PREVALENCE OF ALCOHOL-RELATED ATTENDANCE AT AN INNER-CITY EMERGENCY DEPARTMENT AND ITS IMPACT: A DUAL PROSPECTIVE AND RETROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Alcohol-related hospital attendances at Emergency Departments (ED) are a potentially avoidable burden on National Health Services (NHS) resources. Understanding the number and type of patients attending EDs with alcohol intoxication is important in estimating the workload and cost implications. We used best practice from previous studies to establish the prevalence of adult alcohol-related ED attendances and estimate the costs of clinical management and subsequent health service use.

Methods: The setting was a large inner-city ED in northeast England, United Kingdom. Data were collected via (i) retrospective review of hospital records for all ED attendances for four pre-specified weeks in 2010/11 to identify alcohol-related cases along with 12 months follow-up of the care episode, and (ii) prospective 24/7 assessment via breath alcohol concentration testing of patients presenting to ED in the corresponding weeks in 2012/13.

Results: The prevalence rates of alcohol-related attendances were 12% and 15% for the retrospective and prospective cohorts. Prospectively, the rates ranged widely from 4% to 60% during the week, rising to over 70% at weekends. Younger males attending in the early morning hours at weekends made up the largest proportion of alcohol-related attendances. The mean cost per attendance was £249 (SD £1,064); the mean total cost for those admitted was £851 (SD £2,549). The most common reasons for attending were trauma-related injuries, followed by psychiatric problems.

Conclusions: Alcohol-related attendances are a major and avoidable burden on emergency care. However, targeted interventions at weekends and early morning hours could capture the majority of cases and help prevent future re-attendance.

INTRODUCTION

Alcohol consumption is a major concern for public health as well as a burden on health services. There is some evidence that the introduction of the United Kingdom (UK) Government's Licensing Act in 2003, which aimed to reduce high intensity, rapid (or binge) drinking by extending the hours that alcohol could be bought, had the opposite effect.[1] The overall cost to the National Health Service (NHS) in England of alcohol harm has been estimated as £2.7 billion per annum and £646 million in Emergency Departments (ED).[2] Alcohol-related attendances can be the direct result of personal alcohol consumption or an indirect consequence of someone else doing so. The majority of these attendances are preventable and so most of the cost is avoidable. Thus these resources could be used to meet other clinical demands.

In 2010/2011 there were over 21 million attendances at English EDs.[3] In light of the increasing evidence supporting the effectiveness and cost-effectiveness of screening and brief alcohol intervention in EDs,[4-7] accurate data on the extent alcohol-related attendances is needed to inform intervention strategies.[8] A limited amount of such prevalence work exists worldwide and it shows wide variation. A retrospective review of medical records over a two year period in Australia found that 5% of ED presentations were alcohol-related,[9] whilst in Belgium a prevalence of 1.2% was reported over 12-months.[10] A retrospective cohort study using medical records in a London ED reported that 8% attendances were alcohol-related between 21.00 pm and 9.00 am over a one month period.[1] However, retrospective review in the United States National Trauma data bank showed that 28% were alcohol positive using serum blood alcohol concentration data.[11]

Prospectively, it was found via self-reported data that 9% of ED visits in rural Australia were due to alcohol,[12] and in young adults this prevalence was 40%.[13] In an English prospective clinical audit, 55% of attendees over one year in a busy inner city ED were screened for risky drinking (not whether their ED attendance was alcohol-related) and 17% were positive.[14] Similarly, a prospective four week study (representing one week overall) reported that 14% of ED attendances were attributable to alcohol according to patients and 21% according to clinicians.[15] A Colombian study based on clinical assessment reported a prevalence of

21.6%[16] whilst in South Africa a third of trauma unit patients were positive for alcohol use, identified via self-report and breath alcohol concentration tests.[17] Finally, a survey of weekend attendances using breath samples in a random sample of EDs in England reported that 40% of patients overall and up to 70% at peak times had recently consumed alcohol.[18]

The above studies used various methodologies with a number of limitations. Some studies focused on injury or trauma patients rather than all ED patients.[11 16 17] The use of retrospective medical notes[1 9 10] is subject to recording error and prospective studies which collect patient-reported information[14 15] can be subject to response and recall bias. Other limitations were restrictions to particular age groups,[13] or particular times of the day[1], week[18] or year.[1 12 13 15 18] To our knowledge, no previous study has reported data on all alcohol-related attendances across the entire week and across all seasons of the year.

This study combined the strengths of retrospective and prospective data collected across four whole weeks during a year to capture the effect of 'pay days', bank holidays and seasonal trends. The primary aim was to determine the prevalence of alcohol-related ED attendances. The secondary aim was to establish the costs of clinical management and related health costs on emergency care.

METHOD

Setting

The ED of a large inner-city hospital in northeast England.

Measures and procedures

Data for two cohorts of patients aged 18 years and over were gathered, each for pre-specified equivalent periods in 2010/11 and 2012/13 (Table 1). Within the relevant calendar years, one week per quarter was selected to cover the first, second, third and fourth week of the month. Each week of data collection ran from 00.00 hours on day one to 24.00 hours on day seven.

Table 1. Description of datasets

Data collection weeks[1]	Retrospective attendances (2010/11)		Prospective attendances (2012/13)				
	All	Alcohol-related	All	Data available[2]	Alcohol-related[3]		
					All	BrAC	Clinical opinion
	N	n (%)	N	n %	N %	n %	n %
2 Jul-8 Jul	961	122 (12.7)	1,622	656 (40.4)	101 (15.4)	90 (13.7)	11 (1.7)
8 Oct-14 Oct	1,059	157 (14.8)	1,691	1,368 (80.9)	220 (16.2)	145 (10.6)	75 (5.5)
17 Dec-23 Dec	1,464	171 (11.7)	1,558	1,298 (83.3)	186 (14.3)	100 (7.7)	86 (6.6)
25 Feb-3 Mar	1,637	186 (11.4)	1,655	1,430 (86.4)	213 (14.9)	163 (11.4)	50 (3.5)
	5,121	636 (12.4)	6,526	4,752 (72.8)	720 (15.2)	498 (10.5)	222 (4.7)

BrAC, Breath alcohol concentration
[1] Dates inclusive
[2] As a percentage of total presentations
[3] As a percentage of data available
NB percentages do not add to 100 due to rounding

Retrospective data (2010/11)

Computer-based records (attendance database logs and e-records) and paper-based hospital patient records (ED casualty cards and ambulance Patient Report Forms) were screened for ED attendances involving alcohol. All records which included the terms 'alcohol', 'intoxication’ or a type of alcohol consumed by the patient (e.g. ‘patient reported drinking cider’) were categorized as alcohol-related attendances in the dataset. An inventory of Medical Record Numbers and attendance dates were used to ensure patients were not included in the dataset more than once. Each identified alcohol-related case was matched on Medical Record Number and NHS number and details of attendance at ED, hospital admissions, and any subsequent ED and hospital attendances within 12 months from first presentation, were recorded.

Prospective data (2012/13)

Breath samples were collected from patients to provide a non-invasive and objective measure of alcohol intake. Research nurses and other medical staff (referred to as ‘researchers’ in this article) collected breath alcohol concentration (BrAC) measurements using a hand held breathalyser (Dräger Alcotest 6810 med). It was planned to have one researcher to cover each shift during weekdays with an additional researcher to cover Friday and Saturday nights. During the first week of data collection it was recognized that patients could be missed during staff breaks and staff handover times. For the remaining weeks, staff coverage was increased when possible so that in total 84 shifts (56%) were covered by one researcher, and 31 shifts (37%) were covered by two researchers; 6 shifts (7%) were not covered.

Following informed verbal consent, all consenting adult patients were asked to provide brief background information and their breath sample. In cases where the patient lacked the capacity to consent, either an accompanying adult capable of advising on the patient's likely willingness to consent to participation or an appointed consultee (clinician unrelated to the study) consented on the patient's behalf. The duty consultant advised in cases where patients could not be approached (for example, unconsciousness, serious illness, serious injury, risk of violence or excessive pain) as to whether alcohol had been ingested in the preceding 6 hours.

Caldicott approval was granted from the Newcastle upon Tyne Hospitals NHS Foundation Trust to gain access to the full hospital patient records. A favourable ethical opinion for the prospective data collection was obtained from NRES Committee North East - Newcastle & North Tyneside 2 REC Reference 12/NE/0063.

Statistical analysis

The costs of ED attendance and subsequent health care were extrapolated from the hospital patient notes (outpatient consultations, inpatient stays, tests and procedures) collected as part of the retrospective data set. For each participant, using unit costs taken from NHS reference costs and from the Personal Social Care Research Unit,[19] an attendance cost was applied and subsequent costs were added as appropriate (such as x-rays and admissions to wards).

Due to the high proportion of negative cases from the BrAC test results from the prospective cohort, the scores were dichotomized into positive (any quantity of alcohol) and negative cases. The dichotomized scores were used as the dependent variable in a logistic regression to examine predictors of alcohol-related attendances. The independent variables were gender, age group, week of attendance, day of the week, time of presentation and area. The week of attendance variable was dropped from the model because it was not significant. The Hosmer-Lemeshow test was used to assess the goodness of fit.

The Paddington Alcohol Test (PAT) was used to identify the ten most common ED presentations associated with alcohol in both the retrospective and prospective datasets,[20] although we added an extra code to identify patients with ‘intoxication’.

A z test was used to test differences in proportions between the retrospective and prospective cohorts.

RESULTS

Across the four study weeks covered by retrospective data collection, 5,121 adult patients presented to the ED and during the prospective period 6,526 adult patients presented (Table 1). The overall prevalence rates of alcohol-related attendances were 12.4% and 15.2% for the retrospective and prospective samples respectively (Table 2); this difference in proportions was significant ($Z=-3.9$, $p<0.001$). For both cohorts, there were greater numbers of males than females in the alcohol-related groups as well as a greater proportion of younger attendees. The temporal pattern of attendances for the alcohol-related group for both datasets was similar with higher proportions of alcohol-related attendances on weekend days than weekdays and more attendances in night time hours than daytime hours. Traumatic injury was the most common reason for attendance, followed by psychiatric problems for the alcohol-related group.

Table 2: Descriptive information of samples and attendances

	Retrospective[1] (N=5121)		**Prospective**[2] (N=4752)	
	Not alcohol-related	Alcohol ingested	Not alcohol-related	Alcohol related
	n (%)	n (%)	n (%)	n (%)
SAMPLE				
All	4,485 (87.6)	636 (12.4)	4,032 (84.8)	720 (15.2)
Gender				
Male	2,220 (83.5)	439 (16.5)	1,847 (81.0)	432 (19.0)
Female	2,263 (92.0)	197 (8.0)	1,854 (89.8)	210 (10.2)
Missing[1]	2 (0.0)	0 (0.0)	331 (8.2)	78 (10.8)
Age (years)				
18-24	961 (80.6)	231 (19.4)	784 (79.9)	197 (20.1)
25-44	1,461 (85.2)	254 (14.8)	1,022 (83.8)	197 (16.2)
45-64	976 (89.5)	114 (10.5)	760 (88.6)	98 (11.4)
65+	1,032 (97.2)	30 (2.8)	611 (96.7)	21 (3.3)
Missing[1]	55 (1.2)	7 (1.1)	855 (21.2)	207 (28.8)
Area				
NE postcode	4,125 (88.9)	517 (11.1)	2,946 (87.7)	412 (12.3)
Other postcode	345 (74.8)	116 (25.2)	177 (73.4)	64 (26.6)
Missing[1]	15 (0.3)	3 (0.5)	909 (2.2)	244 (33.9)
ATTENDANCES				
Day of week				
Monday	717 (91.5)	67 (8.5)	600 (91.6)	55 (8.4)
Tuesday	605 (89.4)	72 (10.6)	548 (89.7)	63 (10.3)
Wednesday	566 (91.1)	55 (8.9)	584 (87.0)	87 (13.0)
Thursday	624 (89.5)	73 (10.5)	549 (89.3)	66 (10.7)
Friday	648 (87.2)	95 (12.8)	475 (83.0)	97 (17.0)
Saturday	646 (82.6)	136 (17.4)	603 (76.1)	189 (23.9)
Sunday	679 (83.1)	138 (16.9)	665 (80.3)	163 (19.7)
Missing[1]	-	-	8 (0.2)	0 (0.0)
Time of day				
Midnight-5.59 am	526 (64.5)	289 (35.5)	390 (52.3)	356 (47.7)
6.00 11.59 am	1,167 (95.0)	63 (5.1)	1,062 (94.3)	64 (5.7)
Noon-17.59 pm	1,612 (94.2)	100 (5.9)	1,529 (94.9)	82 (5.1)
18.00-23.59 pm	1,180 (86.5)	184 (13.5)	964 (82.8)	200 (17.2)
Missing[1]	-	-	87 (1.8)	18 (0.4)
Week of year				
2 Jul-8 Jul	839 (87.3)	122 (12.7)	555 (84.6)	101 (15.4)
8 Oct-14 Oct	902 (85.2)	157 (14.8)	1,148 (83.9)	220 (16.1)
17 Dec-23 Dec	1,293 (88.3)	171 (11.7)	1,112 (85.7)	186 (14.3)
25 Feb-3 Mar	1,451 (88.6)	186 (11.4)	1,217 (85.1)	213 (14.9)
Reason for attendance[3]				
Fall	50 (84.8)	9 (15.3)	148 (82.7)	31 (17.3)
Collapse (including fits)	199 (82.2)	43 (17.8)	128 (88.9)	16 (11.1)
Head injury	119 (68.9)	55 (31.6)	67 (62.6)	40 (37.4)
Assault	29 (46.0)	34 (54.0)	22 (31.4)	48 (68.6)
Accident	1,025 (90.1)	113 (9.9)	956 (87.7)	134 (12.3)
Unwell	143 (94.1)	9 (5.9)	44 (97.8)	1 (2.2)
Gastro-intestinal	351 (93.9)	23 (6.2)	272 (91.3)	26 (8.7)
Psychiatric	89 (58.6)	63 (41.5)	63 (50.8)	61 (49.2)
Cardiac (including chest pain)	320 (96.7)	11 (3.3)	257 (96.6)	9 (3.4)
Repeat attender[4]	Unknown	Not included	Unknown	Unknown
Intoxication[5]	6 (4.0)	144 (96.0)	4 (4.4)	88 (95.6)
Other	1,662 (97.6)	41 (2.4)	1,161 (95.5)	55 (4.5)

Missing[1]	492 (9.6)	91 (1.8)	910 (19.1)	211 (4.4)

[1] As a percentage of total presentations
[2] As a percentage of data available
[3] According to Paddington Alcohol Test
[4] Repeat attender category not captured in these datasets
[5] Intoxication code included due to use at Paddington Alcohol Test outside its original purpose
NB percentages do not add to 100 due to rounding

The mean BrAC reading for all positive cases (n=498) was 0.7 mg/l (SD=0.4). The results from the logistic regression showed that the odds of having a positive BrAC test were significantly higher in males, and that the odds significantly increased with decreasing age attending over the weekend. Individuals who came from outside the region (i.e. visitors to the city) had significantly higher odds of a positive BrAC test (Table 3). The Hosmer-Lemeshow test is not significant (p=0.54) so the model is an adequate fit. An exploration of possible interactions found a statistically significant interaction between age group and time of day. Figure 1 illustrates this interaction; alcohol-related attendance in the early morning hours of the day is highest in the 18-24 year age group, whereas at the other times of day attendance is highest in the 25-44 year age group.

Table 3: Logistic regression of positive BrAC test on gender, age, day of the week, time of presentation and postcode (prospective dataset)

		Odds Ratio	Std. Err.	z	P>z	95% Confidence Interval
Gender	Male	1.00				
	Female	0.58	0.07	-4.59	<0.01	0.46-0.73
Age group (years)	65 and over	1.00				
	45-64	4.03	1.11	5.08	<0.01	2.35-6.90
	25-44	5.31	1.39	6.38	<0.01	3.18-8.87
	18-24	5.78	1.52	6.68	<0.01	3.45-9.66
Day of week	Monday	1.00				
	Tuesday	1.53	0.39	1.69	0.09	0.93-2.52
	Wednesday	1.64	0.41	2.00	0.05	1.01-2.66
	Thursday	1.50	0.38	1.60	0.11	0.91-2.48
	Friday	2.49	0.63	3.61	<0.01	1.52-4.10
	Saturday	3.74	0.88	5.59	<0.01	2.35-5.94
	Sunday	3.27	0.76	5.10	<0.01	2.07-5.15
Time of day	06.00-11.59	1.00				
	Noon-17.59	0.82	0.18	-0.91	0.36	0.54-1.25
	18.00-23.59	3.86	0.72	7.26	<0.01	2.68-5.56
	Midnight-05.59	17.04	3.19	15.17	<0.01	11.81-24.59
Area	NE postcode	1.00				
	Other	1.92	0.38	3.27	<0.01	1.30-2.83

BrAC, breath alcohol concentration

Figure 1 here

Figure 2 illustrates the pattern of attendance for the prospective cohort; although the peak time of general attendance at the ED was 12.00 pm to 13.00 pm, alcohol-related attendances peaked between 2.00 am and 3.00 am at 59.0%. Using the data for Friday and Saturdays only, this percentage rose to a peak of 71.9% of attendances.

Figure 2 here

Exploring service use in the 12 months after attendance in the retrospective cohort, it was found that 102 of the 636 (16.0%) attendances resulted in the patient being admitted to a ward or observation unit (Table 4). Of those admitted subsequent transfer to another ward was common (n=29, 28.4%; data not shown) predominantly to the Emergency Assessment Unit. The mean cost per attendance was £249 (SD £1,064), with a best to worst scenario as £173 to £316. The majority of individuals however just incurred the cost of an attendance (£112) and hence the median cost (and the associated IQR was £112-£112). The mean cost for admissions (up to three admissions per patient) was £851 (SD £2,549). As Table 4 illustrates the median costs are lower than mean costs, which indicates that a small number of individuals were very high users of services and this skewed mean cost data to the right. The costs broken down by gender and age show that overall males use more NHS resources than females. Table 4 also shows that although older people may cost more per patient, younger people as a group are more costly to the NHS because they have more alcohol-related attendances.

Table 4. Costs to NHS of alcohol-related ED attendance (£) (retrospective dataset)

	N	Cost		Best case scenario[4]	Worst case scenario[4]
		Mean (SD)	Median (IQR range)	Mean (SD)	Mean (SD)
Attendances and admissions					
Overall cost of attendance[1]	636	249 (1,064)	112 (112 – 112)	173 (933)	316 (1,232)
Cost of first ward	102	338 (620)	46 (1 - 342)	297 (529)	423 (702)
Cost of second ward	29	1,438 (4,558)	293 (134 - 1,166)	1,229 (4,032)	1,693 (5,249)
Cost of third ward	13	818 (730)	601 (236 - 1,138)	722 (645)	944 (842)
Total ward admission cost[2]	102	851 (2,549)	294 (5 – 916)	738 (2,238)	1,024 (2,934)
Costs by gender and age					
Male					
18-24 years	153	166 (368)	112 (112 - 112)		
25-44 years	169	269 (481)	112 (112 - 112)		
45-64 years	84	171 (292)	112 (112 - 112)		
65+ years[3]	27	1,324 (4,809)	112 (112 - 112)		
Female					
18-24 years	78	126 (68)	112 (112 - 112)		
25-44 years	85	199 (324)	112 (112 - 112)		
45-64 years	30	305 (498)	112 (112 - 112)		
65+ years	3	302 (328)	112 (112 - 112)		

[1] overall cost of attendance = attendance cost + total ward admission cost + x-ray cost (as applicable)
[2] total ward admission cost = first ward + second ward + third ward (as applicable)
[3] this group included one outlier who had an extended hospital stay
[4] mean costs were based upon the National average cost from the NHS reference costs and the best and worst case scenarios are based upon the lower and upper quartile cost from the same source.
SD, standard deviation; IQR, inter-quartile range

DISCUSSION

The overall prevalence rates of alcohol-related attendances were 12% and 15% for the retrospective and prospective cohorts, with high variation according to the time of day and day of the week. On weekend days, over 70% of attendances were alcohol-related and these patients typically presented in the early hours of the morning. Alcohol-related attendance were statistically more likely to be younger males visiting the ED in the early morning hours at weekends. The reason for attending the ED was similar across both samples, most commonly a traumatic injury, followed by psychiatric problems. The cost estimates to the

NHS for alcohol-related attendance at EDs ranged from £173 to £316, increasing substantially (mean £851) if hospital admission was required. Using conservative median costs the emergency care in this hospital alone could be around £1,000,000 per annum for alcohol-related attendances, although the true public sector cost could be much higher due to admissions, and associated ambulance and police work. This indicates significant NHS burden if all such EDs in the UK are sustaining similar demands associated to alcohol-related attendance.

Patients with alcohol intoxication are often a complex group of patients to assess and treat. While some patients will simply sober up and leave, others present with a range of needs from relatively minor injuries to high-level care admission and further medical input. These patients can also present with challenging behavior, brought on by intoxication which can adversely impact on staff and other patients, who may experience delayed care. Thus it is important to identify the number and characteristics of alcohol-related ED attendances to inform staffing decisions and potentially target preventive interventions. Our results suggest that EDs would benefit from routinely providing staff to cover the night and early morning shifts, particularly at weekends to cope with the high proportion of alcohol-related attendances at these times.

Previous retrospective studies reported prevalence rates, ranging from 1% to 8%.[1 9 10] However our estimate was 12% using similar methods. Other prospective studies have reported prevalence rates ranging from 9% to 40%.[12 15 18] Although our prevalence rate of 15% is at the lower end of this range, this may be due to the fact that we included all times and days of the week rather than focusing on just the busiest weekend days.[18] Our finding of a larger number of overall ED attendances in 2012/13 compared to 2010/11, reflects that this

ED unit became over 20% busier (partly due to an organizational change in the hospital) over the time-frame of this study. Nevertheless, broadly similar prevalence rates and profiles of alcohol-related attendances suggests a persistence in this significantly sized but avoidable area of work. Whilst our mean cost of a primary visit of £249 was lower than that recently reported in Belgium of £400,[10] when follow-up treatment costs are allowed for, the true average cost per patient rises substantially. Previous international studies have reported that alcohol-related attendances are strongly associated with mental health disorders;[9 10 12] which our work confirms in a UK setting. This emphasizes the importance of Liaison psychiatry services to address the mental health needs of patients being treated for physical conditions.[21]

By using a combination of measures across entire weeks and all seasons, we overcame the problem of measuring maximum attendance only, for example, at weekends or at a particular time of year when events such as festive holiday may bias results. This study confirms the evidence from previous work reporting high prevalence of alcohol-related attendances at weekends and in the early hours of the morning.[18] Even using a simple dichotomized measure of negative and positive BrAC scores we were able to show that alcohol-related attendances are more highly associated with being male, being younger, attending at weekends and in the early morning hours. Our observation that individuals who travelled into the city had significantly higher odds of a positive breath alcohol test than local residents, confirms the idea that city centres attract revellers from elsewhere. However, the cost burden often falls on city hospitals and other local public sector services.[22]

We encountered initial difficulty in implementing our first week of prospective data collection due to staff breaks and staff handover times; strategies were put into place to address this by ensuring more staff were available as critical times. The subsequent weeks achieved a high response rate (over 80% each week) and therefore we believe our data provide an accurate and generalizable dataset. Nevertheless, it is worth speculating on the effect the missing data may have had on the results; anecdotally it was reported that sober patients were generally amenable to providing a breath sample while they waiting for treatment, and that declining to participate and absconding, for example, tended to be by intoxicated patients. We therefore propose that any effect is more likely to have led to our prevalence rates of alcohol-related attendance being underestimates rather than overestimates. We acknowledge the limitation of using a single site. However, we found a similar peak in alcohol related attendances of around 70% in the early hours of the morning as a larger national study in the UK which was based on data from a 24 hour period (Saturday night through Sunday morning) in the month of June.[18] What our work adds is a wider view over all days of the week and all seasons of the year.

Having established a clear estimate of the prevalence of alcohol-related attendances in ED, the next critical step is to implement strategies to reduce this potentially avoidable work. There is good evidence that referral for brief intervention results in reduced re-attendance for ED.[5] There is also evidence supporting the idea of training paramedics to work with patients with alcohol-related injury or illness at the scene of the first contact which could directly benefit the patient and the ambulance service by reducing frequent and regular callers known to have alcohol problems.[23] In England there have been improvements in the recognition of alcohol misuse in EDs following recommendations from the Department of Health that brief advice should be provided in health settings such as EDs.[24] From our study, we can recommend that a pragmatic approach for EDs to cope with the influx of alcohol-related attendances will be to routinely provide staff to cover the night and early morning shifts, particularly at weekends, to enable brief intervention delivery that can help to reduce subsequent alcohol consumption and its related problems.[25]

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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Figure legends

Figure 1: BrAC positive patients by age group and time of day

Figure 2. BrAC positive and negative patients