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Screening in brief intervention trials targeting excessive drinkers in general practice: systematic review and meta-analysis

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Abstract

Objective To determine the effectiveness of programmes of screening in general practice for excessive alcohol use and providing brief interventions.

Design Systematic review and meta-analysis of randomised controlled trials that used screening as a precursor to brief intervention.

Setting General practice.

Main outcome measures Number needed to treat, proportion of patients positive on screening, proportion given brief interventions, and effect of screening.

Results The eight studies included for meta-analysis all used health questionnaires for screening, and the brief interventions included feedback, information, and advice. The studies contained several sources of bias that might lead to overestimates of the effects of intervention. External validity was compromised because typically three out of four people identified by screening as excessive users of alcohol did not qualify for the intervention after a secondary assessment.

Overall, in 1000 screened patients, 90 screened positive and required further assessment, after which 25 qualified for brief intervention; after one year 2.6 (95% confidence interval 1.7 to 3.4) reported they drank less than the maximum recommended level.

Conclusions Although even brief advice can reduce excessive drinking, screening in general practice does not seem to be an effective precursor to brief interventions targeting excessive alcohol use. This meta-analysis raises questions about the feasibility of screening in general practice for excessive use of alcohol.

Introduction

General practitioners are strongly encouraged to identify and intervene with patients whose alcohol consumption is hazardous or harmful to their health. Screening using standardised questioning and brief interventions consisting of a few minutes of feedback, information, and advice are promoted for that purpose.¹⁻³

Intervention can work and has been reviewed,⁴⁻¹⁰ but studies of the effects of interventions ignore the many patients who screen positive but are excluded,

especially before randomisation.¹¹ The effectiveness of screening as a precursor to brief intervention has not been systematically evaluated.

This review aims to answer the question, how effective is screening in general practice for locating patients who consume excessive amounts of alcohol and can benefit from brief interventions and change their drinking to within sensible limits?²

Methods

We used the basic review and meta-analysis principles recommended by the Cochrane collaboration and the principles of mapping attrition set out by Feinstein.^{12 13}

Identifying studies

AB and TT searched the electronic databases, checked reference lists of earlier reviews and retrieved papers, hand searched, and consulted European experts. They then defined a final electronic search strategy, given on bmj.com. They also defined inclusion criteria for trials (box). Medline, Embase, PsycInfo, Cochrane, and ETOH databases were searched without time limits for reports in English language on controlled trials.

Assessing validity

We assessed validity in two ways: firstly by looking for selection bias, performance bias, attrition bias, and detection bias in the studies included in our meta-analysis (internal validity), and secondly by looking at losses from the screenable population in all selected studies (external validity).^{12 13}

Assessing outcomes

Absolute risk reduction (in this case an increase in benefit) shows the difference between experimental and control groups in the proportions of people drinking below weekly limits at follow up. All calculations were intention to treat, and 12 months was a typical follow up period.¹⁴

Number needed to treat equals 1 divided by the absolute risk reduction. Negative values indicate harm and positive values indicate benefit. For example, an NNT of +20 means that an extra patient benefits for every 20 patients treated with the "new intervention."¹⁵

Screening effect—To describe the effect of screening we estimated the number of positive events per 1000 patients screened. This figure shows the proportion of patients who will benefit from the programme.

Summarising effects across studies

We used the fixed effect Mantel-Haenszel pooling method and the matching heterogeneity statistic for combining results from the different studies.¹⁶

Results

Inclusion and description of studies

Nineteen papers were included in our assessment of external validity (table 1). We mapped these studies according to the different types of attrition from screening to follow up and estimated the numbers for each type of attrition. In general, a high percentage of patients who screened positive were excluded by protocol, refused further participation, or were not included for unspecified reasons during a secondary assessment carried out by a researcher and taking place before the randomisation.

Studies included for meta-analysis

Two of the 19 studies did not report the number screened to obtain subjects for randomisation.^{17 18} Another nine did not report an event outcome measure (fifth criteria, box). These 11 studies were excluded from our meta-analysis.¹⁹⁻²⁷ The meta-analysis included eight of the largest studies (table 2); one of these was a subgroup analysis that did not contribute to the pooled effect values.²⁸

For screening, all eight studies used general health or lifestyle questionnaires that included questions on alcohol consumption. Questionnaires were provided to patients when they came to visit their doctor. Four studies also invited patients by mailing out questionnaires,^{29 30-32} and one study telephoned patients.³⁰

The interventions ranged from a 10 minute consultation^{29 32} to up to five consultations lasting 5-20 minutes.³³ The intervention protocols all included feedback on present drinking, education on risk and strategies for changing drinking, and the practitioner's advice to cut down on drinking.

Methodological quality

Table 3 shows the four key components of study validity.^{12 16} One study randomised four participating

Criteria for including studies

- Focus on excessive alcohol use (hazardous or harmful drinking) but not focus on a specific disease and not focus on alcohol dependency
- Recruitment involved screening or a procedure similar to screening
- Brief interventions were studied (minutes (not hours) of interaction) in general practice settings (not in hospital wards, not in emergency rooms, not in ad hoc research clinics)
- A randomised controlled design was used to compare outcome of a brief intervention with outcome of no/less intervention
- Studies were included for meta-analyses if they reported at least one discrete outcome measure reflecting a clinically significant change in alcohol consumption (an experimental event) and reported the number screened to obtain the study sample

practices rather than patients³⁰ and another one used weekly shifts between intervention and control periods.³³ All studies found sufficient blinding impossible.

In general, follow up rates were high and the US studies all had follow up of 85% or more.^{28 30 34 35} The TrEAT group studies^{28 34 35} did not state their sample size considerations; their goal for consumption after treatment was more liberal than the criteria for excess drinking at screening, and follow up rates differed considerably between allocation groups in two of these studies (90% v 97%; $P = 0.0002$ ³⁴ and 94% versus 100%; $P = 0.039$ ²⁸; table 3). The large UK study by Wallace et al had a lower follow up rate for the male intervention group (83% v 89%; $P < 0.05$).³¹

Heterogeneity

The studies varied slightly regarding inclusion criteria and baseline prevalence. However, the outcome results were not significantly different (test for heterogeneity $\chi^2 = 8.9$, $df = 6$, $P = 0.18$).

Intervention effect and assessment efforts

The pooled absolute risk reduction was 10.5% (95% confidence interval 7.1% to 13.9%; table 4); hence the pooled number needed to treat (NNT) was 10 (7 to 14). NNTs of single studies ranged from 5 to 61, and all results favoured intervention to some degree.

Table 1 Participation and losses from positive screening to follow up in 19 general practice brief intervention studies on patients who screened positive for excessive alcohol use (arranged by size of the available group)

First author (year)	No of participants	No of non-receptive patients	No of patients excluded or not eligible	No of patients not accessible	No of patients lost for reasons not clearly specified
Wallace (1988) ³¹	748	1761	1664	281	0
Fleming (1997) ³⁴	723	1096	63	190	853
Ockene (1999) ³⁰	481	41	945	293	0
Maisto (2001) ²⁷	250	1045	42	51	0
Richmond (1995) ³³	197	286	64	59	195
Manwell (2000) ²⁸	174	276	0	0	280
Senft (1997) ¹⁹	414	20	41	84	102
Aalto (2001) ²¹	202	362	0	0	94
Fleming (1999) ³⁵	146	272	232	6	0
Cordoba (1998) ¹⁸	229	0	0	0	317
Anderson (1992) ³²	100	245	40	34	0
Aalto (2000) ²⁰	78	235	0	0	40
Scott (1990) ²⁹	50	195	93	14	0
Burge (1997) ²²	175	58	49	44	0
Seppa (1992) ²³	95	87	118	0	0
McIntosh (1997) ²⁴	143	106	0	16	0
Romelsjo (1989) ²⁵	72	33	151	1	1
Tomson (1998) ²⁶	72	27	120	3	0
Heather (1987) ¹⁷	104	?	?	?	?

Table 2 Characteristics and results of studies of screening and brief intervention in general practice for excess alcohol consumption included for meta-analysis

Study (country; participants)	Screening method and when administered	Definition of excessive drinking*	No screened; screened positive (%); randomised (%)	Mean (SD) drinks per week at baseline	Intervention	Treatment goal (maximum drinks*/week)	Follow up period	Difference between groups for main outcomes as reported in the paper
Manwell (USA; women aged 18-40) ²⁸	Lifestyle questionnaire administered during consultation	>11/week or ≥5/occasion; 2 positive answers to CAGE	5979; 730 (12); 205 (3.4)	14 (9)	Physician advice (15 min)×2; telephone booster×2; self help material	13	4 years	Change in No of drinks/week: -1.7 (P=0.0039)† ARR for binge drinking: 3.4% (P=0.0021)† ARR for drinking above limits: 11% (P=0.05)†
Scott (UK; women aged 17-69) ²⁹	Health questionnaire administered during consultation; some patients invited for first screening by mail or telephone	>17/week	11521; 384 (3.3); 104§ (0.9)	30 (10)	Physician advice (10 min)×1; self help material	12	1 year	Change in No of drinks/week: -1.1 (NS) ARR for binge drinking: 1.6% (NS) ARR for drinking above limits: 3.3% (NS)
Fleming (USA; men and women aged over 65) ⁴⁵	Health questionnaire administered during consultation	>11/week or ≥4/occasion (men), >8/week or ≥4/occasion (women); or 2 positive answers to CAGE	6073; 656 (11); 158 (2.6)	16 (9)	Physician advice (10-15 min)×2; telephone booster ×2; self help material	20 (men), 13 (women)	1 year	Change in No of drinks/week: -5.3 (P<0.001)‡ ARR for binge drinking: 59% (P<0.005)‡ ARR for drinking above limits: 63% (P<0.005)‡
Ockene (USA; men and women aged 21-84) ³⁰	Health questionnaire administered during consultation; some patients invited for first screening by mail or telephone	>12/week or ≥5/occasion (men), >9/week (women); or ≥4/occasion or 2 positive answers to CAGE	9772; 1760 (18); 530 (5.4)	20 (15) men; 13 (7) women	Physician or nurse advice (5-10 min)×1; self help material	12 (men), 9 (women)	0.5 year	Change in No of drinks/week: -2.4 (P=0.001) ARR for binge drinking: 5.0% (P=0.32) ARR for drinking above limits: 20% (P=0.01)
Fleming (USA; men and women aged 18-65) ³⁴	Health questionnaire administered during consultation	>14/week (men), >11/week (women)	17695; 2925 (17); 774 (4.4)	22 (13) men; 15 (10) women	Physician advice (15 min)×2; telephone booster ×2; self help material	20 (men), 13 (women)	1 year	Change in No of drinks/week: -3.5 (P<0.01)‡ ARR for binge drinking: 17% (P<0.02)‡ ARR for drinking above limits: 30% (P<0.001)‡
Richmond (Australia; men and women aged 18-70) ³³	Health questionnaire administered during consultation	>29/week (men), >17/week (women)	13017; 894 (6.9); 378§ (2.9)	42 (24) men; 22 (14) women	Physician advice (5-20 min)×1-5; self help material	23 (men), 12 (women)	1 year	Change in consumption: -0.3 (NS) Temporary effect on problem score
Wallace (UK; men and women aged 17-69) ³¹	Health questionnaire administered during consultation; some patients invited for first screening by mail	>22/week (men), >13/week (women)	62153; 4454 (7.2); 909 (1.5)	42 (21) men; 24 (12) women	Physician advice (few min)×1-5; self help material	22 (men), 13 (women)	1 year	Change in No of drinks/week: men -6.7 (P<0.001); women -3.5 (P<0.05) ARR for drinking above limits: men 18% (P<0.001); women 18% (P<0.05)
Anderson (UK; men aged 17-69) ³²	Health questionnaire administered during consultation; some patients invited for first screening by mail	>29/week	8483; 524 (6.2); 259§ (3.1)	44 (11)	Physician advice (10 min)×1; self help material	18	1 year	Change in No of drinks/week: -5.4 (P<0.06) ARR for binge drinking: 30% (P<0.05) ARR for drinking above limits: 13% (P<0.05)

ARR=absolute risk reduction; NS=not significant; CAGE is a four questions screening test (Cut-down contemplations, Annoyed by criticism, Guilt after drinking, and use of Eye-opener to steady nerves).

*Number of standard drinks (12 g alcohol) per week or per occasion.

†P values based on repeated measures test.

§More than two arms in study.

‡P values apply to tests for difference in means or homogeneity of proportions.

All NNT values have to be interpreted in the light of the screening and assessment activity that took place to establish the trial sample as well as the character of the outcome in question. Nine per cent of patients (12327/134693; range in individual studies, 3.3% to 18%) screened positive; further assessment identified 2.5% (3317/134693; range 0.9% to 5.4%) who were given brief interventions.

Screening effectiveness and programme outcome

The pooled screening effect was 2.6 (1.7 to 3.4) patients per 1000 screened for achieving sensible drinking (table 4).

The figure shows the results of the single studies and the pooled estimate. All results favour screening

and intervention to some degree, the results seem to be quite homogeneous, and the pooled estimate is clearly significant.

Discussion

If a practitioner screens 1000 patients, carries out further assessment in 90 patients (9%) who screen positive, and gives feedback, information, and advice to 25 (2.5%) who qualify for brief intervention, two or three patients can be expected to have reduced their alcohol consumption to below recommended maximum levels after 12 months.

Table 3 Quality of studies included in meta-analysis

First author	Sample size	Validity assessment criteria			
		Randomisation (selection bias)	Blinding (performance bias)	Follow up (attrition bias)	Sample size calculations (detection bias)
Manwell ²⁸	205	++	-	+ (97%; I=C)	-
Scott ²⁹	104	++	+ (research staff)	+ (69%; I=C)	++
Fleming ³⁵	158	+	-	++ (92%; I=C)	-
Ockene ³⁰	530	- (4 practices)	+ (research staff)	++ (91%; I=C)	+
Fleming ³⁴	774	++	-	+ (93%; I=C)	-
Richmond ³³	378	- (weekly shifts)	+ (research staff)	+ (69%; I=C)	++
Wallace ³¹	909	+	+ (research staff)	- (82%; I=C)	++
Anderson ³²	192	++	+ (research staff)	+ (65%; I=C)	++

Selection bias: Randomisation quality and description of randomisation (- not justified, + fully described or valid procedure, ++ described and valid procedure)

Performance bias: Blinding and description of blinding; includes between groups detection bias (- no blinding, + single blinded, ++ double blinded)

Attrition bias: Follow up rate and differences between intervention group (I) and controls (C): (- <85% and different rates, + ≥85% or no difference, ++ ≥85% and no difference)

Detection bias (regarding multiple outcome measures): Sample size calculated and justified (- not justified, + partially justified, ++ fully justified)

Methodological considerations

We discovered several sources of bias, all tending towards overestimation of effect: impossibility of blinding patients and practitioners, combined with self reported outcome measures³⁶; three papers did not report their sample size calculations and redefined excessive drinking at follow up^{28 34 35}; one paper, which reported better results than the others, had a shorter follow up³⁰; and the two largest studies may have been affected by attrition bias.^{31 34} Self selection (through mailed and telephone invitations) in some studies^{29 30-32} may have compromised their external validity.

Pooled numbers needed to treat derived from meta-analyses can be misleading.³⁷ For NNTs to be comparable, they must define patients' condition and its severity and the intervention, its outcome, and the setting, which they did in the present analysis. Nevertheless cultural, age, and sex differences should be taken into consideration, and single studies might contribute valuable information that should not be eclipsed by pooled estimates. Although the study by Anderson and the TrEAT trial both attempted to exclude people who were highly dependent on alcohol, the nature of the "events" might differ between men who drink heavily (included if > 29 drinks; mean consumption 44 drinks, goal 18; screening effect 3.7 per 1000)³² and less heavy drinkers (included if > 14 drinks; mean 22, goal 20; screening effect 2.6 per 1000).³⁴

Although positive net benefit is still possible when the screening effect is 2.6 per 1000 screened, screening for excessive drinking is in keen competition with

other proposals for screening. A recent paper points out that a doctor in primary care needs 7.4 hours per working day to provide the preventive services recommended by US Preventive Services Task Force.³⁸ Family doctors would have to give up other activities to free resources for a programme that would result in safer drinking habits for only a handful of their patients.

Drinking and general practice

The literature on brief intervention documents that a patient who is drinking excessively may reduce their alcohol consumption once a practitioner speaks to them. But if change occurs in only two or three of 90 patients who screened positive and were assessed further, the practitioner who screened 1000 patients to find those 90 could perceive this as a 97% disappointment rate.

Conversations about drinking may take place in many ways in general practice. Future research might focus on how a well established helping relationship can cover drinking related problems and risks in a way that benefits the patient and appeals to the practitioner.

In the meantime, we propose a focus on the fact that information and advice is sometimes helpful, especially when rapport has been established, the agenda agreed on, and assessment of drinking lies naturally within the doctor's role. To help patients change their lifestyle, practitioners need and want supplementary training. These processes of improving good clinical practice could also be considered complex interventions, and trials could be developed accordingly.

Table 4 Outcomes in studies included in meta-analysis. Values in parentheses are 95% confidence intervals

Study	Intervention group (EER)*	Control group (CER)*	Absolute risk reduction (%) (EER-CER)	Number needed to treat (1÷ARR)	Proportion (%) of screened patients given intervention†	Screening effect‡
Manwell ²⁸	83/103	71/102	11.0 (-0.9 to 22.5)	9 (4 to -113)	3.43	3.8 (-0.3 to 7.7)
Scott ²⁹	9/33	10/39	1.6 (-18.1 to 21.9)	61 (5 to -6)	0.90	0.1 (-1.6 to 1.9)
Fleming ³⁵	66/87	44/71	13.9 (-0.5 to 27.9)	7 (4 to -195)	2.60	3.6 (-0.1 to 7.3)
Ockene ³⁰	102/274	66/256	11.4 (3.5 to 19.1)	9 (5 to 28)	5.42	6.2 (1.9 to 10.3)
Fleming ³⁴	277/392	247/382	6.0 (-0.6 to 12.5)	17 (8 to -171)	4.37	2.6 (-0.3 to 5.5)
Richmond ³³	16/96¶	13/93¶	2.7 (-7.8 to 13.1)	37 (8 to -13)	2.90	0.8 (-2.3 to 3.8)
Wallace ³¹	116/448	48/459	15.4 (10.5 to 20.4)	6 (5 to 10)	1.46	2.2 (1.5 to 3.0)
Anderson ³²	14/80	4/74	12.1 (1.8 to 22.4)	8 (4 to 54)	3.05	3.7 (0.5 to 6.8)
Subtotal (pooled estimate)	600/1410	432/1374	10.5 (7.1 to 13.9)	10 (7 to 14)	2.46	2.6 (1.7 to 3.4)

Test for heterogeneity: $\chi^2=8.9$, df=6, P=0.18; test for overall effect: z=6.03, df=1, P<0.0001.

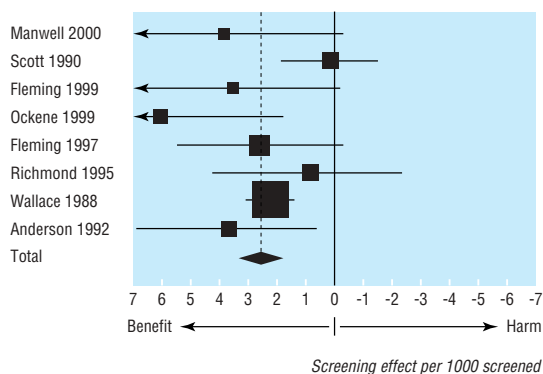
*Proportions of sensible drinkers at follow up.

†Number randomised=number screened.

‡Screening effect=ARR×(% given intervention)/1000.

§This trial had 6 months' follow up.

¶Calculated from percentages given in text (not found in tables of article).



Effect of screening for excessive drinking: number of patients with a positive outcome (reduction in drinking to below maximum recommended limits) per 1000 screened

Conclusions

Although even brief advice can make a difference, this review calls into question the model of universal screening in general practice as a case finding approach.

Future research should focus on other ways of addressing excessive drinking among patients in general practice. More attention should be paid to the skills required for successful interviewing, exchange of information, advice giving, and counselling.

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What is already known on this topic

Even a few minutes of feedback, information, and advice by a general practitioner can make some excessive drinkers change to alcohol consumption within sensible consumption limits

General practitioners are strongly encouraged to screen their patients and intervene with those whose alcohol consumption is hazardous or harmful to their health

What this study adds

The internal and external validity of trials of screening based brief interventions is questionable

Only one in four patients who screen positive for excessive drinking qualify for brief intervention after further assessment

Only two to three patients per thousand screened will benefit from the laborious activities entailed in screening