General practice

Efficacy of the alcohol use disorders identification test as a screening tool for hazardous alcohol intake and related disorders in primary care: a validity study

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Abstract

Objective: To determine the properties of the alcohol use disorders identification test in screening primary care attenders for alcohol problems.
Design: A validity study among consecutive primary care attenders aged 18-65 years. Every third subject completed the alcohol use disorders identification test (a 10 item self report questionnaire on alcohol intake and related problems) and was interviewed by an investigator with the composite international diagnostic interview alcohol use module (a standardised interview for the independent assessment of alcohol intake and related disorders).
Setting: 10 primary care clinics in Verona, north eastern Italy.
Patients: 500 subjects were approached and 482 (96.4%) completed evaluation.
Results: When the alcohol use disorders identification test was used to detect subjects with alcohol problems the area under the receiver operating characteristic curve was 0.95. The cut off score of 5 was associated with a sensitivity of 0.84, a specificity of 0.90, and a positive predictive value of 0.60. The screening ability of the total score derived from summing the responses to the five items minimising the probability of misclassification between subjects with and without alcohol problems provided an area under the receiver operating characteristic curve of 0.93. A score of 5 or more on the five items was associated with a sensitivity of 0.79, a specificity of 0.95, and a positive predictive value of 0.73.
Conclusions: The alcohol use disorders identification test performs well in detecting subjects with formal alcohol disorders and those with hazardous alcohol intake. Using five of the 10 items on the questionnaire gives reasonable accuracy, and these are recommended as questions of choice to screen patients for alcohol problems.

Introduction

Hazardous alcohol intake and related disorders are a major public health issue. Data from the World Health Organisation's collaborative project on psychological problems in general health care have shown that alcohol dependence or harmful use of alcohol as defined by the 10th revision of the International Classification of Diseases (ICD-10) is present in about 6% of primary care attenders, ranking third in frequency after major depression and generalised anxiety.[1]

In addition to formal alcohol disorders such as dependence or harmful use, increasing attention has been paid to hazardous alcohol intake, defined as a level of consumption or pattern of drinking which, if it persists, is likely to result in harm. Hazardous alcohol intake is directly or indirectly implicated in many physical, psychological, and social problems, imposing a substantial financial burden on the drinkers and on society.[2-4] Moreover, drinking at levels causing detectable biochemical abnormalities is associated with a mortality that is twice that of the normal population.[5]

Primary prevention often requires national strategies promoting an overall decrease of alcohol consumption in the population. By contrast, secondary prevention can effectively be undertaken at the primary care level by means of early detection of people with hazardous alcohol intake and time limited interventions aimed at decreasing alcohol consumption and thus the likelihood of subsequent harm and dependence. Though several screening instruments have been developed that are fairly short and easy to administer, they tend to detect severe alcohol disorders such as dependence and overlook hazardous drinking. The WHO therefore devised a 10 item questionnaire—the alcohol use disorders identification test[6]—whose distinct advantage is the ability to detect both formal alcohol disorders and hazardous alcohol intake.

We investigated the screening properties of the alcohol use disorders identification test in the detection of primary care attenders with formal alcohol disorders or hazardous alcohol intake.

Subjects and methods

Sampling strategy

Ten primary care physicians in Verona, north eastern Italy, allowed investigators to visit their clinics twice a week, once in the morning and once in the afternoon. Among patients aged 18-65 attending other than for a prescription, every third patient was approached up to

a total of 50 patients at each clinic. Subjects were informed about the project and told that responses would be kept confidential. Those agreeing to participate had the size of a standard drink[7] explained to them (see box) and then completed the alcohol use disorders identification test in the waiting room. In addition, the alcohol use module of the composite international diagnostic interview[8 9] was administered by an investigator at the clinic on the same day or at the patient's home within a week. Investigators included three doctors and a final year student in psychology; they received group training in administering the composite international diagnostic interview and practised individually in role play sessions before the fieldwork. Finally, for each eligible subject the primary care physician rated on a form a list of clinical signs often related to alcohol consumption (for example, abnormal skin vascularisation, jaundice, hand tremor, liver characteristics); noted drinking behaviour over the previous 12 months (no alcohol abuse, occasional alcohol abuse, regular alcohol abuse); and noted the intake of psychotropic drugs during the two weeks before examination.

Instruments

The alcohol use disorders identification test is a self administered questionnaire including three items on the amount and frequency of drinking, three on alcohol dependence, and four on common problems caused by alcohol (see appendix). Each item is scored 0-4, giving a total score of 40.

The composite international diagnostic interview is a standardised diagnostic interview for assessing mental disorders according to criteria of the ICD-10[10] and the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised* (DSM-III-R).[11]

English versions of both instruments were translated into Italian, and the Italian versions were independently translated back into English; changes were made where necessary in order to ensure close correspondence between the original and Italian versions.

Diagnostic criteria

The screening properties of the alcohol use disorders identification test were tested against the standard criteria listed in the box. Criteria were fulfilled during the 12 months before examination and based on responses to the alcohol use module of the composite international diagnostic interview, which was the standard for the study.

Alcohol dependence and harmful use were diagnosed according to ICD-10 criteria. Defining hazardous alcohol intake was difficult, as the risk associated with alcohol consumption lies along a continuum. Recommendations on levels of safe drinking published in the United Kingdom by the Health Education Authority and supported by the Royal College of Psychiatrists, the Royal College of General Practitioners, and the Royal College of Physicians[12 13] suggest that 30 g pure ethanol daily in men and 20 g daily in women constitute hazardous alcohol intake. The definitions of hazardous alcohol intake in this study (see box), based on categories of quantity and frequency of alcohol consumption from the alcohol use module of the composite international diagnostic

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Standard diagnostic criteria used in validating alcohol use disorders identification test

Alcohol dependence (at least three items required)(ICD-10)

(1) Strong desire or sense of compulsion to take the substance

(2) Impaired capacity to control substance taking behaviour in terms of onset, termination, or levels of use

(3) Physiological withdrawal state when substance use is reduced or stopped or use of the substance to relieve or avoid withdrawal symptoms

(4) Evidence of tolerance to the effects of the substance

(5) Other pleasures or interests being given up or reduced because of the substance use

(6) Persistent substance use despite clear evidence of harmful consequences

Harmful alcohol use (ICD-10)

(*a*) Clear evidence that the substance use is responsible for (or is substantially contributing to) physical or psychological harm

(*b*) The nature of the harm is clearly identifiable and specified

(*c*) The pattern of use has persisted for at least one month or has occurred repeatedly within the 12 month period

(*d*) The subject does not fulfil criteria for alcohol dependence

Hazardous alcohol intake

Men: Three to seven drinks almost every day or seven or more drinks at least three times a week

Women: Two to five drinks almost every day or five or more drinks at least three times a week

A standard drink was defined as equivalent volumes containing an average of 13.5 g ethanol. Definitions of a standard drink were based on local alcoholic beverages and included one glass of wine (125 ml), one bottle of beer (500 ml), and one measure of spirits (40 ml)[7]

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interview, closely corresponded to the recommendations reported above.

Statistics

The screening properties of the alcohol use disorders identification test were investigated by receiver operating characteristic analysis. This technique summarises the validity coefficients of a test and provides an overall index of diagnostic accuracy (that is, the area under the receiver operating characteristic curve) by plotting sensitivity against the false positive rate for all possible cut off scores. An area under the receiver operating characteristic curve of 0.5 is obtained when the discriminatory ability of a test is no better than chance; a value of 1.0 represents perfect discriminatory ability.[14] A computer program for receiver operating characteristic analysis similar to that developed by Dorfman and Alf[15] and modified by Metz *et al*[16] was used in this study.

Logistic regression analysis was performed to identify linear combinations of items in the alcohol use disorders identification test that minimised the probability of misclassification between subjects with and without alcohol dependence, harmful use, or hazardous intake. A stepwise selection of predictor variables was adopted by using the likelihood ratio statistic as a test for

Table 1 Validity coefficients of 10 item alcohol use disorders identification test in detection of subjects with and without alcohol dependence, harmful alcohol use, or hazardous alcohol intake considered together

Cut off	Sensitivity	Specificity	Positive predictive value†	Positive predictive value 25%‡	Positive predictive value 50%§
≥1	1.00	0.27	0.19	0.25	0.41
≥3	0.96	0.58	0.28	0.36	0.53
≥5	0.84	0.90	0.60	0.68	0.81
≥7	0.54	0.97	0.73	0.80	0.89
≥9	0.43	0.99	0.86	0.90	0.95
≥11	0.31	1.00	1.00	1.00	1.00

Area under receiver operating characteristic curve 0.949 (95% confidence interval 0.940 to 0.959).
†Positive predictive value in study sample (prevalence of alcohol dependence, harmful use, or hazardous intake 14.5%).
‡Represents positive predictive value when prevalence of alcohol dependence, harmful use, or hazardous intake in population is 25%.
§Represents positive predictive value when prevalence of alcohol dependence, harmful use, or hazardous intake in population is 50%.

Table 2 Validity coefficients of five items of alcohol use disorders identification test selected through logistic regression analysis in detection of subjects with and without alcohol dependence, harmful alcohol use, or hazardous alcohol intake considered together

Cut off	Sensitivity	Specificity	Positive predictive value†	Positive predictive value 25%‡	Positive predictive value 50%§
≥1	1.00	0.27	0.19	0.25	0.41
≥3	0.96	0.60	0.29	0.37	0.54
≥5	0.79	0.95	0.73	0.80	0.89
≥7	0.37	0.99	0.84	0.89	0.94
≥9	0.27	1.00	0.95	0.97	0.99

Area under receiver operating characteristic curve 0.931 (95% confidence interval 0.919 to 0.944).
†Positive predictive value in study sample (prevalence of alcohol dependence, harmful use, or hazardous intake 14.5%).
‡Represents positive predictive value when prevalence of alcohol dependence, harmful use, or hazardous intake in population is 25%.
§Represents positive predictive value when prevalence of alcohol dependence, harmful use, or hazardous intake in population is 50%.

removal and a probability level of 0.10 to remove a variable.

Results

Five hundred subjects were approached at the primary care clinics, of whom 489 (97.8%) agreed to participate and 482 (96.4%) completed the evaluation. Most were women (n = 306; 63.5%), married (290; 60.2%), and employed (274; 56.8%) and had low educational attainment (320 (66.4%) educated to secondary school level only). Mean age was 42.2 (SD 14.4) years. Seven subjects (1.5%) fulfilled ICD-10 criteria for alcohol dependence; all were men, with a median age of 43 years (range 21-61 years). Fifteen subjects (3.1%) fulfilled ICD-10 criteria for harmful alcohol use; 13 (86.7%) were men, with a median age of 50 years (range 24-65 years). Lastly, 62 subjects (12.9%) satisfied criteria for hazardous alcohol intake; 51 (82.3%) were men, with a median age of 48 years (range 21-65 years).

The screening characteristics of the alcohol use disorders identification test were initially tested separately against the diagnostic criteria listed in the box. The questionnaire performed well in detecting subjects with alcohol dependence (area under receiver operating characteristic curve 0.91; 95% confidence interval 0.88 to 0.94), harmful alcohol use (0.90; 0.88 to 0.92), and hazardous alcohol intake (0.92; 0.90 to 0.93).

However, though sensitivity and specificity were above 0.8 irrespective of the criterion used, positive predictive values (that is, the probability of having the disorder among patients with positive test results) were low, indicating a high proportion of false positive results.

As the alcohol use disorders identification test is expected to be more suitable for initial screening of people with probable alcohol problems of any type rather than for accurate detection of people with formal alcohol disorders, the screening characteristics of the questionnaire were tested against all three drinking categories considered together. Table 1 shows that the performance of the questionnaire was high, with an area under the receiver operating characteristic curve of about 0.95. The cut off score of 5 provided a good trade off between sensitivity (0.84) and specificity (0.90); however, the positive predictive value was comparatively low, indicating that 40% of subjects scoring 5 or higher were false positive cases. Higher positive predictive values were found at higher cut off scores, though at the expense of decreased sensitivity; higher positive predictive values might be expected at lower cut off scores in populations with a higher prevalence of alcohol problems.

As low positive predictive values might result from the 10 items of the questionnaire being given the same weight in computing a total score, logistic regression analysis was performed to identify the items minimising the probability of misclassification between subjects with and without alcohol dependence, harmful use, or hazardous intake considered together. Estimated coefficients and related statistics from logistic regression analysis are not reported here but are available on request. Five items were retained in the model (goodness of fit 556.5; df = 463, P = 0.002): item 1 (frequency of drinking), item 2 (number of drinks on a typical day), item 4 (unable to stop drinking), item 5 (failing to do what was normally expected), and item 10 (another person concerned about subject's drinking or suggesting that it should be cut down). The discriminatory ability of the total score resulting from summing the responses to the five items is shown in table 2. Overall performance was high, with an area under the receiver operating characteristic curve of 0.93. A total score of 5 or more on the five selected items was associated with a sensitivity of 0.79, a specificity of 0.95, and a positive predictive value of 0.73; moreover, the probability of a subject scoring less than 5 having alcohol problems was less than 4%.

These findings can be compared with the low ability of doctors to detect patients with hazardous alcohol intake or formal alcohol disorders, only 39% of these patients being rated as abusers of alcohol either occasionally or regularly.

Discussion

This study shows that the alcohol use disorders identification test is a simple questionnaire that takes only a few minutes to complete and performs well in detecting both people with formal alcohol disorders and those with hazardous alcohol intake. As five of the 10 items on the questionnaire are reasonably accurate for screening, physicians or other primary care professionals are recommended to use them as questions of choice to screen patients for alcohol problems of any

type. Subsequent detailed evaluation can then be offered to those with positive test results in order to reach firm diagnostic conclusions. Our findings are similar to those from the exploratory WHO multicentre study,[17] in which the 10 item alcohol use disorders identification test had a mean sensitivity of 0.80 and a mean specificity of 0.89 across participating centres.

Several screening instruments for alcohol disorders have been tested, including the Michigan alcoholism screening test[18] and its shorter versions[19-21], the CAGE questionnaire,[22] the Veterans alcoholism screening test,[23] and the primary care evaluation of mental disorders.[24] In general the ability of these instruments to detect formal alcohol disorders is comparable to that of the alcohol use disorders identification test.[24 25] However, most of the instruments have not been tested in the detection of hazardous alcohol intake; when this was done sensitivity failed at unacceptable levels.[26] Other instruments, such as the Munich alcoholism test,[27] require clinical examination to elicit physical signs related to excessive alcohol consumption, which makes them less likely to be used by busy physicians or prevents their use by non-medical professionals. Hence the alcohol use disorders identification test has definite advantages over existing screening instruments, as it can screen both for hazardous alcohol intake (possibly in patients before symptoms begin or in those with mild symptoms) and for formal alcohol disorders and can be used by health workers with no formal medical training.

We acknowledge that our study has possible limitations. Firstly, as data on alcohol consumption in the area were not available we did not perform a power calculation for required sample size and selecting comparatively few patients with alcohol problems might have affected the findings. Secondly, a proportion of subjects with alcohol problems might be expected to underreport them both on the alcohol use disorders identification test and at the diagnostic interview, with validity coefficients of the questionnaire being artificially raised. Independent data provided by primary care physicians suggest that this bias was limited, as three quarters of subjects with physical signs possibly due to excessive drinking reported alcohol problems at interview. No other sources of information (for example, spouse or other key informants, hospital records, biological markers, etc) were available to examine this issue further. Finally, some items included in the alcohol use disorders identification test were embodied within standard validating criteria, which might also have resulted in inflated estimates of test accuracy. Other validity studies using different sources of information and standard criteria may be useful to clarify this issue.

Appendix

Alcohol use disorders identification test. (Scores for response categories are given in parentheses)

1 *How often do you have a drink containing alcohol?*
   (0) Never (1) Monthly or less (2) Two to four times a month (3) Two or three times a week (4) Four or more times a week

2 *How many drinks containing alcohol do you have on a typical day when you are drinking?*
   (0) 1 or 2 (1) 3 or 4 (2) 5 or 6 (3) 7 to 9 (4) 10 or more

3 *How often do you have six or more drinks on one occasion?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

4 *How often during the past year have you found that you were not able to stop drinking once you had started?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

5 *How often during the past year have you failed to do what was normally expected of you because of drinking?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

6 *How often during the past year have you needed a first drink in the morning to get yourself going after a heavy drinking session?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

7 *How often during the past year have you had a feeling of guilt or remorse after drinking?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

8 *How often during the past year have you been unable to remember what happened the night before because you had been drinking?*
   (0) Never (1) Less than monthly (2) Monthly (3) Weekly (4) Daily or almost daily

9 *Have you or has someone else been injured as a result of your drinking?*
   (0) No (2) Yes, but not in the past year (4) Yes, during the past year

10 *Has a relative or friend or a doctor or other health worker been concerned about your drinking or suggested you cut down?*
   (0) No (2) Yes, but not in the past year (4) Yes, during the past year

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A trip to Halkyn Mountain

The half term holiday in May gave us a chance to get out into the country. We went by bike to Halkyn Mountain to collect fossils and mineral specimens; current hot topics in science. The day was hot and with the wind at our backs we were through Mold and on the way up from Holywell before lunch.

We arrived hot and breathless to fling ourselves down in heather and bracken on top of the hill with views over the Dee and Wirral. Beyond, in haze, could be made out Liverpool Cathedral, vague shapes of docks and civic buildings, and, on the far horizon, the Isle of Man was a smudge like a cloud.

We watched a Tiger Moth from Sealand going through its paces. National Service was waiting in three or four years, and we debated which force we would join if given any choice. Norman planned to be an actuary when that was over, Steve wanted to be an architect but thought that he would follow his father in shipping. I was uncertain, but doctoring seemed a good idea.

After the sandwich lunch collecting began in earnest. We would compete for the best rocks and petrified remnants of long extinct life forms. The hillside was littered with spoil from old mine workings. It wasn't too difficult to pick up good pieces of galena; the lead ore that had been mined here since Roman times. Worked out after the first world war, the workings had long fallen into decay. Shafts had been capped or fenced, but sheep went missing when the ground gave way after heavy rain.

About two in the afternoon we wandered towards some trees to escape the heat and found ourselves staring at a hole in the ground. The fence around it was rotten posts and rusty barbed wire. There was a single beam across the entrance to the open shaft. We threw stones and counted the seconds to the splash far below in the flooded bottom. Norman said, "Bet you wouldn't shin across that beam." The foolish challenge was thoughtlessly accepted, and I was under the wire and straddling the beam in moments. I shinned across, legs dangling; grasping the beam for dear life. The others watched spellbound as I reached midway and hesitated at the dank feel of the wood, slimy and wet with moss. A cold draught came up from far below, chilling my legs and the sweat trickling down my neck and armpits. Fixing my eyes on the far side of the shaft, the old brickwork and a rusty ladder leading down into the darkness, it was vital not to look down.

Gravel and small stones slithered into the abyss as I moved forward. The ground was unstable. I was very frightened. At last I made a grab for the turf on the far side and half heaved, half rolled myself up to safety.

The boys emptied their rucksacks for me to pick and choose. I selected a magnificent lump of shining galena from Steve and a perfect trilobite from Norman. We went home in silence, agreeing to be vague about how we had spent the afternoon.

I met Norman recently, retired from insurance after 40 years with the same firm. Steve never did architecture, dying at 18 on National Service. I think of him when I handle the rock, which was a paperweight in my surgery for years. A reminder of near disaster on Halkyn Mountain long ago, it tells of the spontaneity, risk taking, and folly of adolescence. The shaft remains uncapped.

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We welcome filler articles of up to 600 words on topics such as *A memorable patient, A paper that changed my practice, My most unfortunate mistake,* or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disc.