The value of the CAGE in screening for alcohol abuse and alcohol dependence in general clinical populations: a diagnostic meta-analysis
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CRD summary
This review concluded that the CAGE questionnaire is of limited diagnostic value for screening purposes at the recommended cut-point of two or more. The review was generally well-conducted and the authors’ conclusions are likely to be reliable.

Authors’ objectives
To determine the accuracy of the CAGE questionnaire in screening for alcohol abuse or dependence in a general clinical population.

Searching
MEDLINE was searched from 1974 to December 2001 using the reported search terms. In addition, a number of general practice journals (in Dutch) and reference lists were screened and experts were contacted. The studies could be reported in any language apart from Japanese.

Study selection
Study designs of evaluations included in the review
Only studies that included consecutive patients or a random sample of patients were included.

Specific interventions included in the review
Studies that assessed the CAGE questionnaire as an independent questionnaire were eligible for inclusion. Studies that embedded CAGE in a larger questionnaire were included if the four CAGE questions were kept together.

Reference standard test against which the new test was compared
Studies had to use the American Psychiatric Association’s DSM criteria for the diagnosis of alcohol abuse or dependence as the reference standard. Studies in which only patients who screened positive on CAGE received the reference standard interview were excluded, as were studies in which less than 50% of the initially defined study population received the reference standard. Studies in which all screen-positive patients and a random sample of the screen-negative patients received the reference standard were included.

Participants included in the review
Only studies conducted in general clinical populations were included. Studies conducted in psychiatric or emergency departments were excluded. The studies had to provide a good description of the study population so that it could be classified as in-patient or out-patient, and as belonging to primary care or a general hospital population. The included studies involved in-patients, ambulatory medical patients and primary care patients; most studies included patients with specified minimum ages that ranged from 16 to 65 years.

Outcomes assessed in the review
The studies had to provide sufficient data to calculate diagnostic value indicators at all different thresholds for the CAGE questionnaire.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed studies for inclusion. Any disagreements were resolved by referral to a third reviewer.

Assessment of study quality
Inclusion was based on the fulfilment of several quality-related factors: appropriate study population, appropriate reference standard, avoidance of verification bias. The included studies were assessed for the possibility of selection bias. Two reviewers independently assessed validity and resolved any disagreements through recourse to a third reviewer, if required.

**Data extraction**

One reviewer extracted the data and a second reviewer checked them. The sensitivity, specificity, positive and negative likelihood ratios, and positive and negative predictive values were calculated from data reported in the original articles or provided by the authors of the original studies. All measures of test performance were calculated for each of the CAGE thresholds, together with the 95% confidence intervals (CIs).

**Methods of synthesis**

How were the studies combined?

Measures of test performance and the area under the receiver operating characteristic (ROC) curve were pooled using the random-effects model of DerSimonian and Laird. ROC curves were pooled using the methods of Kester and Buntinx.

How were differences between studies investigated?

A threshold effect for all studies and for each of the thresholds, and for heterogeneity between studies, was investigated using the chi-squared test. The studies were analysed in subgroups according to setting (in-patients, ambulatory medical patients or primary care).

**Results of the review**

Ten studies (n=4,562) were included. Of these, five were in primary care patients (n=2,708), three in ambulatory medical patients (n=1,202) and two in in-patients (n=652).

CAGE threshold >= 1: the sensitivity ranged from 61 to 100% and the specificity from 37 to 88%.

CAGE threshold >= 2: the sensitivity ranged from 46 to 92% and the specificity from 62 to 95%.

There was significant heterogeneity between studies for all CAGE thresholds and for all measures of test performance. Sensitivity was higher and specificity lower in in-patients compared with ambulatory or primary care patients.

The pooled area under the ROC curve was 0.87 (95% CI: 85, 89).

**Authors’ conclusions**

The CAGE questionnaire is of limited diagnostic value for screening purposes at the recommended cut-point of two or more.

**CRD commentary**

The review addressed a focused objective supported by clearly defined inclusion criteria that limited the review to high-quality studies. Several relevant sources were searched and attempts were made to minimise language bias. It was not clear whether the authors made specific attempts to locate unpublished studies. Appropriate steps were taken to minimise bias in the review process and the methods used to pool the data were appropriate. The authors’ conclusions were supported by the results presented and are likely to be reliable.

**Implications of the review for practice and research**

The authors did not state any implications for practice or further research.
Bibliographic details

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Other publications of related interest
This additional published commentary may also be of interest. Schorling JB. Review: sensitivity of the CAGE questionnaire for the DSM diagnosis of alcohol abuse and dependence in general clinical populations was 71% at cut points >=2. Evid Based Med 2005;10:26.

Indexing Status
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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.