ORIGINAL ARTICLE

Use of blood alcohol concentration in resuscitation room patients

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Objective: To clarify the use of blood alcohol concentration (BAC) in the emergency department resuscitation room, by comparing it with a subsequent alcohol questionnaire and by surveying patients' attitudes to BAC testing.

Design: Observational study.

Participants: 273 resuscitation room patients at St Mary's Hospital, Paddington between August 2005 and February 2006.

Main outcome measures: BAC comparison to questionnaire results, and attitudes to BAC testing.

Results: The level of agreement between positive screening by questionnaire and a BAC of >80 mg/100 ml was low ($\kappa=0.29$, 95% confidence interval 0.12 to 0.46) because each test measures different aspects of drinking. Patients accepted the use of BAC tests in detecting alcohol use, though a small minority reported concerns over confidentiality.

Conclusion: Use of BAC testing complements later questionnaire screening to identify alcohol misuse in patients initially brought to the emergency department resuscitation room, providing results are fed back to the patient. Potential ethical, judicial and insurance concerns should not prevent the use of BAC when judged to be in the patient's best interest.

Alcohol misuse is a major problem confronting all emergency departments (EDs).^{1,2} One in three adult patients consumes alcohol before attendance; after midnight the number rises to two in three.³ Up to 46% of injuries presenting to EDs worldwide are alcohol related,⁴ although figures are unknown for those being treated in the resuscitation room. We have previously shown that the period immediately following an attendance at an ED provides a "teachable moment" for counselling about the prevention of hazardous alcohol use.⁵ For every two accepted referrals to an alcohol nurse specialist (ANS) there was one less re-attendance within the following 12 months, compared with simple written advice.⁶ A brief questionnaire specifically designed to detect hazardous drinking, the Paddington Alcohol Test (PAT), was used for that research.⁶ This is an accurate and reliable method for assessing alcohol consumption,^{7,8} but requires the patient to be conscious, with normal cognitive function and mental capacity. Such an application is impractical in the frenetic environment of the resuscitation room.

Blood alcohol concentration (BAC), used with Glasgow Coma Scores, can affect patient management—for example, by determining if a patient requires tracheal intubation or computed tomography scanning⁹—especially for those with impaired consciousness, drug overdose, or trauma.^{10–12} Indeed, it has been stated that all comatose patients smelling of alcohol must have a BAC analysis.¹³ The potential, however, for opportunistic identification of alcohol misuse among patients treated initially in the resuscitation room has not been examined.

We have previously delineated the top 10 presenting complaints where the PAT can be most effectively used at initial presentation.¹⁴ This excluded those not in a position to respond to a questionnaire—that is, all those treated in the resuscitation room. In light of the recent government report,³ highlighting concerns of increased alcohol use, we carried out an audit in the resuscitation room at St Mary's Hospital in

Paddington (central London). We will later report on the relationship of presenting complaint, service utilisation and BAC level. In this first paper, we report on: (1) levels of agreement between BAC tests and PAT; and (2) patient acceptability of the audit, in view of potential concerns over ethical, judicial and insurance claim considerations.

METHODS

Participants and procedures

Blood samples were sent to the diagnostic chemical pathology department for BAC analysis from all persons aged 16 and over managed in the resuscitation room. The St Mary's ED sees over 65 000 adults each year and includes a four bed resuscitation room for patients needing immediate care (triage categories 1 and 2). Expected admissions by duty teams, patients transferred from other hospitals, those who did not need initial blood tests (for example, fractures), and those who had initial blood tests in other parts of the ED were excluded. Each blood sample was assigned an identifying number to log each patient into a database.

Patients admitted to a ward from the resuscitation room were followed up in order to apply both the PAT and a questionnaire on attitudes to screening. They met the following inclusion criteria: proficiency in English sufficient to complete the survey (judged by hospital staff and research team) and cognitively/physically able to be interviewed. Ethical approval was obtained from St Mary's Local Research Ethics Committee; this study fell within the remit of audit (St Mary's Hospital, No. EC2143 dated 31 March 2005 with a codicil for use of the additional Patient Attitude Questionnaire of 17 August 2005). As an audit, the ethics committee agreed consent for BAC was not required, although verbal consent was obtained from all those who were asked to complete the subsequent questionnaires.

Abbreviations: ANS, alcohol nurse specialist; BAC, blood alcohol concentration; ED, emergency department; PAT, Paddington Alcohol Test

Measures

Blood alcohol concentration (BAC)

Blood for BAC, sent in a fluoride oxalate bottle, was measured by an automated enzymatic method, DRI Ethyl Alcohol Assay (Microgenics GmbH, Passau, Germany) on an Olympus AU2700 analyser (Olympus Optical Co Ltd). This assay is specific for ethyl alcohol. The analysis was carried out simultaneously with other urgent biochemistry tests from the resuscitation room on a 24 hour/7 days a week basis. Test results are reported as either <10 mg/100 ml or in actual mg amount for those over 10 mg.

Paddington Alcohol Test (PAT)

The five-item PAT questionnaire asks patients about the maximum units consumed, how often they drink more than twice the recommended limit, and whether they believe their attendance is related to alcohol.⁷⁻⁸ It is considered to be positive in men drinking more than 8 units, and women more than 6 units in a single session, at least once a week, or in anyone who believed their attendance was alcohol related.

Patient Attitude Questionnaire

A simple four item questionnaire (table 1) was designed specifically for use on subsequent admission to a ward. An explanation of the reason for the audit was given to each patient first, outlining the potential advantages and disadvantages of testing for alcohol, and any questions were answered. It was made clear to patients that the researcher did not know the results of their BAC test and had no part in their care.

Analyses

Data were analysed using the SPSS statistical programme. Descriptive statistics, student t tests, and levels of agreement beyond chance with 95% confidence intervals (CI) are reported. Patients were grouped into those who had BAC above and below 80 mg/100 ml (to convert to mmol/l divide by 4.6; thus an alcohol of 80 mg/100 ml is 17.4 mmol/l). Although not a medically determined figure, BAC 80 mg/100 ml was chosen as it is the legal limit for driving in the UK because it is associated with a fivefold increase in the likelihood of being involved in a road traffic accident.¹⁵ Due to wide variabilities of lean body

mass, consumption rate with food eaten or not, degree of tolerance and time elapsed since drinking, this figure cannot be reliably converted to units of alcohol consumed.⁸

RESULTS

During the data collection period (22 August 2005 and 28 February 2006), 1044 patients who met the inclusion criteria were treated in the resuscitation room. Of these, 944 (90%) had a BAC reported. The majority, 792 (84% of 944) attended for medical reasons, 445 (47% of 944) with non-cardiac conditions and 347 (37%) with cardiac conditions. A further 139 (15%) attended for surgical reasons, of which 123 (13%) were trauma related and 16 (1.5%) non-trauma, with the remaining 4 (0.5%) for gynaecological/obstetric reasons. Data were not available for 9 patients (1%).

Of the 944 patients, 273 (29%) were later interviewed to complete the PAT and attitude questionnaires. Their mean (SD) age was 62 (18.24) years, and 158 (58%) were male. Two hundred and forty-two (89%) presented with medical complaints and 29 (10.5%) with surgical complaints. Data were not available for the remaining 2 patients (<1%).

Of the 671 patients who were not followed up, 415 (44%) were discharged from the hospital before they could be approached for interview, 104 (11%) had language barriers, 86 (9%) were too ill or had cognitive difficulties, 28 (3%) died, 28 (3%) were already followed up at a prior admission, and 10 (1%) declined to be interviewed.

Those who were interviewed were found to be statistically older than those who were not ($t = -5.42$; $p < 0.01$). One hundred and fifty-eight (58%) of those who were interviewed were male, compared to 418 (62%) of those who were not ($\chi^2 = 2.23$; $p = 0.32$). When only considering those who had a BAC value >10 mg/100 ml, the difference was not significant ($t = 1.94$; $p = 0.54$).

In those who were interviewed, ($n = 273$) BAC ranged from a 0–440 mg/100 ml. Thirty-two (12%) had evidence of alcohol use (BAC >10 mg), with 25 (9%) having a BAC >80 mg/100 ml. Mean alcohol concentration among those who did consume alcohol was 170 mg/100 ml (SD = 115.38).

The κ coefficient for PAT status versus BAC of >80 mg/100 ml was 0.29 (95% CI 0.12 to 0.46), while the level of agreement between the specific question in the PAT: “Is your attendance related to alcohol?”, and an elevated BAC (>80 mg/100 ml) was $\kappa = 0.30$ (95% CI 0.11 to 0.49), indicating a low level of agreement between the two (table 2).

Patient attitude questionnaire

Irrespective of initial BAC, when asked how comfortable people were about the blood sampling of an unconscious patient, the median rating was 1 indicating a high degree of comfort. Scores ranged from 1 to 4, with five people (1.8%) reporting that they felt uncomfortable, but none reported being “very uncomfortable”. When asked how they felt about BAC being measured in *all* patients (regardless of a capability to consent) as part of standard practice, the median response was 1. The range of scores was 1 to 5, with 10 (3.6%) patients—none BAC test or PAT questionnaire positive—stating that they would feel uncomfortable or very uncomfortable if all patients were to be routinely screened. In response to open ended questions, 264 (97%) patients reported that implementing BAC testing as a routine procedure would be acceptable; anecdotally, most thought that medical staff needed to have as much knowledge of a patient’s circumstances as possible to provide appropriate treatment. However, nine—none BAC/PAT positive—raised the issue of confidentiality/privacy, stating that they were concerned about who would have access to this information.

Table 1 Patient Attitude Questionnaire

We are currently conducting a review (audit) of alcohol use by people needing treatment in our Resuscitation Room (Resusc.) comparing this to published work done elsewhere. Alcohol use can have an impact on the physical state of individuals and the way that clinicians treat certain problems, or which medications are given. Since most individuals in Resusc. are unconscious or at the very least, distressed, it is not usually practical to ask them about alcohol use then. Therefore we are measuring blood alcohol levels to better understand the needs of our patients and also so that we can help prevent recurrences. The results of this audit will give us a lot of useful medical information, but we are also interested in the opinions of our patients.

- 1. How do you feel about your blood having been tested for alcohol?
- 2. Would you ideally like to have been asked first (if practical)?
- 3. On a scale of 1 to 5 (1 = totally comfortable, 5 = extremely uncomfortable) how would you rate your comfort level with blood alcohol screening in Resusc. if you were unconscious?

1	2	3	4	5
Totally comfortable				Extremely uncomfortable
4. On a scale of 1 to 5 how would you rate your comfort level if blood alcohol screening for all in Resusc. became standard procedure, even if conscious?				
1	2	3	4	5
Totally comfortable				Extremely uncomfortable

Table 2 Paddington Alcohol Test (PAT) versus blood alcohol concentration (BAC) in 273 patients

BAC	PAT			Is your attendance related to alcohol?		
	Negative	Positive	Total	No	Yes	Total
<80 mg/100 ml (<17.4 mmol/l)	228 (92%)	20 (8%)	248 (100%)	240 (97%)	8 (3%)	248 (100%)
>80 mg/100 ml (>17.4 mmol/l)	15 (60%)	10 (40%)	25 (100%)	18 (72%)	7 (28%)	25 (100%)

DISCUSSION

This study is the first to report data from an ED resuscitation room that compare BAC at presentation, with subsequent screening for alcohol misuse using a questionnaire. Previous work has shown how BAC influences management decisions⁹⁻¹¹ and correlates with diagnosis and outcomes.¹⁶⁻¹⁹

Among our 273 patients, one in 10 had a BAC of >80 mg/100 ml, and 30 were found to be misusing alcohol according to the PAT. This level of alcohol use is lower than that reported previously,³ but our patient sample relates to the resuscitation room only, where more patients were found to be attending for medical reasons than trauma.

The level of agreement between the two measures was not high: two-thirds of those who were PAT positive had a BAC <80 mg/100 ml, and 60% of those with a BAC >80 mg/100 ml scored negative on the PAT. However, PAT reviews the ongoing extent of a patient's drinking, while BAC indicates a recent episode of drinking. PAT is capable of detecting alcohol misuse in those patients who may not have consumed alcohol before admission, while 80 mg/100 ml could have been reached on about 4 units of alcohol,⁸ which would not necessarily imply alcohol misuse according to PAT guidelines unless associated with a resulting ED attendance.⁷ Those who are PAT negative but have a notably elevated BAC in the resuscitation room could be identified as having little awareness that occasional heavy alcohol use can be potentially damaging. This group is important: they are not dependent, but may not appreciate that alcohol is a drug,⁸ or realise their drinking is unhealthy; they can benefit from early feedback, leading them to contemplate change.²⁰ Likewise, PAT proved to be effective in identifying individuals who may not have drunk alcohol before coming to the ED, but who nevertheless misuse alcohol. Each test is therefore useful for facilitating "the teachable moment",^{5,6} especially for a population of young, mobile patients who may not often visit their general practitioner, or even be registered with one.

Most patients (263 (96%)) were comfortable with routine BAC screening in the resuscitation room. They viewed this as helpful for identifying patients who have consumed excessive alcohol, thus ensuring that they received appropriate management. Although non-English speakers were excluded, the population served by St Mary's Hospital is ethnically diverse and the sample included many people from ethnic communities including those whose cultural and religious background proscribes the use of alcohol.

A limitation of this study was that the sample was confined to resuscitation room patients who were subsequently admitted to a ward long enough to answer both PAT and the attitude questionnaire. We were unable to include people who were discharged soon after their treatment, a group which tended to be younger. However, among those who did consume alcohol, there were no significant differences in mean BACs between the two groups. Furthermore, some patients may have felt obliged to support the audit due to the medical care they were

receiving. We attempted to reduce this possible source of bias by making it clear to participants that the information they gave us would be treated in confidence and that the person asking them about attitudes to screening was not involved in any other part of their clinical management. Asking a sample of patients not taking part in the audit to complete the questionnaire would have served as a useful comparison group.

Some concerns have been raised in regard to testing for blood alcohol that results may be requested by the police and used in criminal proceedings against patients. These should not cloud decisions about what is in the best clinical interests of the patient. Doctors should seek consent from competent patients to undertake any test which is necessary or which may directly benefit the patient, but not delay for those who temporarily lack capacity.²¹ They should keep results confidential unless required by law to disclose the information, or if they are satisfied that there is an overriding public safety interest in the disclosure (Sir Graeme Catto, General Medical Council; Dr M Dudley, Senior Medicolegal Adviser, Medical Protection Society, personal communications). A BAC taken as part of the medical care of a patient cannot be used in court, as blood or urine samples must have been taken in a prescribed manner by a forensic medical examiner.

Similarly, the response of an insurance company to a raised BAC revealed in a later medical report (only provided with the patient's further written consent) may cause concern, but this depends on circumstances, such as a raised BAC in the driver of a car involved in an accident, or a pedestrian struck by a sober driver. Insurance companies (>400 in the UK) vary in their assessments, but will in general settle claims for car accidents, or indeed for any accident, even if the driver/perpetrator is shown to have a raised BAC (Mr Derek Fawell, Policy Advisor, Association of British Insurers, personal communication; www.abi.org.uk). Only in the USA do some states still allow insurance companies to withhold payment to a hospital if information demonstrates that a patient was intoxicated at the time of an accident.²²⁻²³ This is now changing, the benefits of brief intervention being appreciated.²⁴

Clinical judgement should dictate whether or not to request a BAC,⁹⁻¹¹ as for any other investigation, and the result discussed with the patient after recovery.²¹

We report that from 2005, Westminster Primary Care Trust has funded a full time ANS to provide alcohol health work at St Mary's Hospital.^{1,2} This is in accordance with guidance from the Royal College of Physicians, London,²⁵ and also from the American College of Surgeons.²⁶

St Mary's now provides around the clock BAC testing, results being available within the hour. The ANS follows up all patients with a notably elevated BAC to ensure that they have received feedback and brief advice (using the PAT), together with an offer of brief intervention. As noted in the introduction, this is effective in reducing re-attendance. Promoting patient health and reducing re-attendance rates, while adhering to General Medical Council guidelines,²¹ is the responsibility of all doctors.

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DETAILS OF CONTRIBUTORS, AND THE NAME OF THE GUARANTOR

RT, MC, TP, PH, NB and EC designed the study protocol. EC, TP, PH, AB and JF collected study data. PH led the laboratory work. All authors helped analyse data, interpret findings and writing this paper. RT is the guarantor for the paper and accepts full responsibility for the conduct of the study, had access to the data, and controlled the decision to publish.

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