuals among the target population, the higher the proportion of individuals who can be retained in the intervention once they have started to participate, and the higher the efficacy of the intervention the higher the population impact will be. The target behaviour prevalence determines whether it is reasonable to intervene on a population level. In order to evaluate the population impact when intervening in a specific setting, information on the prevalence of the disorder is inevitable.

Epidemiological research has revealed that in the general population (GP), problematic drinking patterns are more prevalent than alcohol use disorders (AUDs). Although published epidemiological data usually have been restricted to alcohol dependence and alcohol-abuse, large population surveys like the US National Epidemiologic Survey And Related Conditions study (NESARC: $n = 43{,}093$) (Grant et al. 2004) reveal that using the total adult population as the denominator, the prevalence rate of at-risk drinking without abuse or dependence is 20.6% if risk drinking is defined as exceeding the weekly limits (>14/>11 standard drinks per week for men/women) based on average weekly volume of intake or exceeding the daily limits (>4.5/>3.5 drinks per day for men/women) on any day in the past year (Dawson, personal communication). The prevalence rate is 12.1 and 8.4% when risk drinking is defined as exceeding the weekly or daily limits at least once a month or at least once a week, respectively. In comparison, the prevalence of alcohol dependence and abuse were 3.8 and 4.7%, respectively (Grant et al. 2004).

At the same time, data on the prevalence of unhealthy alcohol consumption in GHs are scarce. The majority of studies on alcohol problems in GH settings were either restricted to AUDs only (John et al. 1999; Chen et al. 2004; Vitale et al. 2006; Wu et al. 2006) or based only on screening data (Roche et al. 2006) without relying on DSM-IV (American Psychiatric Association 1995) criteria for AUDs. A recently conducted intervention trial in a GH setting that has overcome these restrictions has found the majority of inpatients with unhealthy alcohol use patterns to be alcohol dependent (Saitz et al. 2006), thus indicating that BIs are not effective in this setting. Among all inpatients of an urban teaching hospital, this study revealed a prevalence of 17% for unhealthy alcohol use, defined as AUD or at-risk drinking. Of these, 77% fulfilled the criteria for alcohol dependence, which results in a prevalence of less than 4% for at-risk drinking without AUDs among all GH patients (Saitz et al. 2007). These numbers suggest that at-risk consumers are underrepresented in inpatient settings and that systematic screening and BI are inappropriate in this setting from a public health perspective. However, this low rate of at-risk drinkers appears questionable given the finding that at-risk drinkers in the GP report a similar incidence of admission to a GH compared to individuals without unhealthy alcohol consumption (Bischof et al. 2004). In addition, findings are restricted to one urban teaching hospital, and although regional differences exist concerning alcohol consumption (Grant 1997), no reference can be made to the prevalence in the area the study of Saitz and colleagues was conducted in. Furthermore, findings from Saitz et al. are derived from a subgroup of individuals that could be enrolled into an intervention trial that tended to report higher values on the Alcohol Use

Disorders Identification Test (AUDIT) (Babor et al. 2001) and reported a significant higher maximum number of drinks per occasion (Saitz et al. 2006). Finally, during the first 7 months of the study, only patients with eight points or more on the AUDIT were diagnosed. According to recent research, this cut-off value leads to high rates of false negatives (Reinert and Allen 2007).

The present study describes the prevalence of AUDs and at-risk drinking in a population sample and a sample of inpatients from surgical and internal wards of a GH. Both samples cover the same region and have used the same gold standard for assessing AUDs and at-risk drinking.

Methods

Assessment

The diagnoses of alcohol dependence and alcohol-abuse were based on DSM-IV criteria (American Psychiatric Association 1995). At-risk consumption was defined according to the British Medical Association (1995) as an average daily consumption per day of more than 30 g of alcohol for men and more than 20 g of alcohol for women. The diagnosis of at-risk consumption was based on average daily consumption calculated from the items of the Munich Composite International Diagnostic Interview (M-CIDI; Wittchen et al. 1995), the German version of the CIDI (Robins et al. 1988), on frequency ("Within the last 12 months, did you drink at least one glass of alcohol almost every day, three to four times a week, one or two times a week, one to three times a month, or less than once a month?") and quantity ("During the past 12 months, what [on this illustration] do you usually drink in one day, and how much ?").

Samples

GP study (sample 1)

The study design is described in more detail elsewhere (Meyer et al. 2000, 2001). Non-institutionalised individuals aged 18–64 years were randomly recruited from the resident registration office files in the northern German city of Luebeck (200,000 inhabitants) including the rural catchment area of the city (Meyer et al. 2000, 2001). A total of 4,075 interviews could be conducted (response rate: 70.2%). A comparison of the expected and observed distribution of sociodemographic variables revealed no bias within the study sample compared to GP characteristics (Meyer et al. 2000). Alcohol dependence according to DSM-IV was assessed by the M-CIDI (Wittchen et al. 1995) conducted by trained and supervised lay-interviewers. Of the sample, 3.8% fulfilled DSM-IV criteria for lifetime alcohol dependence and 1.3% were alcohol dependent in the last 12 months according to M-CIDI. These rates are rather low compared to data of the United States (Grant 1997) and are lower than in other parts of Germany (Meyer et al. 1998). This is due to distinct regional differences in alcohol consumption between federal states in Germany with rates of at-risk drinking ranging between 2.2 and 23% (mean 13.5%). Luebeck belongs to the state with the second lowest rate of at-risk-drinkers (5.9%) (Meyer et al. 1998).

GH study (sample 2)

Sample 2 is part of the intervention study "Randomised controlled trial of an expert system for patients with at-risk drinking, alcohol abuse and alcohol dependence in GH". In this study, all inpatients consecutively admitted to any of the internal or the surgical wards of a GH aged 18–64 years were screened for alcohol consumption. Internal and surgical wards in Germany account for 56.4% of all inpatient beds in all hospitals in Germany (source: Scientific-Use-File Krankenhausstatistik 2003, Teil II: Diagnosen; http://www.forschungsdatenzentrum.de/bestand/krankenhaus/index.asp).

The GH provides routine care and covers the same region the population survey was conducted in. For alcohol screening, we used the AUDIT (Babor et al. 2001) or the newly developed Brief Alcohol Screening Instrument for medical Care (BASIC; Bischof et al. 2007). The sample was divided into two subsamples at random; the inpatients of one subsample received the AUDIT, the individuals of the other subsample received the BASIC. As cut-off values for a positive screening test, we chose five points for the AUDIT and two points for the BASIC on grounds of findings from the first study. In addition, the Luebeck Alcohol abuse and dependence Screening Test (LAST; Rumpf et al. 1997) was deployed in both subsamples with a cut-off value of two points. Patients screening positive on at least one of the screening questionnaires were asked for study participation and were, in case of having given their informed consent, interviewed within 24 h after screening, using the M-CIDI which served as the gold standard for the unhealthy alcohol use diagnosis. Recruitment of participants is displayed in Fig. 1. During the baseline assessment, 2,949 questionnaires were assessed (response rate 96%). Patients ineligible for, or refusing, the diagnostic procedure ($n = 197$) were older [mean age 46.7 (SD 12.9) vs. 43.4 years (SD 13.0), $P < 0.001$] and revealed lower mean values on the LAST [1.9 (SD 1.9) vs. 2.3 (SD 2.0), $P = 0.025$], but revealed no differences in terms of gender, schooling or smoking status. These individuals were excluded from the present analysis, leaving a total sample size of 2.752 subjects.

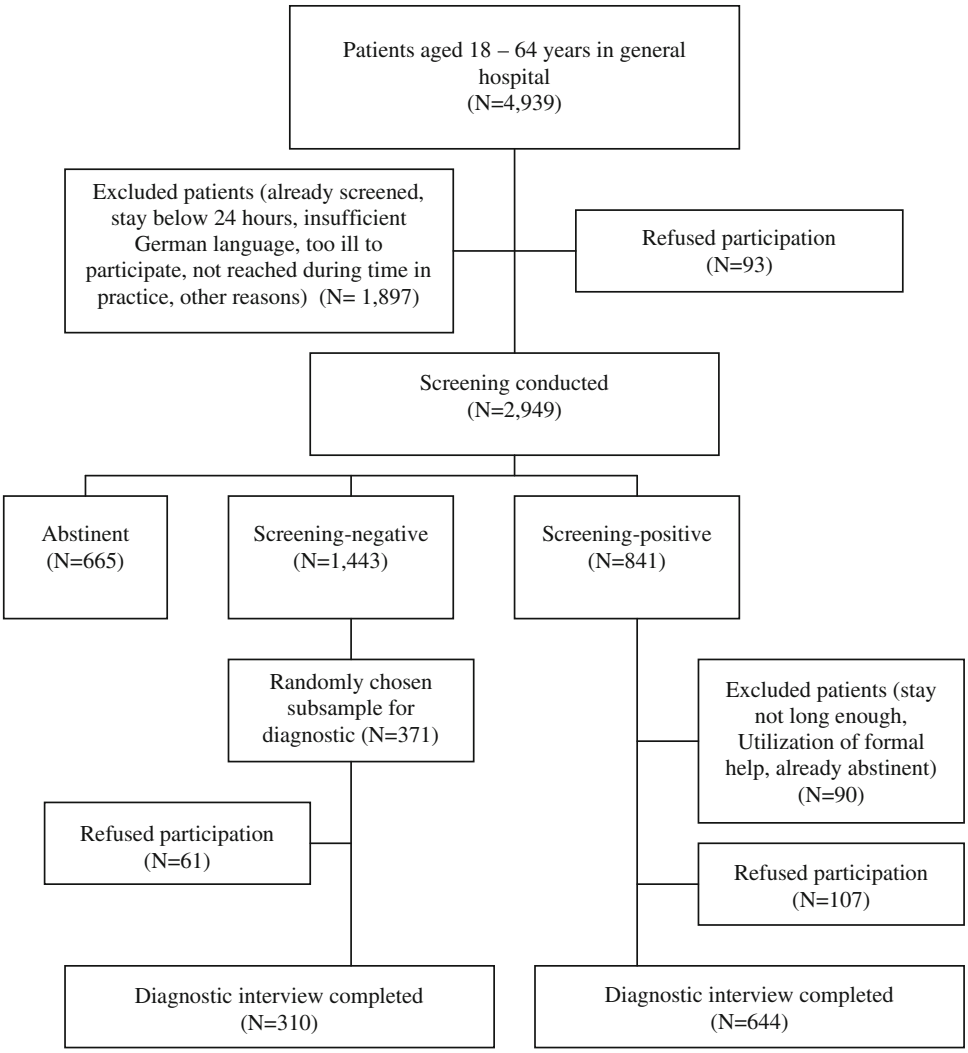

Fig. 1 Recruitment of study participants in the general hospital study (sample 2)

Of the 644 screening positive patients who completed the diagnostic interview, 150 patients met the diagnostic criteria for alcohol dependence, 74 for alcohol abuse, and 169 showed at-risk consumption without meeting the criteria for an AUD. In total, 393 persons met the criteria for either at-risk consumption and/or an AUD.

In addition, 310 randomly recruited patients screening negative who reported alcohol consumption in the previous year were interviewed using the M-CIDI (participation proportioned: 83.6%). Compared to the remaining sample of screening negative patients with alcohol consumption, who had not been recruited for the diagnostic interview, these individuals showed an elevated proportion of females (53.2 vs. 45.9%; $P = 0.025$), but there were no further differences in terms of sociodemographic or substance-related variables. Among these, four subjects fulfilled the criteria for AUD or at-risk-consumption (one with alcohol dependence, two with alcohol abuse and one with at-risk consumption only).

Data analysis

Statistical analysis was performed using SPSS 16.0. As a first step, bivariate analyses were performed to explore differences between both samples. Because both samples differed significantly with respect to gender distribution (females: GP 49.8%; GH 41.1%; $df = 1$, Pearson-$\chi^2 = 52.2$, $P = <0.001$), group differences were also calculated separately by gender. Differences were analysed using Chi-square tests for non-parametric and two-tailed t tests for parametric variables.

Second, group differences were analysed using multinomial regression analyses for each unhealthy alcohol consumption pattern with unrisky consumption as the reference group. To control for confounding age, sex and smoking status effects, these variables were included as covariates into the regression models. Odds ratios (OR) and 95% confidence intervals (CI) are presented.

Results

Table 1 displays demographic variables and substance-related variables for the GH and GP sample. GH patients were older, more often current smokers and more likely to report unhealthy alcohol use. Unhealthy alcohol consumption was significantly ($\chi^2 = 129.16$, $P < 0.001$) elevated in GH subjects (14.4%) compared to GP subjects (7.6%). In male participants, prevalence rates were elevated for alcohol dependence (5.5 vs. 1.3%) and alcohol abuse (2.0 vs. 4.5%). In female subjects, alcohol dependence was also more prevalent in GH subjects (0.5 vs. 2.4%), but rates of alcohol abuse were the same in both samples (0.3%).

Results of the multinomial regression analysis are displayed in Table 2. After controlling for differences in smoking status, age and gender, individuals with alcohol dependence and alcohol abuse were more likely to be detected in the GH setting, whereas setting was not predictive for at-risk drinking without holding an AUD.

As expected, being male, smoking was significantly predictive for at-risk drinking or holding an AUD, while age was positively related to at-risk drinking and negatively related to holding an AUD.

Discussion

This is the first study analysing the distribution of unhealthy drinking patterns including at-risk consumption in the GP and a GH covering the same region using an identical gold standard for assessing AUDs and at-risk drinking. The GH sample can be regarded as being representative for the individuals hospitalised in this region within 1 year. Both studies used the same gold standard (M-CIDI) which was assessed in personal interviews. The proportions of participants among the eligible persons in both studies were good.

Data reveal that AUDs and smoking are more prevalent in GH patients, probably reflecting their heightened

Table 1 Differences in age and substance-related variables between general population (GP) and general hospital (GH) subjects

	Male participants		*P*	Female participants		*P*	Total sample		*P*
	GP ($n = 2,045$)	GH ($n = 1,578$)		GP ($n = 2,030$)	GH ($n = 1,167$)		GP ($n = 4,075$)	GH ($n = 2,752$)	
Current smoker (%)	39.3	49.0	<0.001	35.3	40.9	<0.001	37.3	46.6	<0.001
Age [M (SD)]	41.6 (13.0)	47.1 (12.4)	<0.001	41.7 (12.8)	46.7 (13.1)	<0.001	41.6 (12.9)	47.0 (12.7)	<0.001
Alcohol-related diagnoses (%)			<0.001			<0.001			<0.001
No risky consumption	89.2	79		95.7	94.5		92.4	85.6	
At-risk	6.6	8.7		2.7	3.5		5.1	6.2	
Abuse	2.0	4.5		0.3	0.3		1.2	2.8	
Dependence	2.2	7.8		0.5	2.4		1.3	5.5	

Table 2 Multinomial regression analyses for prediction of unhealthy alcohol consumption

	ND ($n = 6.102$)	OR (CI 95)		
		AR ($n = 376$)	AA ($n = 121$)	AD ($n = 205$)
Age	Ref	1.021[a] (1.012–1.03)	0.952[b] (0.938–0.966)	0.985[b] (0.974–0.997)
Gender	Ref			
Male		2.496[b] (1.976–3.153)	10.645[b] (5.55–20.417)	3.727[b] (2.607–5.327)
Female		Ref		
Current smoker	Ref			
Yes		1.021[b] (1.831–2.819)	1.885[b] (1.294–2.747)	4.993[b] (3.542–7.039)
No	Ref		Ref	
Setting	Ref			
Population		Ref		
Gen. hospital		1.073[c] (0.863–1.335)	2.93[b] (1.995–4.303)	4.085[b] (2.931–5.617)

ND no diagnosis, *AR* at-risk consumption, *AA* alcohol abuse, *AD* alcohol dependence, *OR* odds ratio, *CI* 95% confidence interval, *ref* reference category

[a] $P < 0.05$, [b] $P < 0.001$, [c] $P =$ ns

morbidity compared to subjects in the GP. However, at the same time, data show that at-risk consumption is about as prevalent in GHs as we would expect on grounds of data from the GP. In GHs, the absolute numbers of at-risk consumers that can be reached equals the number of subjects with AUDs. Furthermore, at-risk drinkers without a diagnosis of an AUD are the largest group of unhealthy alcohol consumers in both samples, indicating that the spectrum of unhealthy alcohol use is not narrow. This finding contrasts strongly with previous findings on prevalence estimates in GH populations that found the vast majority of inpatients to be alcohol dependent (Saitz et al. 2006). The prevalence estimate of Saitz and colleagues is based on a subsample of 35% of all patients screening positive who were eligible and agreed to study participation. This subgroup tended to report higher values on the AUDIT and reported a significantly higher number of drinks per drinking occasion as well as per week (Saitz et al. 2006). These contradictory findings may be explained by: (a) during the first 7 months of the study, Saitz et al. restricted their diagnostic procedure to a cut-off score of eight points, which is higher than recommended in newer studies on the AUDIT (Reinert and Allen 2007), and (b) differences in insurance coverage between Germany, where all citizens are obliged to have health insurance, and the US, where 16% of the population do not hold a health insurance (DeNavas-Walt et al. 2006) may also account for the discrepancies.

There are some limitations to our findings. First, data of the GP study was assessed 8 years prior to data collection in the GH. During that period, per capita alcohol consumption and prevalence rates of at-risk drinking have slightly decreased in Germany (Kraus et al. 2006), indicating that the differences in prevalence estimates found in our data might still underestimate the "real" differences. However, replicating our findings using large-scale samples that were assessed during the same period remains necessary. Second, only individuals with positive screening results in at least one screening questionnaires where systematically diagnosed in the GH, which might have also lead to an underestimation of prevalence rates in this setting. However, since our cut-off values were quite low and the number of false-positives in a randomly chosen subsample of 310 patients was very small, we assume that these differences between the study designs did not substantially influence our main findings.

Taken together, data indicate that substantial numbers of individuals with unhealthy drinking patterns without alcohol dependence can be easily accessed in the setting of GHs. Implementing BIs in the GH therefore are a promising tool for reducing alcohol consumption on a population level and for reducing alcohol-related morbidity and mortality. In order to optimise early interventions in this field, more fine-grained analyses on psychosocial variables that may influence the effectivity of BIs are needed and developing effective interventions for the substantial group of individuals with AUDs is mandatory.

Acknowledgments This work was supported by the German Federal Ministry of Research and Education. The present analysis is part of the projects TACOS (Transitions in Alcohol Consumption and Smoking; Grant. No. 01EB 9406) and Extra (Stepped Interventions for Problem drinkers; Grant 01EB 0421). This study is part of the German research network EARLINT (Early substance use Intervention). The authors wish to thank Claudia Köbke and Christina Bluhm for data collection, Anja Kreuzer for data entry and -editing, the medical and nursing staff of the SANA Hospital Luebeck (Prof. Dr. T.-H. Hütteroth, PD Dr. C. Blöchle) for co-operation with the project, and the patients for participation.

Conflict of interest statement The authors declare that they have no conflict of interest.

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