UK National Screening Committee

Screening for alcohol misuse in adults

External review against programme appraisal criteria for the UK National Screening Committee (UK NSC)

Version: 3

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Solutions for Public Health

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The UK NSC advises Ministers and the NHS in all four UK countries about all aspects of screening policy. Its policies are reviewed on a 3 yearly cycle. Current policies and the policy review process can be found at https://www.gov.uk/guidance/evidence-and-recommendations-nhs-population-screening#evidence-review-process

Abbreviations List

AUDIT	Alcohol Use Disorder Identification Test
AUDIT-C	AUDIT - Consumption
CI	Confidence interval
CIDI	Composite International Diagnostic Interview
DIS	Diagnostic Interview Schedule
DSM	Diagnostic and Statistical Manual of Mental Disorders
MD	Mean difference
MHCID	Mental Health Composite International Diagnostic Interview
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NPV	Negative predictive value
OR	Odds ratio
PHE	Public Health England
PPV	Positive predictive value
QUADAS-2	Quality Assessment of Diagnostic Accuracy Studies-2
RCT	Randomised controlled trial
RD	Risk difference
RR	Rate ratio
SCAN	Schedules for Clinical Assessment in Neuropsychiatry
TLFB	Time-Line Follow Back
UK NSC	United Kingdom National Screening Committee

Competing Interest

All SPH authors have completed the ICMJE uniform disclosure form (www.icmje.org/coi_disclosure.pdf) and declare: grants from Public Health England to SPH to undertake the submitted work, no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work

Plain English Summary

Alcohol misuse is a significant cause of mortality, morbidity and social issues in the UK. Alcohol misuse is linked to a number of serious diseases including heart disease, stroke, liver disease and cancer and social costs of alcohol misuse include disruption to work and family life, violence, traffic incidents and healthcare-related costs.

This document reviews evidence published between January 2010 and December 2015 on population based screening for alcohol misuse in adults. This review updates the previous review for the UK National Screening Committee (UK NSC) completed in 2010 which recommended that a population based screening programme for alcohol misuse should not be introduced in the UK.

The aim of population based screening for alcohol misuse would be to identify individuals at risk of alcohol misuse and refer them for intervention to reduce their alcohol use and their risk of harm and the findings of this review should only be considered in this context. This document does not consider the assessment of risk covered by guidance from the National Institute for Health and Care Excellence (NICE) which involves identifying people who may have an alcohol-use disorder during contact with services.

This review of the evidence found a number of problems which would prevent the UK NSC recommending a population based screening programme. These were:

- There is no agreed independent gold standard against which the screening test can be measured.
- There is insufficient evidence of agreed cut-off levels for different subgroups in a population based screening population.
- There is a lack of evidence that a population based screening programme would improve morbidity and mortality or would reduce social harm.

Because of these uncertainties this review concluded that a population based screening programme should not be introduced in the UK.

Executive Summary

Purpose of the review

This document reviews evidence published between January 2010 and December 2015 on screening for alcohol misuse in adults. The review concerns national population based screening and the findings should only be considered in this context. It does not consider the risk assessment of people who are not seeking treatment for alcohol problems but may be asked about their drinking during their contact with health and social care services.

Background

Alcohol misuse is linked to increased risk for a number of serious diseases including heart disease, stroke, liver disease and cancer in both men and women. The risk of all-cause mortality is also higher in alcohol-dependent people compared to the general population. In 2012, the percentage of adults who reported drinking more than guideline recommended levels on the heaviest drinking day in the past week was 51% in England, 55% in Wales and 63% in Scotland.

Previous recommendation

The current UK NSC policy is that systematic population screening of adults for alcohol misuse is not recommended. The previous UK NSC external review of screening for alcohol misuse was produced in 2010 and found that the UK NSC criteria for a formal screening programme were not met in a number of areas relating to the test and long term effectiveness in reducing mortality or morbidity.

This update review explores the volume, quality and direction of the literature published since 2010 and focuses on key questions relating to the conclusions of the previous review. The aim of the review is to inform discussion on whether the recent evidence provides a sufficient basis on which to recommend the introduction of a population based screening programme for alcohol misuse for adults in the UK.

The key questions considered in this review are:

A) Is there an independent gold standard against which the screening test can be measured?
B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?
C) Is there any evidence demonstrating the long-term effectiveness of a population screening programme in improving morbidity, mortality, and reducing social harm?

Major findings and gaps in the evidence

The review found that there are still a number of areas where the UK NSC criteria for introducing a population based screening programme are not met:

- There is no agreed independent gold standard against which the screening test can be measured.
- Studies assessing test performance in different subgroups were identified. However there was insufficient evidence to conclude that there are agreed cut-off levels for different subgroups of the target population for population based screening.

- There is a lack of evidence that a population screening programme would improve morbidity and mortality or would reduce social harm.

Recommendation

The review concluded that, at present, the evidence base is insufficient to recommend a UK systematic population based screening programme for alcohol misuse in adults.

This rapid review update was conducted between January and March 2016. It considered studies listed in bibliographic databases. It did not include grey literature or hand searching of reference lists for additional papers. The review focused on specific questions agreed with the UK NSC relating to key points raised by a previous 2010 review. Overall there was an absence of studies that directly addressed the key questions of interest for population based screening.

Introduction

Alcohol misuse is a significant cause of mortality, morbidity and social issues in the UK[1]. For example, alcohol misuse is linked to a number of serious diseases including heart disease, stroke, liver disease and cancer[1]. A 2015 meta-analysis found a statistically significant increase in risk of all-cause mortality for alcohol-dependent people compared to the general population, equating to the risk being approximately 3 times higher in alcohol dependent people[2]. In 2013 there were 6,592 alcohol-related deaths in England, an increase of 1% from 2012[3]. Social costs of alcohol misuse can include disruption to work and family life, violence, traffic incidents and healthcare-related costs[4].

The National Institute for Health and Care Excellence (NICE) published a quality standard on alcohol dependence and harmful alcohol use in 2011[5] and a 2010 public health guideline on preventing harmful drinking[6]. Both include recommendations on circumstances in which individuals might be tested for alcohol misuse, but define screening as follows:

> "For the purposes of this guidance, screening involves identifying people who are not seeking treatment for alcohol problems but who, in the view of the professional, may have an alcohol-use disorder. Practitioners may use any contact with clients to carry out this type of screening. The term is not used here to refer to national screening programmes such as those recommended by the UK National Screening Committee."

This current review concerns population based screening for alcohol misuse and does not consider the type of testing initiated by clinicians covered by NICE guidance. The findings of this review only relate to the issue of systematic population screening of adults for alcohol misuse against the UK NSC criteria. They should not be considered as a commentary on current clinical practice of identifying alcohol misuse through the testing initiated by clinicians covered by NICE guidance or recommendations on testing for alcohol misuse issued by the Department of Health.

Basis for current recommendation

The current UK NSC policy is that the systematic population screening of adults for alcohol misuse is not recommended. The previous UK NSC external review of screening for alcohol misuse was produced in 2010[7] and found that the UK NSC criteria for a formal screening programme were not met in a number of areas relating to the test and long term effectiveness in reducing mortality or morbidity.

Current update review and approach taken

The current review considers population based screening for alcohol misuse in adults and was prepared by Solutions for Public Health, in discussion with the UK National Screening Committee (UK NSC).

The key questions addressed in the current review were developed by the UK NSC with input from Solutions for Public Health and are based on the key areas where alcohol misuse in adults did not meet the criteria for a population based screening programme in the 2010 UK NSC review. The current evidence summary was developed using a rapid review methodology and assessed using the UK NSC reporting checklist for evidence summaries. Its purpose is to update the evidence in the key areas of the test and the long term benefits of a population based

screening programme. The key questions and the UK NSC criteria to which they relate are presented in Table 1.

A systematic literature search of four databases was conducted by the UK NSC in June to July 2015[8] and updated in December 2015[9] for evidence published since January 2010. A total of 2,876 unique references were identified. A first sift by title and abstract was undertaken by the UK NSC information scientist for potential relevance to the review. Three hundred and ninety-one references were sent to Solutions for Public Health for further evaluation. Details of the databases searched, search terms and inclusion and exclusion criteria used for the initial screening of results are presented in the Search Strategy section at the end of this report.

Each section below provides information on the evidence selection process and number of included studies for the given criterion. Selection and appraisal of studies was undertaken by one reviewer. Any queries were resolved through discussion with a second reviewer.

Overall, 41 studies were identified as potentially relevant during title and abstract sifting and further assessed at full text. The main reason for excluding papers based on the title and abstract was that they did not address the key questions of interest in this review. For example, a study might consider an intervention or test for alcohol misuse but not in a context or population relevant to population based screening. Other reasons for excluding papers included studies about the epidemiology of alcohol misuse, attitudes to screening for alcohol misuse, the cost-effectiveness of screening, the practical process of implementing screening and the development of guidelines, none of which relate to the key questions for this review.

Of the 41 studies assessed at full text, 6 were included in the final analysis. These studies are discussed further in the sections below. The review was quality assured by a second senior reviewer who was not involved with the writing of the review in accordance with Solutions for Public Health's quality assurance process.

Table 1: Key questions for current review of screening for alcohol misuse in adults

Criterion[1]	Key Questions (KQ)	# Studies Included
4. There should be a simple, safe, precise and validated screening test.	A) Is there an independent gold standard against which the screening test can be measured?	0
5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.	B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?	6
11. There should be evidence from high quality randomised controlled trials that the screening programme is effective in reducing mortality or morbidity. Where screening aimed solely at providing information to allow the person being screened to make an "informed choice" (such as Down's syndrome or cystic fibrosis carrier screening), there must be evidence from high quality trials that the test accurately measures risk. The information that is provided about the test and its outcomes must be of value and readily understood by the individual being screened.	C) Is there any evidence demonstrating the long-term effectiveness of a population screening programme in improving morbidity, mortality, and reducing social harm?	0

[1] https://www.gov.uk/government/publications/evidence-review-criteria-national-screening-programmes/criteria-for-appraising-the-viability-effectiveness-and-appropriateness-of-a-screening-programme (January 2016)

Appraisal against UK NSC Criteria[†]

Description of the evidence

Each of the three key questions and their associated criteria are considered in turn below.

Each criterion was summarised as 'met', 'uncertain' or 'not met' by considering the results of the included studies in light of the volume, quality and consistency of the body of evidence. Several factors were considered in determining the quality of the identified evidence, including study design and methodology, risk of bias and applicability of the evidence.

Criterion 4: There should be a simple, safe, precise and validated screening test.

The 2010 UK NSC review found that no one gold standard had been used in developing questionnaires for alcohol screening. Reference standards that had been reported in different studies included the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria, diagnostic interviewing and questioning about alcohol consumption. The reliance of existing reference standards on self-reported behaviour and self-reported behaviour change which can potentially be manipulated by the person undertaking the test was also raised in the 2010 review. A number of markers were considered in the 2010 review, including the enzymes gamma-glutamyl transpeptidase, aminotransferase, alanisne aminotransferase, ratio and mean corpuscular volume of erythrocytes and carbohydrate-deficient transferring. Overall, these had relatively poor performance as screening tests[7].

Key Question A: Is there an independent gold standard against which the screening test can be measured?

Results

In the current review, of the 41 studies identified as potentially relevant during title and abstract sifting, 6 related to the use of biomarkers to detect alcohol use. The biomarkers discussed in these papers included ethyl glucuronide in hair and urine, ethyl sulfate in urine, phosphatidylethanol in blood, fatty acid ethyl esters in hair, phosphatidylethanols in breath, phosphatidylethanols carbohydrate-deficient transferrin and gamma-glutamyltransferase and metabolites in urine for detecting wine. An additional paper discussed changes to DSM criteria definitions. However, none of these studies were included after review of the full text as they did not consider test performance in a screening context or in a general population. Instead the context of these studies was about detecting alcohol abuse in case-control studies and monitoring abstinence or drinking behaviour, for example, in alcohol dependent patients.

Six additional studies assessing the performance of screening tests in general populations were identified and are discussed below in relation to Key Question C and presented in the appendix tables. As with the 2010 UK NSC review, this update review found that these studies used various diagnostic interviewing and questioning methods about alcohol use as the reference standard. These included the Schedules for Clinical Assessment in Neuropsychiatry (Lundin et al 2015[10]); the Time-Line Follow-Back and World Mental Health Composite International Diagnostic Interviews (in combination) (Foxcroft et al 2015[11]); the Time-Line Follow-Back (used singly)

[†] These criterion are available online at https://www.gov.uk/government/publications/evidence-review-criteria-national-screening-programmes/criteria-for-appraising-the-viability-effectiveness-and-appropriateness-of-a-screening-programme (January 2016)

(Aalto et al 2011[12]); the Time-Line Follow-Back and Diagnostic Interview Schedule (in combination) (Johnson et al 2013[13]) and The Composite International Diagnostic Interview (used singly) (Saitz et al 2014[14]).

Discussion

This review did not identify any new studies published since the last review to suggest that there is an independent gold standard for alcohol screening tests. As in the 2010 UK NSC review, the reference standards used in studies assessing the performance of screening tests were diagnostic interviewing and questioning about alcohol use using a range of different measures.

Summary: Criterion 4 not met

The review did not identify any new evidence establishing an independent gold standard marker against which alcohol screening tests can be measured. In the absence of such evidence this criterion remains unmet.

Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.

The 2010 UK NSC review[7] found that the Alcohol Use Disorder Identification Test (AUDIT[‡]) was the most extensively studied screening tool. The 2010 review cited an optimal screening threshold of 8+ for the detection of harmful alcohol intake in Caucasian men. However, the 2010 review also concluded that there was no one valid test that could be used for the whole population and that cut-off levels had yet to be defined for some subgroups of the population such as young people, women, ethnic minorities and people aged over 65.

Key Question B: Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?

Results

In the current review, of the 41 studies identified as potentially relevant during title and abstract sifting, 14 related to this criterion. After assessment of the full papers 6 studies assessing cut-off levels for alcohol screening tests were included. Other studies that were assessed at full text were excluded because they were about diagnostic rather than screening tests or because they had a case-control design so did not apply to screened populations.

In selecting studies for inclusion, studies assessing performance in general populations of relevance to population based screening were prioritised. Four of these considered AUDIT and AUDIT-C[§], for example, Lundin et al (2015)[10] explored their performance in a general population of men and women aged 20 to 64; Johnson et al (2013)[13] explored their performance in a primary care population of men and women; Foxcroft et al (2015)[11] explored their performance

[‡] The Alcohol Use Disorder Identification Test (AUDIT) is a self-reported screening test, developed by the World Health Organization[10]

[§] The Alcohol use Disorder Identification Test- Consumption (AUDIT-C) is a shortened version of AUDIT. It uses the first three questions of AUDIT which relate to frequency and amount of drinking and frequency of binge drinking[10]

in a general population of men and women aged 18 to 35; and Aalto et al (2015)[12] explored their performance in an older population aged 65 to 74. Two studies considered the performance of single question screening tests, for example, Mitchell et al (2014)[15] conducted a meta-analysis of one or two screening questions in primary care and Saitz et al (2014)[14] assessed the performance of single screening questions for adults in primary care.

Table 2 summarises the performance of the screening tests at the optimum cut-off levels identified in the studies. Overall, the studies considering the performance of AUDIT and AUDIT-C all achieved sensitivity scores of at least 64%, with most achieving scores of more than 80%. For specificity, the lowest score was 61% with most achieving scores of more than 70%. Positive predictive values (PPV) for AUDIT and AUDT-C varied from 21% to 78%. The meta-analysis of single screening questions included eight studies assessing performance for any defined alcohol problems and reported a pooled sensitivity of 55% and specificity of 87%. This resulted in a PPV of 53%. The additional study (published after the search date of the systematic review) achieved a higher sensitivity (88%), but a lower PPV (35%).

Further details of the studies (including 95% confidence intervals when reported) and a quality assessment of the studies using the Quality Assessment of Diagnostic Accuracy Studies (QUADAS-2) framework are provided in the appendix tables. The QUADAS-2 framework is used to assess the quality of primary test accuracy studies and includes domains on patient selection, the index test, the reference standard, test strategy flow and timing and applicability.

All of the included studies had a low possibility of bias in the patient selection and applicability domains. Three of the five studies assessed using QUADAS-2 used adequate blinding of assessors. In the remaining two studies, one did not use blinding and in the other this information was not provided. There were a number of areas where the included studies were at unclear or high risk of potential bias. All studies considered different cut-off levels to determine an optimum cut-off level, which may over-estimate test performance in an independent sample[16]. In addition, all studies used some form of diagnostic interview or questioning about alcohol use as the reference standard, and in all but one of the studies, not all participants in the study completed the reference standard interview which also means that not all participants were included in the analysis. Reasons for the non-completion of the reference standard interview, when stated, included loss to follow-up, refusal, loss of data due to a computer error, difficulty in arranging a suitable time and suspension of data collection by the researchers when they had completed a pre-determined target number of interviews.

Discussion

The 2010 UK NSC review found that AUDIT was the most extensively studied screening tool and this remains the case. For the studies identified in this review, all sensitivity and specificity scores were greater than 60% at the optimum cut-off level identified suggesting moderate test performance, although there was more variation in PPV which ranged from 21% to 78%. The interpretation of the results is complicated by differences in the level of alcohol misuse assessed, differences in the age ranges of the subgroups and the different tests and reference standards used.The 2010 review cited a systematic review on the performance of AUDIT for detecting ‘at risk’ drinking. At a cut-off level of <8, sensitivity ranged from 31% to 89% and specificity ranged from 83% to 96%. However, only one of the studies identified in the current review considered a cut-off level of more than 8 and this related to the detection of hazardous drinking.

The studies identified in the current review go some way towards addressing the limitations identified in the 2010 UK NSC review. For example they assess test performance for men and women and for different age groups in populations relevant to population based screening. However, the volume of new evidence was low (6 studies) and the number of participants in the subgroups varied considerably. We did not identify any studies assessing test performance for different ethnic groups. The studies were set in Sweden[10], Finland[12], the UK[11] and the US[13,14]. In the two studies that reported ethnicity, the majority of the sample was Caucasian.

For any one population subgroup, information on the optimum cut-off level comes from one individual study, and depends on the level of alcohol detection that is of interest. The high risk of potential bias in some areas, for example in the fact that not all participants completed the reference standard interview, also reduces confidence in the results. As such, there is insufficient information at present to conclude that there are agreed cut-off levels for subgroups of the population.

Summary: Criterion 5 not met

Some progress has been made since the 2010 UK NSC review in exploring suitable cut-off levels for subgroups of the population. However the volume of new evidence is low and variations in the subgroups considered limits the overall conclusions that can be drawn, for example, in the age range, tests and reference standards used and level of alcohol detection that is of interest. It cannot yet be said that suitable cut-off levels for the target population have been defined and agreed so this criterion is not met.

Table 2: Summary of the performance of screening tests in primary care populations

Screening Test	Alcohol use assessed	Reference Standard	Population	Optimal cut-off	Sensitivity	Specificity	PPV	NPV	Study
AUDIT	Any alcohol misuse	SCAN interview	Men aged 20 to 64 (n=452)	7	71%	82%	60%	88%	Lundin et al (2015)[10]
AUDIT	Any alcohol misuse	SCAN interview	Women aged 20 to 64 (n=638)	5	66%	82%	41%	93%	Lundin et al (2015)[10]
AUDIT	Hazardous drinking	TLFB and MHCIDI	Men aged 18 to 35 (n=138)	9	64%	82%	77%	71%	Foxcroft et al (2014)[11]
AUDIT	Hazardous drinking	TLFB and MHCIDI	Women aged 18 to 35 (n=282)	4	88%	67%	74%	85%	Foxcroft et al (2014)[11]
AUDIT	Heavy drinking	TLFB	Adults aged 64 to 75 (n=517)	5	86%	87%	---	---	Aalto et al (2011)[12]
AUDIT	Unhealthy alcohol use	TLFB and DIS	Men (n=119)	5	77%	76%	70%	83%	Johnson et al (2013)[13]
AUDIT	Unhealthy alcohol use	TLFB and DIS	Women (n=98)	3	86%	74%	57%	93%	Johnson et al (2013)[13]
AUDIT	Alcohol dependence	TLFB and DIS	Men (n=51)	6	84%	76%	43%	96%	Johnson et al (2013)[13]
AUDIT	Alcohol dependence	TLFB and DIS	Women (n=33)	4	88%	76%	28%	98%	Johnson et al (2013)[13]
AUDIT + binge drinking question	Unhealthy alcohol use	TLFB and DIS	Men (n=119)	6	82%	76%	71%	86%	Johnson et al (2013)[13]
AUDIT + binge drinking question	Unhealthy alcohol use	TLFB and DIS	Women (n=98)	4	87%	85%	71%	94%	Johnson et al (2013)[13]
AUDIT-C	Any alcohol misuse	SCAN interview	Men aged 20 to 64 (n=452)	6	66%	83%	59%	86%	Lundin et al (2015)[10]
AUDIT-C	Any alcohol misuse	SCAN interview	Women aged 20 to 64 (n=638)	4	80%	72%	34%	95%	Lundin et al (2015)[10]
AUDIT-C	Hazardous drinking	TLFB and MHCIDI	Men aged 18 to 35 (n=138)	5	82%	69%	71%	80%	Foxcroft et al (2014)[11]
AUDIT-C	Hazardous drinking	TLFB and MHCIDI	Women aged 18 to 35 (n=282)	4	82%	75%	78%	80%	Foxcroft et al (2014)[11]

AUDIT-C	Heavy drinking	TLFB	Adults aged 64 to 75 (n=517)	4	94%	80%	---	---	Aalto et al (2011)[12]
AUDIT-C	Unhealthy alcohol use	TLFB and DIS	Men (n=119)	4	82%	67%	63%	84%	Johnson et al (2013)[13]
AUDIT-C	Unhealthy alcohol use	TLFB and DIS	Women (n=98)	3	82%	76%	58%	91%	Johnson et al (2013)[13]
AUDIT-C	Alcohol dependence	TLFB and DIS	Men (n=51)	5	80%	74%	40%	95%	Johnson et al (2013)[13]
AUDIT-C	Alcohol dependence	TLFB and DIS	Women (n=33)	3	88%	65%	21%	98%	Johnson et al (2013)[13]
AUDIT-C	Alcohol dependence	CIDI	Adults (n=286)	3	92%	71%	23%	---	Saitz et al (2014)[14]
AUDIT-C + binge drinking question	Unhealthy alcohol use	TLFB and DIS	Men (n=119)	4	86%	61%	61%	86%	Johnson et al (2013)[13]
AUDIT-C + binge drinking question	Unhealthy alcohol use	TLFB and DIS	Women (n=98)	3	86%	74%	57%	93%	Johnson et al (2013)[13]
Single screening questions	Alcohol dependence	CIDI	Adults (n=286)	---	88%	84%	35%	---	Saitz et al (2014)[14]
Single screening questions	Defined alcohol problems	Interview	Adults (n=5,646)	---	55%	87%	53%	88%	Mitchell et al (2014)[15]

AUDIT – Alcohol Use Disorders Identification Test; AUDIT-C - Alcohol Use Disorders Identification Test – Consumption; CIDI - Composite International Diagnostic Interview; DIS – Diagnostic Interview Schedule; MHCID – Mental Health Composite International Diagnostic Interview; SCAN – Schedules for Clinical Assessment in Neuropsychiatry; TLFB – Time-Line Follow Back

Criterion 11. There should be evidence from high quality randomised controlled trials that the screening programme is effective in reducing mortality or morbidity. Where screening aimed solely at providing information to allow the person being screened to make an "informed choice" (such as Down's syndrome or cystic fibrosis carrier screening), there must be evidence from high quality trials that the test accurately measures risk. The information that is provided about the test and its outcomes must be of value and readily understood by the individual being screened.

In 2010, there was limited evidence that brief interventions can lead to reduced exposure to alcohol in the short to medium term in Caucasian men[7]. The key question for the current review is not to revisit the evidence on the effectiveness of brief intervention, but to search for evidence for the long-term effectiveness of a population based screening programme as this was considered a key limitation in the previous review.

Key Question C: Is there any evidence demonstrating the long-term effectiveness of a population screening programme in improving morbidity, mortality, and reducing social harm?

Results

In the current review, of the 41 studies identified as potentially relevant during title and abstract sifting, 20 related to this criterion. Review of the full text of these papers did not identify any studies that assessed the effectiveness of a population screening programme. The main reason for excluding studies at this stage was that they focused on the effectiveness of an intervention rather than the effectiveness of population screening. For example, Watson et al (2013)[17] examined the clinical and cost-effectiveness of stepped care intervention compared to minimal intervention for older alcohol users identified by opportunistic screening in primary care and Kaner et al (2013)[18] examined the effectiveness of screening and brief alcohol intervention in primary care. These studies did not randomly assign participants to screening or no screening. Instead all participants were screened and those with positive screening results were randomised to an intervention or control group. These studies therefore assess the effectiveness of an intervention, rather than the effectiveness of population based screening and do not provide any information to answer our key question on the effectiveness of a population based screening programme in improving morbidity, mortality and reducing social harm. Other reasons for excluding papers that were assessed at full text included studies that were about the effectiveness of implementation strategies for screening and intervention and studies reporting short-term effects on alcohol use rather than longer-term impact on morbidity and mortality.

Discussion

This review did not identify any studies on the long-term effectiveness of a population based screening programme in improving morbidity or reducing social harm.

Summary: Criterion 11 not met.

This review did not identify any studies considering the effectiveness of a population based screening programme for alcohol misuse in reducing mortality or morbidity. In the absence of such evidence this criterion is not met.

Conclusions and implications for policy

This report assesses population based screening for alcohol misuse in adults against select UK NSC criteria for appraising the viability, effectiveness and appropriateness of a screening programme. This review assessed key questions to determine if evidence published since 2010 supports a recommendation for population based screening for alcohol misuse in adults in the UK.

The volume, quality and direction of evidence published since January 2010 does not indicate that population based screening for alcohol misuse in adults should be recommended in the UK. Several uncertainties remain across key criteria, including:

- There is no agreed independent gold standard against which the screening test can be measured.
- Studies assessing test performance in different subgroups were identified. However there was insufficient evidence to conclude that there are agreed cut-off levels for different subgroups of the target population for population based screening.
- There is a lack of evidence that a population screening programme would improve morbidity and mortality or would reduce social harm.

Limitations

This rapid review update was conducted between January and March 2016. It considered studies listed in bibliographic databases. It did not include grey literature or hand searching of reference lists for additional papers. The review focused on specific questions agreed with the UK NSC relating to key points raised by the previous 2010 review. Overall there was an absence of studies that directly addressed the key questions of interest for population based screening for alcohol misuse.

Search strategy

Four literature searches on screening for alcohol misuse in adults were performed by Paula Coles, UK NSC Information Scientist in June – July 2015. All four search strategies were re-run in December 2015.

Searches 1,2 and 3 (June 2015)

SOURCES SEARCHED: Medline, Embase, PsychINFO and the Cochrane Library

DATES OF SEARCH: January 2010 – June 2015 (All searches carried out on 22nd June 2015)

SEARCH 1

1. (alcohol$ and screen$3).ti. (1135)
2. ((drink$ and screen$3) not water).ti. (207)
3. (CAGE and (alcohol or drink$)).ti. (96)
4. ((AUDIT or AUDIT C or AUDIT PC) and (alcohol or drink$)).ti. (173)
5. (FAST and (alcohol or drink$)).ti. (76)
6. (paddington alcohol test or (PAT and (alcohol or drink$))).ti. (7)
7. (Michigan alcohol screening test or (MAST and (alcohol or drink$))).ti. (30)
8. (5 shot or 5shot or fiveshot or five shot).tw. (12)
9. ((gamma-glutamyltransferase or GGT or Gamma GT) and alcohol).ti. (95)
10. ((carbohydrate-deficient transferrin or CDT) and alcohol).ti. (178)
11. ((mean corpuscular volume or MCV) and alcohol).ti. (23)
12. ((biochemical indicator$ or biochemical marker$) and alcohol$).ti. (57)
13. SASSI.tw. (38)
14. SASQ.tw. (10)
15. (ASSIST and alcohol$).ti. (22)
16. ((indicator$ or sign$ or correlate$) and alcohol).ti. (1025)
17. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (2862)
18. limit 17 to yr="2010 -Current" (891)
19. **SIGN Systematic review, RCT, observational study filters applied to 18 = 309**

SEARCH 2

1. 80. ((practitioner or professional or doctor) and intervention$ and alcohol$).ti. (8)
2. 81. (training and brief and intervention$).ti. (56)
3. 82. ((patient or client) and alcohol$ and screen$3).ti. (13)
4. 83. ((patient or client) and (alcohol$ and intervention$)).ti. (13)
5. 84. (accept$ and alcohol$).ti. (133)
6. 85. (manag$ and drink$3).ti. (122)
7. 86. (cop$3 and drink$3).ti. (212)
8. 87. (drink$3 behav$ and alcohol$).ti. (287)
9. 88. (treat$ and drink$3 behav$).ti. (22)
10. 89. ((practitioner or professional or doctor) and (patient or client)).tw. and alcohol.ti. (124)
11. 90. 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 (966)
12. 91. limit 90 to yr="2010 -Current" (307)
13. **SIGN systematic review, RCT and observational study filters applied to 12 = 114**

SEARCH 3

1. 80. (intervention$ and alcohol$).ti. (1390)

2. 81. ((hazardous drink$3 or harmful drink$3) and intervention$).ti. (42)
3. 82. (counsel$4 and alcohol$).ti. (188)
4. 83. ((excessive drink$3 or alcohol dependen$2) and brief intervention$).ti. (15)
5. 84. (alcohol$ and brief advice).ti. (15)
6. 85. (problem drink$3 and intervention).ti. (43)
7. 86. 80 or 81 or 82 or 83 or 84 or 85 (1655)
8. 87. limit 86 to yr="2010 -Current" (736)
9. SIGN systematic review, RCT and observational study filters applied to 8 = 418

	Search 1	**Search 2**	**Search 3**	**Total**
Medline	309	114	418	841
Embase	277	97	458	832
PsycINFO	701	225	566	1,492
Cochrane Library	---	---	---	1,066
Total				**4,231**

A further, simple search to update the UK epidemiological data used in the 2010 review was also carried out and retrieved 5 reports.

After automatic and manual de-duplication, 2,535 unique references were sifted by title and abstract for potential relevance to the review.

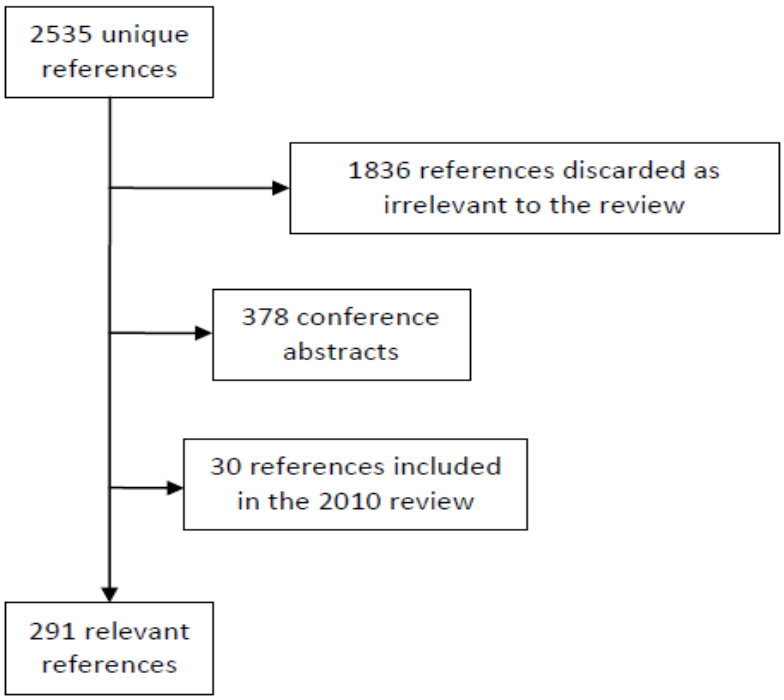
Inclusions

- General adult (over 18) population in UK, Europe, USA, Canada, Australia and New Zealand. If studies referring to adolescents or youths have been included, this is because people over the age of 18 have been included as a subgroup.
- Full text available in English

Exclusions

- Specific or high risk populations, e.g. university students, veterans, those with co-existing substance abuse problems etc.
- Those with comorbid psychiatric conditions
- Articles looking at macro-level interventions, such as alcohol pricing, advertising or alcohol outlet density
- Conference abstracts
- Non-English versions of questionnaires
- Protocols
- Full text not in English language

291 references were deemed to be potentially relevant.



The previous review had highlighted the limited evidence to verify whether a reduction in alcohol would improve morbidity, mortality or social harm. Therefore, an additional search was carried out, without the use of search filters, in order to widen the net for potentially relevant references in this area.

Search 4 (July 2015)

SOURCES SEARCHED: Medline, Embase, PsychINFO and the Cochrane Library

DATES OF SEARCH: January 2010 – July 2015 (All searches carried out on 23rd July 2015)

SEARCH STRATEGY:

1. Alcohol Drinking/ (54732)
2. Alcoholism/ (68844)
3. (hazardous drink$3 or harmful drink$3).tw. (1055)
4. (excessive drink$3 or alcohol dependen$2).tw. (10918)
5. problem drink$3.tw. (2534)
6. 1 or 2 or 3 or 4 or 5 (116796)
7. Alcohol Abstinence/ (152)
8. Temperance/ (2486)
9. Rehabilitation/ (16862)
10. Remission Induction/ (33351)
11. Secondary Prevention/ (15916)
12. (improve$ adj2 drinking).tw. (325)
13. ((reduction or reducing) adj2 alcohol adj2 consumption).tw. (527)
14. drinking status.tw. 599

15. (abstain$ or abstinence or abstention).tw. (21700)
16. 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 (89570)
17. Treatment Outcome/ (692710)
18. "Outcome Assessment (Health Care)"/ (52618)
19. "Quality of Life"/ (129051)
20. Morbidity/ 24236
21. Mortality/ (35888)
22. Social Problems/ (7378)
23. alcohol consumption.tw. (30819)
24. alcohol related problems.tw. (2078)
25. social harm$.tw. (179)
26. ((nondrinking or non-drinking) and outcome$).tw. (75)
27. outcome measure$.tw. (160962)
28. quality of life.tw. (169654)
29. well-being.tw. (44950)
30. (mortality or morbidity).tw. (628011)
31. 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 (1631213)
32. 6 and 16 and 31 (3669)
33. limit 32 to yr="2010 -Current" (1162)

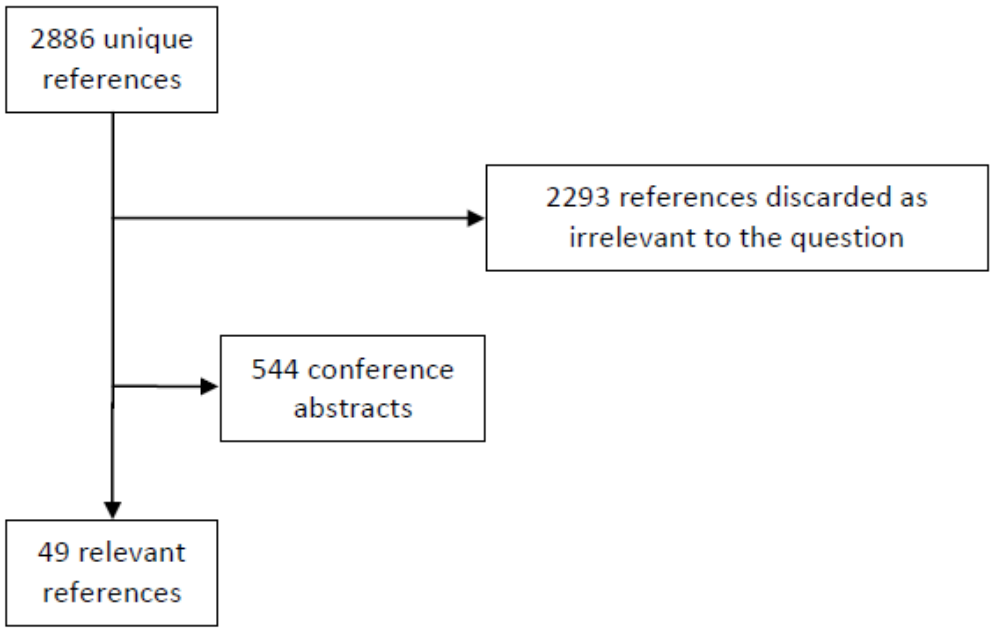
This strategy was also translated into Embase, PsycINFO and the Cochrane Library.

	Search 4
Medline	1,162
Embase	1,484
PsycINFO	997
Cochrane Library	433
Total	**4,076**

Inclusions

Studies that looked at whether stopping or reducing alcohol consumption actually improves outcomes relating to morbidity, mortality and social harm.

49 additional references were passed to the reviewer for further appraisal and possible inclusion in the final review.



December 2015 update

SOURCES SEARCHED: Medline, Embase, PsychINFO and the Cochrane Library

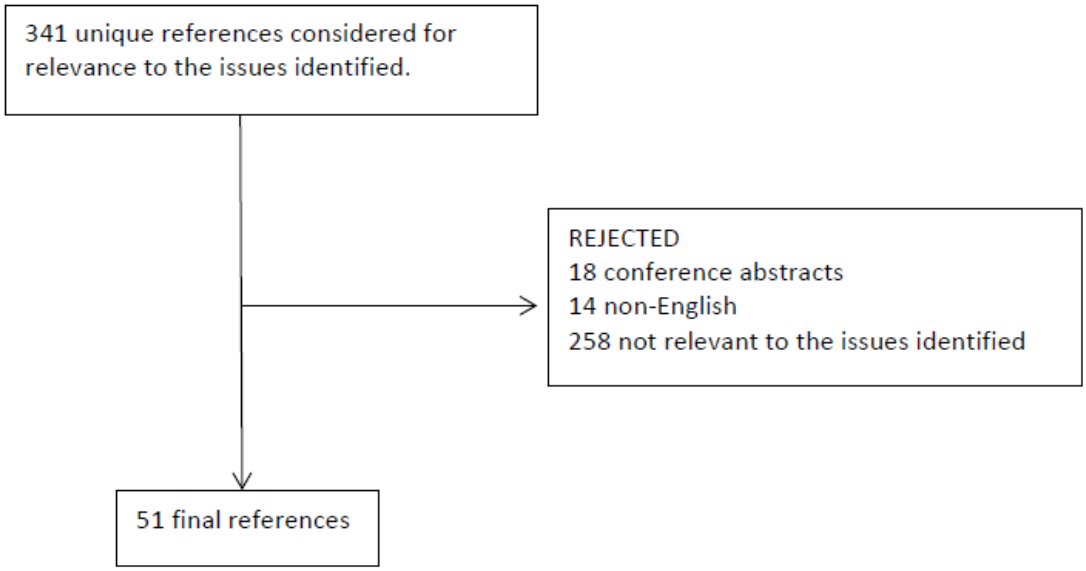
DATES OF SEARCH: January 2015 to December 2015 (all searches carried out on 10th December 2015)

SEARCH STRATEGY: (As searches 1, 2, 3 and 4 above)

	Search 1	**Search 2**	**Search 3**	**Search 4**	**Total**
Medline	41	24	68	99	232
Embase	42	18	65	185	310
PsycINFO	127	57	119	154	457
Cochrane Library	117			36	153
Total					**1,152**

After duplicates and studies retrieved by the previous searches were removed, 341 references were sifted by title and abstract against the same issues, inclusion and exclusion criteria described above.

51 references were deemed relevant to the issues highlighted and were passed to the reviewer for further appraisal and possible inclusion in the final review.


341 unique references considered for relevance to the issues identified.
REJECTED
18 conference abstracts
14 non-English
258 not relevant to the issues identified
51 final references

Appendices

Appendix number	1
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Lundin A. Hallgren M. Balliu N. Forsell Y. The use of alcohol use disorders identification test (AUDIT) in detecting alcohol use disorder and risk drinking in the general population: validation of AUDIT using schedules for clinical assessment in neuropsychiatry. Alcoholism: Clinical and Experimental Research 2015, 39(1): 158-165
Study details	Cohort study
Study objectives	Assessing the performance of AUDIT and AUDIT-C in a general population.
Inclusions	A random sample of Stockholm residents who returned a postal questionnaire.
Exclusions	N/a
Population	Adults aged 20 to 64 living in Stockholm (n= 10,441) who returned a postal questionnaire. Of these, 1,492 were invited to an interview and 1,093 completed the interview (885 screen positive; 208 screen negative). Ethnicity not reported.
Test	AUDIT and AUDIT-C
Comparator	The Schedules for Clinical Assessment in Neuropsychiatry interview was used as the reference standard. This uses DSM-IV criteria to assess alcohol dependence and alcohol abuse.
Results	The sensitivity and specificity of AUDIT and AUDIT-C was reported for selected cut-off levels. Confidence intervals were not reported. The AUDIT results for identification of any alcohol misuse at the optimal cut-off levels for men and women were: **Men** Optimal cut-off: 7 Sensitivity: 71% Specificity: 82% PPV: 60% NPV: 88% **Women** Optimal cut-off: 5 Sensitivity: 66% Specificity: 82% PPV: 41% NPV: 93% The AUDIT-C results for identification of any alcohol misuse at the optimal cut-off point for men and women were:

	Men Optimal cut-off: 6 Sensitivity: 66% Specificity: 83% PPV: 59% NPV: 86%	**Women** Optimal cut-off: 4 Sensitivity: 80% Specificity: 72% PPV: 34% NPV: 95%

Quality appraisal

Question	Assessment (Y, N, unclear)	Risk of Bias (low, high, unclear)	Supporting info
Domain I: Patient selection			
Consecutive or random sample of population enrolled?	Y	Low	Random sample
Case-control design avoided?	Y	Low	
Inappropriate exclusions avoided?	Y	Low	
Domain II: Index Test			
Index test results interpreted without knowledge of reference standard results?	Y	Low	AUDIT test results were analysed before interview took place
Threshold pre-specified?	N	High	Various cut-off levels were assessed
Domain II: Reference standard			
Reference standard likely to correctly classify condition?	Unclear	Unclear	Reference standard was a diagnostic interview
Reference standard results interpreted without knowledge of index test results?	Y	Low	Interviewers were blind to the AUDIT result
Domain IV: Test strategy flow and timing			
Appropriate interval between index test and reference standard?	Y	Low	Median time between postal questionnaire and interview was 30 days
Did all participants receive same reference	N	High	A sample of people completing the questionnaire were offered an interview and

standard?			73% completed the interview
All patients included in analysis?	N	High	Not all study participants completed the interview
Applicability			
Applicable to UK screening population of interest?	Y	Low	General population sample (Sweden)
Applicable to UK screening test of interest?	Y	Low	
Target condition measured by reference test applicable to UK screening condition of interest?	Y	Low	

Other comments

AUDIT was completed as part of a larger questionnaire with questions on psychiatric symptoms, traits, stressful life events and work-related factors. This may have affected people's responses.

Appendix number	2
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Foxcroft DR. Smith LA. Thomas H. Howcutt S. Accuracy of Alcohol Use Disorders Identification Test for Detecting Problem Drinking in 18-35 year olds in England: Method Comparison Study. Alcohol and Alcoholism 2015, 50(2): 244-250
Study details	Cohort study
Study objectives	Assessing the performance of AUDIT in a general population of young adults.
Inclusions	Adults aged 18 to 35 randomly selected from primary care lists.
Exclusions	N/a
Population	Young adults, aged 18 to 35, registered at 14 primary care practices in England. Of 14,480 invited to participate, 1,022 returned the questionnaire and 420 completed an interview. Population 86% Caucasian.
Test	AUDIT and AUDIT -C
Comparator	A telephone interview using the Time-Line Follow-Back interview to assess quantity and frequency of alcohol consumption in the past 90 days and the World

	Mental Health Composite International Diagnostic Interview to assess alcohol abuse, alcohol dependence and alcohol use disorders were used as the reference standard.
Results	The sensitivity and specificity of AUDIT and AUDIT-C was reported for selected cut-off levels. The AUDIT results for identifying hazardous drinking at the optimal cut-off levels for men and women were: **Men** Optimal cut-off: 9 Sensitivity: 64% (95%CI 52% to 76%) Specificity: 82% (95%CI 71% to 90%) PPV: 77% (95%CI 64% to 87%) NPV: 71% (95%CI 60% to 80%) **Women** Optimal cut-off: 4 Sensitivity: 88% (95%CI 82% to 93%) Specificity: 67% (95%CI 59% to 75%) PPV: 74% (95%CI 67% to 80%) NPV: 85% (95%CI 76% to 91%) The AUDIT-C results for identifying hazardous drinking at the optimal cut-off levels for men and women were: **Men** Optimal cut-off: 5 Sensitivity: 82% (95%CI 71% to 90%) Specificity: 69% (95%CI 57% to 79%) PPV: 71% (95%CI 60% to 81%) NPV: 80% (95%CI 68% to 89%) **Women** Optimal cut-off: 4 Sensitivity: 82% (95%CI 75% to 88%) Specificity: 75% (95%CI 67% to 82%) PPV: 78% (95%CI 70% to 84%) NPV: 80% (95%CI 72% to 86%) AUDIT and AUDIT-C results for detecting alcohol abuse (DSM-IV), alcohol dependence (DSM-IV) and alcohol use disorder (DSM-V) were also reported separately. For men the optimal cut-off levels ranged from 10 to 12, with sensitivity ranging from 48% to 67% and specificity ranging from 74% to 86%. For women the optimal cut-off levels ranged from 5 to 7, with sensitivity ranging from 63% to 72% and specificity ranging from 56% to 74%.

Quality appraisal

Question	Assessment (Y, N, unclear)	Risk of Bias (low, high, unclear)	Supporting info
Domain I: Patient selection			
Consecutive or random sample of population enrolled?	Y	Low	A random selection of eligible patients were invited from each practice
Case-control design avoided?	Y	Low	
Inappropriate exclusions avoided?	Y	Low	
Domain II: Index Test			

Index test results interpreted without knowledge of reference standard results?	Y	Low	AUDIT test results were analysed before interview took place
Threshold pre-specified?	N	High	Various cut-off levels were considered
Domain II: Reference standard			
Reference standard likely to correctly classify condition?	Unclear	Unclear	Reference standard was a diagnostic interview
Reference standard results interpreted without knowledge of index test results?	Y	Low	Interviews were blind to the AUDIT result
Domain IV: Test strategy flow and timing			
Appropriate interval between index test and reference standard?	Y	Low	Interviews were conducted within 2 weeks of the completion of AUDIT
Did all participants receive same reference standard?	N	High	626 (61%) of participants consented to take part in an interview. 420 (41% of the overall sample) were interviewed
All patients included in analysis?	N	High	420 (41% of the overall sample) completed an interview
Applicability			
Applicable to UK screening population of interest?	Y	Low	UK general population
Applicable to UK screening test of interest?	Y	Low	
Target condition measured by reference test applicable to UK screening condition of interest?	Y	Low	

Other comments

AUDIT was completed as part of a larger general lifestyle questionnaire. This may have affected people's responses.

The researchers stopped conducting interviews when they had reached a pre-determined target sample size of 420 people. Therefore 206 people who consented to an interview were not interviewed due to difficulties in arranging a suitable time or because data collection was stopped after the target timeframe of 2 weeks.

Appendix number	3
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Aalto M. Alho H. Halme JT. Seppä K. The alcohol use disorders identification test (AUDIT) and its derivatives in screening for heavy drinking among the elderly. International Journal of Geriatric Psychiatry 2011, 26: 881-885
Study details	Cohort study
Study objectives	Assessing the performance of AUDIT in a general population of elderly adults.
Inclusions	A random sample of Finnish residents who accepted an invitation to a health check.
Exclusions	N/a
Population	Adults aged 64 to 75 living in three geographical areas of Finland. A random selection of residents was sent a postal questionnaire and an invitation to a health check. The AUDIT screening test and reference standard interview were performed at the health check. Complete data was available for 517 people of the 577 who arrived for the health check and the 528 who completed AUDIT. Ethnicity not reported.
Test	AUDIT, AUDIT-C
Comparator	The Time-Line Follow-Back Interview was used as the reference standard.
Results	The sensitivity and specificity of AUDIT and AUDIT-C was reported for selected cut-off levels (95% confidence intervals not reported). For identifying heavy drinking at the optimal cut-off levels for people aged 64 to 75 were: • AUDIT: optimal cut-off =5; sensitivity = 86%; specificity = 87% • AUDIT-C: optimal cut-off =4; sensitivity = 94%; specificity = 80% Alternative versions of AUDIT (AUDIT-QF and AUDIT-3) were assessed but were judged not to be accurate enough for screening in this age group due to low sensitivity.

Quality appraisal

Question	Assessment (Y, N,	Risk of Bias (low, high,	Supporting info

	unclear)	**unclear)**	
Domain I: Patient selection			
Consecutive or random sample of population enrolled?	Y	Low	Population was a age group sub-set of randomly selected people who completed a postal questionnaire
Case-control design avoided?	Y	Low	
Inappropriate exclusions avoided?	Y	Low	
Domain II: Index Test			
Index test results interpreted without knowledge of reference standard results?	Y	Low	
Threshold pre-specified?	N	High	Various cut-off levels assessed
Domain II: Reference standard			
Reference standard likely to correctly classify condition?	Unclear	Unclear	Reference standard was a diagnostic interview
Reference standard results interpreted without knowledge of index test results?	Y	Low	Interviewers were blind to the AUDIT results
Domain IV: Test strategy flow and timing			
Appropriate interval between index test and reference standard?	N	High	Index test and reference standard performed on the same day
Did all participants receive same reference standard?	N	High	90% of participants attending for the health check completed the interview and were included in the analysis
All patients included in analysis?	N	High	90% of participants attending for the health check completed the interview and were included in the analysis
Applicability			
Applicable to UK screening population of interest?	Y	Low	General population sample (Finland)
Applicable to UK	Y	Low	

screening test of interest?			
Target condition measured by reference test applicable to UK screening condition of interest?	Y	Low	

Other comments

Appendix number	4
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Johnson JA. Lee A. Vinson D. Seale JP. Use of AUDIT-based measures to identify unhealthy alcohol use and alcohol dependence in primary care: a validation study. Alcoholism: Clinical and Experimental Research 2013, 37(S1):E253-E259
Study details	Cohort study
Study objectives	Assessing the performance of AUDIT and AUDIT-C in a primary care population.
Inclusions	Primary care patients attending 1 of 5 US primary care centres.
Exclusions	N/a
Population	Patients from 5 US primary care centres (n=625). Patients were recruited from waiting rooms and interviewed after their primary care appointment. Population was 61% Caucasian and 38% African American.
Test	AUDIT (singly or in combination with a question on binge drinking); AUDIT-C
Comparator	The Time-Line Follow Back Interview and the Diagnostic Interview Schedule were used as the reference standard.
Results	The sensitivity and specificity of AUDIT and AUDIT-C was reported for selected cut-off levels (95% confidence intervals not reported). The AUDIT results for identifying unhealthy alcohol use at the optimal cut-off levels for men and women were: **Men** Optimal cut-off: 5 Sensitivity: 77% Specificity: 76% PPV: 70% NPV: 83% **Women** Optimal cut-off: 3 Sensitivity: 86% Specificity: 74% PPV: 57% NPV: 93%

When AUDIT was combined with a question about 30-day binge drinking the results for identifying unhealthy alcohol use at the optimal cut-off levels for men and women were:

Men	**Women**
Optimal cut-off: 6	Optimal cut-off: 4
Sensitivity: 82%	Sensitivity: 87%
Specificity: 76%	Specificity: 85%
PPV: 71%	PPV: 71%
NPV: 86%	NPV: 94%

The AUDIT-C results for identifying unhealthy alcohol use at the optimal cut-off points for men and women were:

Men	**Women**
Optimal cut-off: 4	Optimal cut-off: 3
Sensitivity: 82%	Sensitivity: 82%
Specificity: 67%	Specificity: 76%
PPV: 63%	PPV: 58%
NPV: 84%	NPV: 91%

When AUDIT-C was combined with a question about 30-day binge drinking the results for identifying unhealthy alcohol use at the optimal cut-off levels for men and women were:

Men	**Women**
Optimal cut-off: 4	Optimal cut-off: 3
Sensitivity: 86%	Sensitivity: 86%
Specificity: 61%	Specificity: 74%
PPV: 61%	PPV: 57%
NPV: 86%	NPV: 93%

AUDIT and AUDIT-C results for alcohol dependence were also reported separately (95% confidence intervals not reported.

The AUDIT results for identifying alcohol dependence at the optimal cut-off levels for men and women were:

Men	**Women**
Optimal cut-off: 6	Optimal cut-off: 4
Sensitivity: 84%	Sensitivity: 88%
Specificity: 76%	Specificity: 76%
PPV: 43%	PPV: 28%
NPV: 96%	NPV: 98%

The AUDIT-C results for identifying alcohol dependence at the optimal cut-off levels for men and women were:

Men	**Women**
Optimal cut-off: 5	Optimal cut-off: 3
Sensitivity: 80%	Sensitivity: 88%
Specificity: 74%	Specificity: 65%
PPV: 40%	PPV: 21%
NPV: 95%	NPV: 98%

Quality appraisal

Question	Assessment (Y, N, unclear)	Risk of Bias (low, high, unclear)	Supporting info
Domain I: Patient selection			
Consecutive or random sample of population enrolled?	Y	Low	Consecutive sample
Case-control design avoided?	Y	Low	
Inappropriate exclusions avoided?	Y	Low	
Domain II: Index Test			
Index test results interpreted without knowledge of reference standard results?	N	High	Index test and reference standard performed at the same time by the same interviewer
Threshold pre-specified?	N	High	Various cut-off levels assessed
Domain II: Reference standard			
Reference standard likely to correctly classify condition?	Unclear	Unclear	Reference standard was a diagnostic interview
Reference standard results interpreted without knowledge of index test results?	N	High	Index test and reference standard performed at the same time by the same interviewer
Domain IV: Test strategy flow and timing			
Appropriate interval between index test and reference standard?	N	High	Index test and reference standard performed at the same time by the same interviewer
Did all participants receive same reference standard?	Y	Low	
All patients included in analysis?	Y	Low	
Applicability			
Applicable to UK screening population of	Y		Primary care population (US)

interest?			
Applicable to UK screening test of interest?	Y		
Target condition measured by reference test applicable to UK screening condition of interest?	Y		

Other comments

Appendix number	5
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Saitz R. Cheng DM. Allensworth-Davies D. Winter MR. Smith PC. The ability of single screening questions for unhealthy alcohol and other drug use to identify substance dependence in primary care. Journal of Studies of Alcohol and Drugs 2014, 75: 153-157
Study details	Cohort study
Study objectives	To assess the effectiveness of single screening questions in detecting alcohol dependence.
Inclusions	Adults attending a US primary care clinic.
Exclusions	People aged under 18 years; people who were not patients of the clinic; people who were unable to participate in an interview due to limited English, acute illness or cognitive impairment.
Population	Patients recruited from the waiting room of one primary care clinic. Of the 394 people eligible, 303 (77%) completed the interview. Data from 14 participants was lost due to a computer error leaving 286 records for analysis. Ethnicity not reported.
Test	Single screening questions; AUDIT-C
Comparator	The computerized version of The Composite International Diagnostic Interview was used as the reference standard.

Results	The sensitivity and specificity for single screening questions to detect alcohol dependence at the optimal cut-off level ≥8 times have had 5 or more drinks in a day in the past year (or 4 or more drinks for women): • Sensitivity: 88% (95% CI 69% to 97%) • Specificity: 84% (95%CI 79% to 89%) • PPV: 35% (95%CI 23% to 48%) • NPV not reported. The AUDIT-C results for identifying alcohol dependence at the optimal cut-off level of 3 were: • Sensitivity: 92% (95% CI 74% to 99%) • Specificity: 71% (95%CI 65% to 76%) • PPV: 23% (95%CI 15% to 33%) • NPV not reported.

Quality appraisal

Question	Assessment (Y, N, unclear)	Risk of Bias (low, high, unclear)	Supporting info
Domain I: Patient selection			
Consecutive or random sample of population enrolled?	Y	Low	Consecutive sample
Case-control design avoided?	Y	Low	
Inappropriate exclusions avoided?	Y	Low	
Domain II: Index Test			
Index test results interpreted without knowledge of reference standard results?	Unclear	Unclear	Information not provided
Threshold pre-specified?	N	High	Various cut-off levels assessed
Domain II: Reference standard			
Reference standard likely to correctly classify condition?	Unclear	Unclear	Reference standard was a diagnostic interview
Reference standard results interpreted without knowledge of index test results?	Unclear	Unclear	Information not provided

Domain IV: Test strategy flow and timing			
Appropriate interval between index test and reference standard?	Unclear	Unclear	Information not provided
Did all participants receive same reference standard?	N	High	77% of those eligible completed the interview
All patients included in analysis?	N	High	77% of those eligible completed the interview. Data from 14 participants was lost due to a computer error
Applicability			
Applicable to UK screening population of interest?	Y		Primary care population (US)
Applicable to UK screening test of interest?	Y		
Target condition measured by reference test applicable to UK screening condition of interest?	Y		

Other comments

Participants were also asked about their use of other substances. Only results relating to alcohol use are reported. Participants also completed the Time-Line Follow-Back interview; however the authors state that the Composite International Diagnostic Interview was used as the reference standard.

Appendix number	6
Relevant criteria	**Criterion 5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.**
Relevant Key question	**B) Is there a suitable test for population screening, with agreed cut-off levels for subgroups of the population?**
Publication details	Mitchell AJ. Bird V. Rizzo M. Hussain S. Meader N. Accuracy of one or two simple questions to identify alcohol-use disorder in primary care. British Journal of General Practice, July 2014 e408-e418
Study details	Meta-analysis of 8 studies
Study objectives	Assessing the performance of 1 or 2 question screening tests to detect alcohol use disorder.

Inclusions	Studies published up to January 2014 assessing the diagnostic accuracy of simple verbal questions to identify people with defined alcohol problems in primary care with a robust interview used as the criterion standard. No language restriction.
Exclusions	Studies not meeting the inclusion criteria.
Population	People attending primary care
Intervention/ test	Single question on alcohol use; two questions on alcohol use
Comparator	Interview was used as the reference standard (using DSM or ICD alcohol use disorder criteria
Results	The meta-analysis results for a single-question test were: • Sensitivity: 54.5% (95%CI 43.0% to 65.5%) • Specificity: 87.3% (95%CI 81.5% to 91.5%) • PPV: 53.3% (95%CI 48.0% to 58.5%) • NPV: 87.8% (95%CI 85.9% to 89.5%) The meta-analysis results for a two question test were: • Sensitivity: 87.2% (95%CI 69.9% to 97.7%) • Specificity: 79.8% (95%CI 75.7% to 83.6%) • PPV: 53.4% (95%CI 49.4% to 57.6%) • NPV: 95.9% (95%CI 94.6% to 97.0%)
Comments	The authors assessed the quality of each included study using the QUADAS checklist. The authors concluded that neither a single or two-question approach is recommended alone due to poor positive clinical utility for case finding but might be of use if combined with longer screening tool.

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[9] Cole P. Literature search in screening for alcohol misuse in adults. UK National Screening Committee, December 2015
[10] Lundin A. Hallgren M. Balliu N. Forsell Y. The use of alcohol use disorders identification test (AUDIT) in detecting alcohol use disorder and risk drinking in the general population: validation of AUDIT using schedules for clinical assessment in neuropsychiatry. Alcoholism: Clinical and Experimental Research 2015, 39(1): 158-165
[11] Foxcroft DR. Smith LA. Thomas H. Howcutt S. Accuracy of Alcohol Use Disorders Identification Test for Detecting Problem Drinking in 18-35 year olds in England: Method Comparison Study. Alcohol and Alcoholism 2015, 50(2): 244-250
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