Optimizing Delivery of Health Care Interventions (ODHIN)

Knowledge base of successful implementation of screening and brief intervention for lifestyle issues in every day routine primary health care practice

Deliverable 2.1, Work Package 2: Knowledge base

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CONTENT

List of Abbreviations

95%-CI	95% Confidence Interval
CBA	Controlled Before-After study
CCT	Controlled Clinical Trial
CFIR	Consolidated Framework for Implementation Research
DALYs	Disability Adjusted Life Years
DL random effects model	DerSimonian and Laird (DL) random-effects model
EMR	Electronic Medical Records
EPOC	Cochrane Effective Practice and Organisation of Care
EU	European Union
GRADE	Grades of Recommendation, Assessment, Development and Evaluation
GP	General Practitioner
ITS	Interrupted Time Series
OR	Odds Ratio
PHC	Primary HealthCare
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
QOF	Quality of Outcomes Framework
QUORUM	Quality of Reporting of Meta-analyses
R-AMSTAR	Revised Assessment of Multiple Systematic Reviews
RCT	Randomised Controlled Trial
RD	Risk Difference
SBI	Screening and Brief Intervention
WP	Work Package

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ABSTRACT

Objective: To complete literature reviews to assess the impact of different behavioural, organisational and financial strategies in changing healthcare provider behaviour across a range of clinical lifestyle interventions.

Methods: Three reviews were done as described in the protocol. Firstly, the (cost-) effectiveness of professional educational and reimbursement strategies on lifestyle and prevention targeted at health professionals were reviewed (review of reviews) as well as the (cost-) effectiveness of e-health strategies on lifestyle and prevention targeted at patients/citizens. Secondly, a review and meta-regression of trials on implementing screening and brief interventions for hazardous and harmful alcohol consumption in primary healthcare was completed. Thirdly, results of the review of trials were compared with other reviews on lifestyle issues such as smoking, non-exercise and unhealthy diet.

Results: The review of reviews showed that none of the categories of educational, financial, e-health or multifaceted oriented interventions was consistently effective on changing behaviour of professionals or patients. Nevertheless, overall trends were identified. Reviews of multi-component implementation strategies suggested that synergy was created in implementation effectiveness by combining different types of implementation strategies, especially when strategies were finetuned to implementation barriers. Furthermore, the evidence base with regard to professional educational and e-health interventions regarding lifestyle interventions showed positive results on provider and patient level. The effect of financial oriented interventions remains inconclusive and needs further investigation.

The results from the review of trials confirmed our presumption that implementation strategies significantly increased the uptake of screening and brief interventions by healthcare providers. In patients' alcohol consumption level we saw a positive trend which was not statistically significant. Meta-regression analysis suggested that application of implementation strategies from multiple implementation domains or levels (e.g. professional education compared with patient oriented strategy like patient feedback) was more effective than using strategies from a single domain on improving screening and brief interventions at the provider level. On the patient level, combining patient oriented with professional and/or organisational oriented strategies showed strongest effect.

The comparative narrative review revealed findings on some implementation strategies of the whole spectrum that could be compared to the trials included in the 2nd review (review of trials): 1) The use of electronic medical records showed positive trends, but were not statistically significant in either of the studies from the review of trials as well as from this comparative review; 2) Both reviews showed a strong effectiveness of multi-component implementation strategies; 3) Both reviews showed that professional educational strategies are likely to be effective amongst a range of lifestyles; 4) Evidence about organisational oriented strategies to enhance implementation of lifestyle interventions was hardly found.

Discussion, conclusion and recommendations: The results presented in these reviews highly agree overall literature about implementation science. Implementation strategies have statistically significant effect on the provision of prevention and health promotion activities of care providers. On the patient level, only some implementation strategies have proven effects regarding lifestyle interventions. Multi-component implementation strategies tailored at identified implementation barriers seem to have positive effect on the healthcare provider as well as on patients. In addition, there were strong indications that professional education is effective, but the effect size varies per lifestyle topic. Besides, optimal education intensity was not identifiable. However, it seemed important that professional education was delivered in the practice setting and applied a stepwise problem solving approach, and that involving professionals with various backgrounds is likely to give synergy in effects (e.g. in general practice). Evidence about optimal education intensity was inconclusive. Evidence from especially the review of trials indicated that combining patient oriented as well as professional and/or organisational oriented implementation strategies was of significant added value, compared to only professional oriented strategies, on the patient alcohol consumption.

Recommendations for practice:

- Successfully changing professional behaviour with regard to SBI does not automatically result in a reduction of patients' alcohol consumption. Therefore we recommend the use of multi-component oriented implementation strategies including the patient level as well as the professional and/or organisation level.
- Involving professionals with various backgrounds in the professional oriented implementation strategy is likely to be more effective on screening behaviour than involvement of just one professional discipline.

Recommendations for further research:

- Evaluate effects on both the levels of provider screening and brief interventions as well as patients' alcohol consumption.
- It needs some time to firstly change healthcare provider behaviour and subsequently influencing patient behaviour. This requires long-term trials, measuring the effects on the short term, after 3 and 6 months and long-term after 12, 18 and even 24 months.
- Investigate effectiveness of financial oriented implementation strategies, as there is a clear knowledge gap in that field
- Investigate to what extent other providers in primary healthcare besides GP's can be involved in, since many trials involve solely GPs.
- Cost-effectiveness of different implementation strategies should be further investigated.
- Determinants of effective implementation strategies should be further investigated. For example: what is the optimal intensity of an educational intervention aimed at nurses and GPs to stimulate screening and brief interventions for hazardous and harmful alcohol use; what is the optimal intensity of financially incentivising general practices in stimulating them to do screening and brief interventions; what factors of

e-health strategies determine the effectiveness at patient level. In addition, applied implementation strategies in studies should be described in more detail.

1.INTRODUCTION

The last decades, non-communicable diseases increasingly contribute to global Disability Adjusted Life Years (DALYs). The global top 3 of DALYs are caused by are ischaemic heart disease, lower respiratory infections, and stroke, respectively, which all are non-communicable diseases [1]. Unhealthy life habits contribute to many non-communicable diseases (e.g. cardiovascular disease, diabetics, chronic lung diseases and cancers), which imply high disease burden as well as high use of healthcare [2, 3]. Mortality due to non-communicable diseases was mainly caused by cardiovascular diseases (48%), cancers (21%), chronic respiratory diseases (12%) and diabetes (3%) in 2008 [4]. These conditions are strongly linked with four behaviours: tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol [5].
In the past decades various effective lifestyle interventions have been developed to help patients and citizens to change unhealthy lifestyle habits. For example, brief interventions and nicotine replacement therapies have shown to be successful to stop smoking [6, 7]. Screening and brief interventions (SBI) for harmful and hazardous alcohol consumption also showed positive effects on alcohol consumption [8]. More recently e-health interventions (a broad category of tools and activities that use modern information technology) have proven to be effective [9]. The numbers needed to treat and the cost-effectiveness of lifestyle interventions seem promising [2, 10]. The next logical step is to implement these cost-effective interventions widely and sustainably, but this has proven to be a major challenge (e.g. [11-14]).

In order to build on, and substantially add to, previous studies on the implementation of lifestyle interventions, it is important to review the evidence base. Previous reviews of a range of different strategies have shown that a variety of implementation strategies result in small to moderate improvements [15-25]. Quality of care improvement requires specific implementation strategies aiming at reduction of barriers and gaining facilitators of high-quality of care [26]. Research identified a range of barriers to implement lifestyle interventions including insufficient knowledge and skills (18-20), absence of adequate reimbursement [26, 27] and lack of available healthcare workers to apply the interventions in daily practice [26, 28]. The current evidence base does not provide strong guidance to decision makers on the best approach to implementation of alcohol-related life style interventions.

Objectives

The overall objective is to bridge the gap between evidence base clinical research and everyday clinical practice by building a knowledge base on how SBI for lifestyle issues can be successfully disseminated and implemented in everyday routine practice. The focus of the application and this work package is on primary health care and on hazardous and harmful alcohol consumption, nonetheless the presumption is that this knowledge base can be translated to the dissemination and implementation of SBI for other lifestyle issues and in other healthcare settings. The following two objectives have been specified:

1. To identify effective strategies to disseminate and implement SBI in primary care settings.
2. To identify factors in the interventions and in the context in which these are applied, which foster or limit dissemination and implementation SBI in primary care settings.

This set of reviews attempts to gain insight in the mechanisms of determinants effecting lifestyle behaviours, with harmful and hazardous alcohol consumption as a study in one of the reviews. In achieving this, a set of three reviews were completed.

Firstly, the review of reviews focused on the (cost-) effectiveness of professional educational and reimbursement strategies on lifestyle and prevention targeted at health professionals were reviewed (review of reviews) as well as the (cost-) effectiveness of e-health strategies on lifestyle and prevention targeted at patients/citizens.

Secondly, a review of trials concering prevention of hazardous and harmful alcohol use was adopted. The European Union (EU) has the highest alcohol consumption of the world: in 2009, the average adult (aged 15+ years) alcohol consumption in the EU was 12.5 litres of pure alcohol. Moreover, Alcohol consumption is the third world leading cause of diseases and premature death [29]. In primary care, screening [30] and brief intervention programs have proven to be effective in reducing alcohol consumption [31-35], with a mean reduction of 38 grams of alcohol per week (three to four glasses of wine)[8]. Despite the evidence for efficacy and cost-efficacy of SBI in PHC, these interventions are not well implemented in routine practice [11]. Commonly, less than 10% of the population at risk are identified, and less than 5% of those who could benefit are offered SBI in PHC settings [11]. In this review of trials we focused on randomized controlled trial papers reporting on the effects of implementation strategies on alcohol consumption in primary care.

Thirdly, in a comparative narrative review, results of the review of trials were compared with other reviews on lifestyle issues such as smoking, non-exercise and unhealthy diet in order to provide recommendations about effective implementation strategies to improve lifestyle interventions in primary care.

1.1 READING GUIDE

This report describes three reviews. For each of the three reviews, we describe methods, results and conclusions separately. First a review of reviews, is reported. To follow step 2, a review of trials, and step 3, in which the review of trials is compared with reviews focused on other lifestyle risk factors, are described. After reporting for the three reviews separately, in section 5 we give our overall discussion, conclusions and recommendations.

Subsequently, references and appendices are reported in sections 6 and 7, respectively.

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Deliverable 2.1, Work Package 2: Knowledge base, Step 1: Review of reviews

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2. WP2 Step 1: review of reviews

2.1 WP2 Step 1 Methods

Data sources and searches

This study comprises a systematic synthesis of reviews (a so called "review of reviews") to gain up-to-date insight into the published evidence in the field of implementing prevention and lifestyle strategies. To do so, we conducted searches in Pubmed and the Cochrane Library from January 2006 till March 2012. The search was split up and combined into four sets by the Boolean operator AND:

Set 1: quality improvement; improvement; improving intervention(s); educational; e-learning; internet-based learning; ICT; information technology; financial; pay for performance; reimbursement; contracting; transparency

Set 2: systematic reviews; meta-analysis

Set 3: smoking; alcohol; exercise; diet

Set 4: prevention; health promotion

Furthermore suggestions of experts in the field of implementation research were assessed.

The search strings for both Pubmed and Cochrane Library are attached in section 2.4.

Study selection

Two reviewers (MK, ML) independently screened resulting citations based on title and abstract. Reviews were considered if they included studies from implementation strategies aimed at (qualified) health professionals and prevention workers and covered education; financial reimbursement or e-health singly or as part of multi-component implementation strategies. We focused on these strategies, as they would be assessed in the ODHIN WP5 trial. Included reviews could report on implementation strategies in all sectors of healthcare and public health. Furthermore, reviews of literature had to be based on a systematically literature search. Reviews were excluded if they didn't measure professional or patient outcomes in an empirical way or if they were narrative literature overviews.

Subsequently, the eligible reviews were obtained full text and independently assessed by two reviewers (MK, MB) using a data-extraction template (see appendix in section 2.4). Disagreements of inclusion were resolved by discussion with a third reviewer (ML).

In many papers the literature reviews contained quantitative evaluations with parallel control groups (randomized or not randomized). We assessed the quality of identified systematic reviews, but poor methodological quality of reviews was not an exclusion criterion.

Data extraction and narrative analysis

Identified reviews were prioritized by implementation strategy i.e. educational, financial reimbursement, e-health or multi-component studies including one of these strategies. E-health reviews were included in this review of reviews because they are considered as structural interventions in terms of changes to the setting/site of service delivery, or changes in physical structure, facilities and equipment.

From each eligible review, data were captured on first author, aim of the review, topic of the review, setting, patient group, implementation strategy (i.e. rationale and intensity of interventions), participants, number of studies included, results, conclusions of authors and applied process measures. Determinants of effects was the primary item for data collection. Subsequently quality of systematic reviews were assessed with the R-AMSTAR instrument for quality of reviews: a (revised) assessment tool for the quality of multiple systematic reviews [3]. This tool consists of 11 items, each with various criteria which have to be satisfied with a minimum score of 11 and maximum of 44 points. The instrument has good face and content validity for measuring the methodological quality of systematic reviews [3]. Also some risks of bias were included in this instrument.

Data synthesis and analysis

Included studies were assessed on a) general study characteristics; b) the method of reporting effectiveness, c) key findings and, if applicable, outcomes for which an effect and statistical significance could be calculated; d) effects for subgroups or subcomponents of reviewed implementation strategies outcomes and in the absence of an overall effect. Using a structured narrative analysis, we classified possible beneficial effects of implementation strategies into five categories of overall beneficial effect, ranging from '– –' to a '++' score, based on the strengths of effect. The reviews containing quantitative outcome measures were given higher weight in final conclusions.

To give in-depth insight in effective implementation strategies, we also identified effective elements of implementation interventions such as location of education, group size with education, financial reimbursement system, etc. In addition, to give an insight into the way implementation strategies are being undertaken and organised in order to stimulate prevention and health promotion of lifestyle activities, also important process measures such as attitudes, costs of implementation, etc. were described besides the provider and patient outcomes.

We present findings of effectiveness for each of the above described implementation strategies. We based our way of reporting on guidelines as described by the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses; formerly QOUROM statement [36, 37].

2.2 WP2 STEP 1 RESULTS

The search strategy resulted in 404 unduplicated citations of reviews, which were screened on the basis of title and abstract. 62 reviews seemed to fulfill the inclusion criteria and were obtained full text for further inclusion. Subsequently 5 reviews did not include our implementation strategies of interest and were also excluded. In the end, 44 reviews were included for this review of reviews, accounting for 747 individual studies. The flow chart of study inclusion is shown in figure 1. Characteristics of the included reviews are shown in table 1. Where hampering or facilitating factors for implementation were found, they were described.

Professional education strategies

Review characteristics

There were nine reviews that included studies focusing on implementation of improving lifestyle behaviours. These ten reviews accounted for 226 included studies of which 219 unique studies. In the educational oriented reviews, three meta-analyses were carried out.

All reviews were targeted at educating health professionals. After scoring the R-AMSTAR instrument, the mean methodological quality of all reviews was 30, with a range of 20 to 37 points. Included educational focused reviews were published between 2006 and 2011. Five reviews did not have language restrictions or publication restrictions. The number of included studies varied broadly from one to 81 studies. Moreover, design of included studies varied from exclusively included RCT's [15, 24, 38] to exclusively included before-and-after designs [39]. With respect to reported outcome measures, six reviews intended to report patient outcomes and all nine reviews intended to report outcomes of health professionals. Furthermore six reviews also intended to report process outcomes and only one review intended to include cost outcomes but failed. Lastly, one review was specifically focused on breast feeding and one review specifically focused on alcohol prevention; other reviews had no specific disease focus.

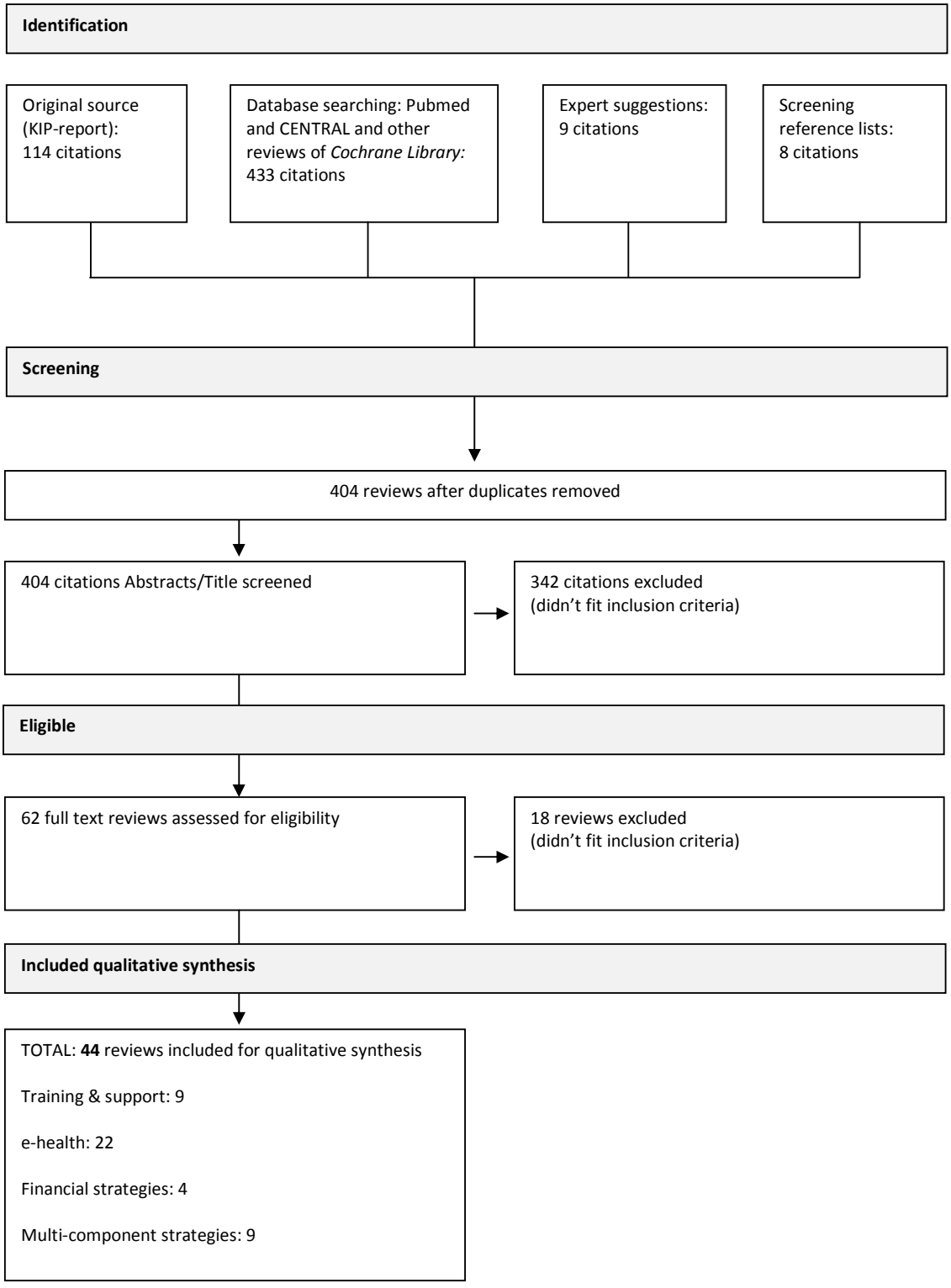
Effectiveness

The effectiveness of educational strategies varied, but were primarily supporting a positive effect of this type of implementation strategy (6 studies). Three studies had mixed effects of educational implementation strategies.

With regard to effective elements, effective education activities mainly were located in practice settings and peer trainers delivered the education. Furthermorea stepwise problem solving strategy seemed to be an effective and therewith important element of effective educational activities.

We attempted to identify most optimal intensity of education, however, if reported, the reviews included a wide range of applied intensities for different topics. The intensity ranged from just 1 session [40] to weekly visits for 12 months [24], and from 20 minutes per session [40] to 3 days [39].

Fig. 1: WP2 Step 1 study eligibility flow chart



Financial strategies

Review characteristics

The financial category included four reviews accounting for 37 individual studies. This category had the lowest number of reviews included and no meta-analyses were carried out. All reviews in this category were targeted at health professionals. The R-AMSTAR score was on average 30, ranging from 24 to 35. The included reviews were published in 2007, 2009, 2011 and 2012. Three reviews had a broad focused search strategy including no language restriction. Just one also did not have a publication restriction. The number of included studies were consistent, ranging from seven to 13 studies per review. Different kinds of designs were included: RCT's, CBA's, and ITS. The reviews also were consistent in their reported outcome measures. All reviews reported provider-related outcomes, three reported patient outcomes and two reported process outcomes. Two reviews reported about costs of the intervention, the other two intended but did not report after all.

Furthermore, all reviews had general target subjects of their intervention: pay for performance, financial incentives or pharmaceutical policies not specifically disease targeted.

Effectiveness

Three of the financial oriented reviews showed mixed results and one review had not studies of target base payment included and had therefore no applicable effect. The reviews hugely varied in terms of payment characteristics: stand-alone system (i.e. project-based), regionally or nationally based; both absolute and relative payment systems were described; and both primary and secondary care were included. However, it was not possible to extract effective elements due to lack of evidence. We neither could say it is effective, nor ineffective.

Support for implementation of e-health

Review characteristics

We found 22 reviews describing e-health interventions. Together they included 437 studies with 87 duplicates, resulting in 350 individual studies. Most of these reviews described patient outcomes, just some also included provider and process outcomes. The category of e-health had the lowest average quality score among the categories of this review: 27 with a range of 14 to 39. As e-health is relatively new in the field, all reviews were fairly recently published. The focus of included reviews regarding language and publication restrictions were on average equally distributed. All reviews also varied greatly in the number of included studies- ranging from 2 to 85 included studies which includes all kinds of designs. Subjects of reviews were very divergent. For example: coronary heart disease [41], sexual health promotion [42] and substance abuse [43-49]. Furthermore, reviews were focused at healthcare setting interventions as well as general population interventions. Costs were reported in three reviews.

Effectiveness

The majority of e-health oriented reviews showed positive or strong positive effects (13 studies), although nine studies yet show mixed effects. Reviews primarily described whether the e-health interventions were effective, there was a minimal focus on effective elements of

the interventions. However, it still seems that effective e-health interventions are interactive and incorporate for example feedback opportunities. This is relates to another effective element, which is that tailoring to users' health behaviour is significant. Ways to tailor are peronsalised web pages and adopting to the stage of change of the e-health user. Lastly, motivational interventions seemed to be effective.

Multi-component implementation

Review characteristics

The category of multi-component interventions accounted for 9 included reviews. These reviews included in total 162 studies with 18 duplicate studies between reviews, resulting in 144 unique studies. Most studies provided patient and provider outcomes, and just some also reported process measures. The multi-component oriented reviews had the highest R-AMSTAR quality score of 30, ranging from 25 to 38. Dates of publishing differed from 2002 to 2010 and had very different kinds of research designs. Almost half of the included reviews had a narrow focus concerning language and publication restrictions. Others had broader foci, for example no language restrictions in the search strategy. The number of studies included did not vary greatly; ranging from four to 33 included studies. In just two reviews the included studies were appropriate to pool. Furthermore, different kinds of subjects were focused on. General as well as very theme-specific, e.g. reducing caesarean section rates. Lastly, just two reviews also reported on cost data.

Effectiveness

Most included reviews (7 studies) supported a positive effect of multi-component implementation strategies, just two concluded mixed effects. Within the reviews that included more types of implementation strategies, numbers of components are used in delivering interventions. One element was assessed as not effective (as stand alone), which is the passive dissemination of guidelines. On the other hand, number of other elements were effective: audit and feedback, outreach visits or education or continuing medical education, reminders, local consensus procedures or opinion leaders, multidiscipinary teams, financial interventions and organisational interventions. Moreover, tailoring to the implementation barriers identified, is a relative very effective part of multi-component interventions. It is important to note that these elements all were part of multi-component implementation strategies. Therefore it could not be said that the elements were effective on stand alone.

Furthermore we notice that within multi-component reviews, elements are identief as effective, while they were not effective as stand alone interventions. For example, within the category of financial oriented interventions, there were strong mixed results. When combined with other kinds of implementation strategies, they might be effective.

Table 1 Characteristics of reviews included WP2 Step 1

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
Educational oriented implementation strategies						
Akl et al 2008[38]	35	1 study: 1 RCT	All settings; the effect of educational games on health professionals' performance, knowledge, skills, attitude and satisfaction, and on patient outcomes; educational games	Qualitative reporting	*Patient outcomes:* Statistically significant difference in main effect of knowledge retention (delayed post-test score) in the gaming reinforcement group compared with the control group (p=0.02). Significant interaction effect between gaming reinforcement and type of instruction suggesting that in the group of patients exposed to the videotape, gaming reinforcement was associated with a statistically higher score than the control group (mean = 16.6 versus mean = 15.5) whereas in patients exposed to the self learning module, gaming reinforcement was not associated with a statistically higher score (mean = 17.0 versus 16.9).	+/-
Farmer et al 2008[50]	33	23 studies: 12 RCT's, 1 CBA, 10 ITS	All; effectiveness of printed educational materials (PEMs)	Quantitative Risk Differences reported, but no formal meta-analysis	*Patient outcomes:* median effect size of -4.3% for patient outcome categorical measures (e.g., screening, return to work, quit smoking) (range -0.4% to -4.6%, 3 studies)). Two studies reported deteriorations in continuous patient outcome data (e.g., depression score, smoking cessation attempts) of -10.0% and -20.5%. *Process outcomes:* - *RCTs: +4.3% on categorical process outcomes (e.g., x-ray requests, prescribing and smoking cessation activities) (range -8.0%to +9.6%, 6 studies), and a relative risk difference*	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					+13.6% on continuous process outcomes (e.g., medication change, x-rays requests per practice) (range -5.0% to +26.6%, 4 studies) - *ITS:* significant effect sizes (relative risk difference range from 0.07% to 31%) *Effective elements:* uncertain *Intensity:* range of 1-12 series of PEM in interventions. No conclusion of review regarding optimal intensity. *No information about group size, or trainers reported*	
Forsetlund et al 2008[15]	37	81 studies: 81 RCT's	Primary and secondary care; To assess the effects of educational meetings on professional practice and healthcare outcomes; educational meetings	Meta-analysis (expressed median adjusted RD with interquartile range; and percentage change from intervention relative to control group)	*Provider outcomes:* Based on 30 trials the median adjusted RD in compliance with desired practice was 6% (interquartile range 1.8 to 15.9) when any intervention in which educational meetings were a component was compared to no intervention. Educational meetings alone had similar effects (median adjusted RD 6%, interquartile range 2.9 to 15.3; based on 21 comparisons in 19 trials). *Patient outcomes:* For patient outcomes the median adjusted RD in achievement of treatment goals was 3.0 (interquartile range 0.1 to 4.0; 5 trials).	+
Mansouri et al 2009[51]	28	6 studies: 6 trials	Primary health care; effect of education on attitude and knowledge of mental health care providers and citizens of Iran	Meta-analysis (expressed standardized mean differences)	*Provider outcomes:* some evidence for the efficacy of training on improvement of attitude and knowledge of the health personnel both in short and long term in PHC system *Patient outcomes:* a meta-analysis of 2 studies showed that the training had an overall significant effect on improving the attitude of the citizens after two years (Z = 1.96, p = 0.05, effect size = 0.22, 95% CI = 0.0–0.44). *Effective elements:* uncertain *Intensity:* not reported	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					Information about group size, location, or trainers not reported	
Nilsen et al 2006[52]	20	11 studies: 5 RCT's , 3 CBA, 2 ITS	Primary health care; implementation of brief alcohol interventions in primary healthcare in order to determine the effectiveness of the implementation efforts by the health care providers; training and support	Qualitative reporting	*Professional outcomes:* Intervention effectiveness (material utilization, screening, and brief intervention rates) generally increased with the intensity of the intervention effort, i.e. the amount of training and/or support provided. Nevertheless, the overall effectiveness was rather modest. *Process outcomes:* see above *Effective elements:* uncertain *Intensity:* 30 minutes – 2 hours *Group sizes:* uncertain. Intervention groups varied 22 physicians-172 physicians *Locations:* outreach, as well as in the practice *Trainers:* not reported	+
O'Brien et al 2007[24]	30	69 studies: 69 RCT's	All; educational outreach visits (EOV's)	Meta-regression (expressed median adjusted RD)	*Provider outcomes:* The median adjusted risk difference (RD) in compliance with desired practice was 5.6% (interquartile range 3.0% to 9.0%). *Effective elements:* details of intensity remains unclear, but more positive effects for locating in practice setting *Intensity:* varied from once to weekly visits for 12 months *Location:* in practice setting *Trainers:* peers (GPs) recommended	+
Ross et al 2009[53]	30	15 studies: 6 RCT's, 4 before-and-after, 5 CCT's	Primary and secondary care setting; educational interventions to improve prescribing by medical students and junior doctors	Qualitative reporting	*Provider outcomes:* There is only moderate evidence in the literature to inform medical schools about how to prepare medical students for the challenges of prescribing *Effective elements:* 1) structured problem solving; 2) problem-solving intervention; 3) six-step process; and 4) simulated scenarios *Intensity:* varied from 1 to 5 sessions, with a range	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					from 20 min- 30 minutes (but most unknown) *Location:* 2 trials reported in-house *No information about group size or trainers reported*	
Söderlund et al 2011[40]	26	10 studies: 3RCT's, 2 CBA, 5 ITS	General health care; motivational interviewing (MI) training for general health care professionals.	Qualitative reporting	*Provider outcomes:* The training generated positive outcomes overall and had a significant effect on many aspects of the participants' daily practice, but the results must be interpreted with caution due to the inconsistent study quality. *Process outcomes:* Although the studies examined heterogeneous outcomes, the participants' reactions were generally favourable. *Effective elements:* uncertain *Intensity:* Training duration ranged from 20 minutes to 24 hours. The median length was approximately 9 h, that is, slightly more than 1 day. Three studies investigated MI training lasting 4 h or less; four studies examined training efforts that lasted 16 h or more. Frequency ranged from 1 to 5 session (regardless of duration per session. *Trainers:* Motivational Interviewing trainers *Group sizes and location not reported*	+
Spiby et al 2009[39]	27	9 studies: 9 before-after studies	All; the effects of training, education and practice change interventions with health professionals and lay breast feeding educator/counsellors on duration of breast feeding	Qualitative reporting	*Patient outcomes:* In four studies it was observed an statistically significant increase in the proportion of women continuing breast after the intervention, but only a short term. In the remaining studies there was a positive trend. There seems to be no single way that consistently achieves changes in breast feeding duration. *Process outcomes:* Including attitude, knowledge and behaviour change among health-care professionals, women's views and costs of the intervention. Outcomes barely reported *Effective elements:* uncertain *Intensity:* varied from 45 minutes (training	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					sessions) to 3 days seminar *Location of intervention:* combining hospital-based and community-based training *Trainers:* educators or counselors *Group size not reported*	
Financial oriented implementation strategies						
Mehrotra et al 2009[54]	24	8 studies (designs unknown)	Hospital; effect of P4P on clinical process measures, patient outcomes and experience, safety, and resource utilization	Qualitative reporting	*Provider outcomes:* reported outcomes of papers lacked. *Patient outcomes:* The most rigorous studies focus on clinical process measures and demonstrate that hospitals participating in the Centers for Medicare and Medicaid Services-Premier Hospital Quality Incentive Demonstration, a P4P program, had a 2- to 4-percentage point greater improvement than the improvement observed in control hospitals. *Process outcomes:* reported outcomes of papers lacked. *Effective elements:* uncertain	-/+
Scott et al 2011[55]	35	7 studies: 3 c-RCT, 2 CBA's, 1 controlled ITS, 1 ITS	Primary health care; effect of changes in the method and level of payment on the quality of care provided by primary care physicians	Qualitative reporting	*Provider and patient outcomes:* Six of the seven studies showed positive but modest effects on quality of care for some primary outcome measures, but not all. One study found no effect on quality of care. Insufficient evidence to support or not support the use.	-/+
Sturm et al 2007[56]	34	13 studies: 3 CITS, 3 ITS, 9 CBA	All; the effects on drug use, healthcare utilisation, health outcomes and costs (expenditures) of policies, that intend to affect prescribers by means of financial incentives	Qualitative reporting	No studies of target based payment included, only these are of relevance for this reviews	NA
Witter et al 2012[57]	27	9 studies: 1RCT, 6 CBA, 2 ITS	All; effects of paying for performance on the provision of health care and health outcomes in low and middle-income countries	Qualitative reporting	*Provider and patient outcomes:* Of the four outcome measures, two showed significant improvement for the intervention group (wasting and self reported health by parents of the under-fives), while two showed no significant difference	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					(being C-reactive protein (CRP)-negative and not anaemic). The two more robust studies both found mixed results - gains for some indicators but no improvement for others *Process outcomes:* Only 2 studies reported on unintended effects - in both studies the authors voiced concerns about the curative nature of the coverage targets and whether this may squeeze out preventive care. However, no conclusive evidence was found to support or refute this. Patient and provider satisfaction: The view from patients is mixed. Staff were mainly critical about the financial interventions. Costs: The range of investment was fromUSD0.5 per capita in Tanzania and Zambia to USD 2.6 per capita in Burundi	
E-health oriented implementation strategies						
Bailey et al 2010[42]	36	15 studies: 15 RCT's	Effects of interactive computer-based interventions (ICBI) for sexual health promotion Both patient and cluster randomized trials included	Meta-analysis with standardized mean differences (SMDs) for continuous outcomes and odds ratios (ORs) for binary outcomes	*Patient outcomes:* Comparing ICBI to 'minimal interventions' such as usual practice, meta-analyses showed statistically significant effects as follows: moderate effect on sexual health knowledge (SMD 0.72, 95% CI 0.27 to 1.18); small effect on safer sex self-efficacy (SMD 0.17, 95% CI 0.05 to 0.29); small effect on safer-sex intentions (SMD 0.16, 95% CI 0.02 to 0.30); and also an effect on sexual behaviour (OR 1.75, 95% CI 1.18 to 2.59). Data were insufficient for meta-analysis of biological outcomes and analysis of cost-effectiveness	+
Beranova et al 2007[41]	23	5 studies: 5 RCT and comparison studies, distribution of designs not reported	To evaluate the use of computer-based softwares for educating patients with coronary heart disease Assumed to be patient-randomized	Qualitative reporting	*Patient outcomes:* There is strong evidence that the use of computer-based educational software improves knowledge in patients with coronary heart disease in the short term *Process outcomes:* Patients reported high satisfaction with the educational programs.	++

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					Patients in the intervention groups were more empowered	
Bewick et al 2008[43]	29	10 studies: 1 RCT, 4 randomized trials, 1 controlled study, 1 cohort study, 3 descriptive studies	Effectiveness of web-based interventions designed to decrease consumption of alcohol and/ or prevent alcohol abuse Assumed to be patient-randomized	Qualitative reporting	*Patient outcomes:* AUDIT: mean effect size d between groups control- intervention of 0.62 (significant) (favours comparison). Effects on unit quantity: mean effect size d between groups control- intervention of 0.03 (ns); 0.55 (ns); and -0.12 (not sign) (favours comparison); Effects on frequency of heavy drinking: 0.04 (ns); -0.29 (ns). Effects on maximum consumption per day: -0.09 (ns); 0.20 (ns) *Process outcomes:* process feedback provided was positive in terms of the usefulness of the site: 57% of participants reported that the websites were interesting, 61% accurate in feedback, 80% helpful and 20%–56% useful. At least three quarters of participants also reported finding the sites easy to use. In addition, a small but notable percentage (3%–8%) of participants reported that they felt that the information would change their alcohol habits for the better.	+
Car et al 2010[58]	36	2 studies: 1 RCT, 1 CBA	Effects of interventions for enhancing consumers' online health literacy (skills to search, evaluate and use online health information). Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* two studies included and only the RCT reported statistically significant effects for primary outcomes related to online health literacy in the intervention group. Those concerned 'Self-efficacy for health information seeking', 'health information evaluation skills' and the 'number of times the patient discussed online information with a health provider. The CBA reported no significant changes. The evidence is too weak to draw any conclusions about implications for the design and delivery of interventions for online health literacy.	-/+
Carey et al 2009[44]	29	35 studies; 43 separate	Efficacy of computer-delivered interventions (CDIs) to reduce alcohol use	Meta-analysis with effect sizes (*d*) as	*Patient outcomes:* CDIs are associated with improvement over time, and produce greater risk	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
		interventions (all pre-post test)	among college students Assumed to be patient-randomized	between-group and within-group differences	reduction than no intervention. Relative to assessment-only controls, CDIs reduced both quantity and frequency measures of consumption; the observed effects are small (0.09–0.28) over short- and long-term intervals	
Civljak et al 2010[59]	36	20 studies: all RCT's or quasi-RCT's	The effectiveness of Internet-based interventions for smoking cessation Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* Results suggest that some Internet-based interventions can assist smoking cessation, especially if the information is appropriately tailored to the users and frequent automated contacts with the users are ensured, however trials did not show consistent effects *Process outcomes:* With regard to satisfaction of users, interactive sites reported benefits.	-/+
Currell et al 2010[60]	35	7 studies: 7 RCT's	Effectiveness of telemedicine as an alternative to face to face patient care Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* Although none of the studies showed any detrimental effects from the interventions, neither did they show unequivocal benefits and the findings did not constitute evidence of the safety of telemedicine *Process outcomes:* All the technological aspects of the interventions appear to have been reliable, and to have been well accepted by patients.	-/+
Garcia-Lizana et al 2007[61]	24	24 studies: 24 RCT's	Clinical effectiveness of interventions using information and communication technologies for managing and controlling chronic diseases Assumed to be patient-randomized	Qualitative reporting	*Patient outcomes:* Most of the reports evaluated did not show significant changes in clinical outcomes or quality of life. Studies with most relevant outcomes achieved in clinical variables were interventions in hypertension and heart failure. Although there was a tendency towards improved indicators, the results were not significant. None of the papers included in the review identified any adverse or negative effects on health or quality of life indicators. *Process outcomes:* When satisfaction was explored it showed that both professionals and patients demonstrated satisfaction with the new technologies	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
Harris et al 2011[62]	38	43 studies: 43 RCT's	Effectiveness and cost-effectiveness of adaptive e-learning for improving dietary behaviours Both patient and cluster randomized trials included	Meta-analysis with WMD	*Patient outcomes:* E-learning interventions were associated with a WMD of +0.24 (95% CI 0.04 to 0.44) servings of fruit and vegetables per day; –0.78 g (95% CI –2.5 g to 0.95 g) total fat consumed per day; –0.24 g (95% CI –1.44 g to 0.96 g) saturated fat intake per day; –1.4% (95% CI –2.5% to –0.3%) of total energy consumed from fat per day; +1.45 g (95% CI –0.02 g to 2.92 g) dietary fibre per day; +4 kcal (95% CI –85 kcal to 93 kcal) daily energy intake; –0.1 kg/m2 (95% CI –0.7 kg/m2 to 0.4 kg/m2) change in body mass index. *Costs:* The incremental cost effectiveness ratio was approximately £102,112 per quality-adjusted life-year (QALY). Although the individual level EVPI was arguably negligible, the population-level value was between £37M and £170M at a willingness to pay of £20,000–30,000 per additional QALY.	++
Lustria et al 2009[63]	22	30 studies: 30 RCT's	To explore how computer-tailored, behavioural interventions implemented and delivered via the Web have been operationalised in a variety of settings Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* The level of sophistication of these interventions varied from immediate risk/ health assessment, tailored web content to full-blown customized health programs. The most common variables for tailoring content were health behaviours and stages of change. Message tailoring was achieved through a combination mechanisms including: feedback, personalization and adaptation	+
McLean et al 2010[64]	39	21 studies: 21 RCT's	The effectiveness of telehealthcare interventions in people with asthma Assumed to be patient-randomized	Meta-analysis with OR for dichotomous outcomes and MD for continuous outcomes	*Patient outcomes:* the included interventions did not improve asthma quality of life (minimum clinically important difference = 0.5): mean difference in Juniper's Asthma Quality of Life Questionnaire (AQLQ) 0.08 (95% CI 0.01 to 0.16). Telehealthcare for asthma resulted in a non-significant increase in the odds of emergency department visits over a 12-month period: OR	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					1.16 (95% CI 0.52 to 2.58). There was, however, a significant reduction in hospitalizations over a 12-month period: OR 0.21 (95% CI 0.07 to 0.61), the effect being most marked in people with more severe asthma managed predominantly in secondary care settings *Process outcomes:* study withdrawal - highly differed between studies. Time off school or work- 3 days per month, 10 days per year and 0.74 in six weeks. PEF monitoring and diary monitoring- telehealthcare improved PEF in some studies, but that this was not a consistent finding. Patient satisfaction- consistent findings that patient prefer telehealthcare above standard care. *Cost outcomes:* The authors mention that it overall appears that the studies which analyzed costs found that where hospitalization was prevented, costs were favourable to continuing the intervention. However, this did not hold true for all studies.	
Portnoy et al 2009[65]	24	75 studies: 75 RCT's; 82 separate interventions	Efficacy of computer-delivered interventions to promote healthy behaviour Both patient and cluster randomized trials included	Meta-analysis with effect sizes (*d*) as between-group differences	*Patient outcomes:* Participants who received a computer-delivered intervention improved several hypothesized antecedents of health behaviour (knowledge, attitudes, intentions); intervention recipients also improved health behaviours (nutrition, tobacco use, substance use, safer sexual behaviour, binge/purge behaviours) and general health maintenance. Several sample, study and intervention characteristics moderated the psychosocial and behavioural outcomes	+
Reavly et al 2010[45]	17	Not reported	Evidence for prevention and early intervention in mental health problems in higher education students	Qualitative reporting	*Patient outcomes:* Regarding prevention or intervene for early for alcohol misuse, effectiveness evidence is strongest for brief motivational interventions and for personalized	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
			Both patient and cluster randomized trials included		normative interventions delivered using computers or in individual face-to-face sessions. Few interventions to prevent or intervene early with depression or anxiety were identified. These were mostly face-to-face, cognitive–behavioural/ skill-based interventions. One social marketing intervention to raise awareness of depression and treatments showed some evidence of Effectiveness. There is very limited evidence that interventions are effective in preventing or intervening early with depression and anxiety disorders in higher education students	
Riper et al 2009[47]	31	14 studies: 14 RCT's	Effectiveness of brief, single-session personalized-feedback interventions without therapeutic guidance to reduce problem drinking Assumed: both patient and cluster randomized trials included	Meta-analysis with effect sizes (*d*) as between-group differences	*Patient outcomes:* The pooled standardized-effect size (14 studies, 15 comparisons) for reduced alcohol consumption at post-intervention was d=0.22 (95% CI=0.16, 0.29, p=0.00; the number needed to treat =8.06; areas under the curve=0.562).	+
Riper et al 2011[46]	33	9 studies: 9 RCT's	Effectiveness of e-self-help Interventions for Curbing Adult Problem Drinking Patient-randomized trials included	Meta-analysis with overall medium effect size (*g*)	*Patient outcomes:* An overall medium effect size (g = 0.44, 95% CI 0.17-0.71, random effect model) was found for the 9 studies, all of which compared no-contact interventions to control conditions	+
Ryhanen et al 2010[66]	25	14 studies: 9 RCT's, 2 clinical trials, 3 quasi-experimental	Effectiveness of Internet or interactive computer-based patient education programs in the field of breast cancer patient education Assumed to be patient-randomized	Qualitative reporting	*Patient outcomes:* The review suggests a positive relationship between the Internet or computer-based patient education program use and the knowledge level of patients with breast cancer. Other effects were diverse	-/+
Tait et al 2010[48]	21	14 studies: 14 randomized trials (controlled not mentioned)	Effectiveness of web-based interventions for problematic substance use by adolescents and young adults	Meta-analysis with effect sizes (*d*) as between-group differences	*Patient outcomes:* The alcohol interventions had a small effect overall (d=− 0.22) and for specific outcomes (level of alcohol consumption, d=− 0.12; binge or heavy drinking frequency, d=− 0.35;	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
			Assumed to be patient-randomized		alcohol-related social problems, d=− 0.57). The interventions were not effective (d=− 0.001) in preventing subsequent development of alcohol-related problems among people who were non-drinkers at baseline.	
Tate et al 2009[67]	14	8 studies(designs not reported)	Cost effectiveness of Internet interventions Assumed to be patient-randomized	Qualitative reporting	Lack of cost data published to date, to draw conclusions	-/+
Verhoeven et al 2007[68]	26	39 studies: 11 RTC's, 19 observational, 6 quasi-experimental, other incidentally used designs	Benefits and deficiencies of teleconsultation and videoconferencing regarding clinical, behavioural, and care coordination outcomes of diabetes care Assumed to be patient-randomized	Qualitative reporting and pooled results, but no formal meta-analysis	*Patient outcomes including costs:* At clinical level, results from the six RCTs of the identified teleconsultation studies did not show a significant reduction in HbA(1c) (0.03%, 95% CI = - 0.31% to 0.24%) compared to usual care. The selected studies suggest that both teleconsultation and videoconferencing are practical, cost-effective, and reliable ways of delivering a worthwhile health care service to diabetics. However, the diversity in study design and reported findings makes a strong conclusion premature	+
Walters et al 2006[69]	18	19 studies: (designs not reported	Effects of computer interventions on smoking cessation Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* While computer-based smoking prevention and cessation programs show promise in influencing tobacco-related behaviours, published studies show mixed results in terms of translating the educational experience to real-world practice. Of the 19 automated, computer-based interventions that were reviewed, nine (47%) showed evidence of effectiveness at the longest follow-up	-/+
Webb et al 2009[70]	23	85 studies (designs not reported)	Which characteristics of Internet-based interventions best promote health behaviour change and to develop a novel coding scheme for assessing mode of delivery in Internet-based interventions	Meta-analysis with effect sizes (*d*) as between-group differences	*Patient outcomes:* Interventions had a statistically small but significant effect on health-related behaviour (d+ = 0.16, 95% CI 0.09 to 0.23).	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
			and also to link different modes to effect sizes. Assumed to be patient-randomized			
White et al 2010[49]	20	17 studies: 17 RCT's	Efficacy of online interventions for alcohol misuse Both patient and cluster randomized trials included	Qualitative reporting	*Patient outcomes:* differential effect sizes to posttreatment ranged from 0.02 to 0.81 (median 0.54). Using the full samples of participant, the mean differential effect size was 0.42. If only identified problem drinkers are included (rather than the full sample dataset), the effect size rose to 0.47. The pre-post differential effect size for brief personalized (normative) feedback programs ranged from 0.02 to 0.81 (mean 0.39, mean 0.33). And for the multi-session modularized programs a pre-post differential effect size of 0.56 was obtained in each case. Pre-post differential effect sizes for peak blood alcohol concentrations (BAC) ranged from 0.22 to 0.88, with a mean effect size of 0.66.	+
Multi-component oriented implementation strategies						
Aboelela et al 2007[71]	27	33 studies: 30 non-randomized clinical trial (pre-post comparison), 3 non-randomized interventions (different unit comparison)	Hospital: acute care/intensive care unit; Effectiveness of interventions aimed at changing healthcare workers' behaviour in reducing healthcare-associated infections (HAI)	Qualitative reporting	*Patient and provider outcomes:* 4 studies reported significant reductions in HAI or colonization rates. These studies used educational programs, multi-disciplinary quality improvement team, compliance monitoring and feedback and a mandate to sign a hand hygiene requirement statement. In all 33 studies, bundles of 2-5 interventions were employed, making it difficult to determine the effectiveness of individual interventions. *Process outcomes:* not reported	+
Akbari et al 2008[72]	33	17 studies: 10 RCT's, 5 CBA's, 1 CCT, 1 ITS	Primary care; Effectiveness and efficiency of interventions to change outpatient referral rates or improve outpatient referral appropriateness	Qualitative reporting	*Patient and provider outcomes:* Effective strategies: - dissemination of guidelines with structured referral sheets;	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					- involvement of consultants in educational activities - organisational interventions - financial interventions Ineffective strategies: - passive dissemination of local referral guidelines - feedback of referral rates - discussion with an independent medical adviser Moderate: - fund holding scheme *Process outcomes:* not reported	
Chaillet et al 2006[73]	29	33 studies: 10 Cluster-RCT's, 6 RCT's, 1 CBA, 16 ITS note: result table includes only 32 citations	To estimate effective strategies for implementing clinical practice guidelines in obstetric care and to identify specific barriers to behaviour change and facilitators in obstetrics	Qualitative reporting	*Patient and provider outcomes:* Educational strategies with medical providers are generally ineffective; Educational strategies with paramedical providers, opinion leaders, qualitative improvement, and academic detailing have mixed effects; Audit and feedback, reminders, and multi-component strategies are generally effective. The proportion of successful strategies is significantly higher among those interventions that include an identification of barriers to change compared with other interventions (93.8% versus 47.1%, n=33, P= .004). *Process outcomes:* not reported	+
Chaillet et al 2007[74]	31	10 studies: 2 Cluster-RCT's, 3 RTC's, 5 ITS	Assumed to be in the hospital; Effectiveness of interventions for reducing the cesarean section rate and to assess the impact of this reduction on maternal and perinatal mortality and morbidity	Meta-analysis with relative risk as measures of effect size	*Patient outcomes:* Significant reduction of caesarean section rates (pooled RR, 0.81; 95% CI, 0.75–0.87; p < 0.00001). Audit and feedback (pooled RR = 0.87 [0.81, 0.93]), quality improvement (pooled RR=0.74 [0.70, 0.77]), and multi-component strategies (pooled RR=0.73 [0.68, 0.79]) were effective for reducing the caesarean section rate. Quality improvement based on active management of labour showed mixed effects. Studies including an identification	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					of barriers to change were more effective than other interventions for reducing the caesarean section rate (pooled RR=0.74 [0.71, 0.78] vs 0.88 [0.82, 0.94]). Among included studies, no significant differences were found for perinatal and neonatal mortality and perinatal and maternal morbidity with respect to the mode of delivery. Only 1 study showed a significant reduction of neonatal and perinatal mortality (p<0.001). *Process outcomes:* not reported	
Flodgren et al 2010[75]	35	6 studies: 6 RCT's	Healthcare organisations, defined as organisations that had health care as their primary objective. All patients in an included study had to be recruited in the context of a healthcare setting; Effectiveness of strategies to change the behaviour of health professionals and the organisation of care to promote weight reduction in overweight and obese people	Meta-analysis with mean differences as measures of effect size	*Patient outcomes:* Educational interventions aimed at GPs, compared to standard care, could reduce the average weight of patients after a year (by 1.2 kg, 95% CI -0.4 to 2.8 kg). Reminders (1 trial) could change doctors' practice concerning men (by 11.2 kg, 95% CI 1.7 to 20.7 kg) but not women (who reduced weight by 1.3 kg, 95% CI -4.1 to 6.7 kg). Patients may lose more weight after a year if the care was provided by a dietician (by 5.6 kg, 95% CI 4.8 to 6.4 kg) or by a doctor-dieticians team (by 6 kg, 95% CI 5 to 7 kg), as compared with standard care (one trial). *Process outcomes:* not reported	+
Gould et al 2010[76]	38	4 studies: 1 RCT, 1 CBA, 2 ITS	Hospital or community setting; success of strategies to improve hand hygiene compliance and to determine whether a sustained increase in hand hygiene compliance can reduce rates of health care-associated infection.	Qualitative reporting	*Patient outcomes:* Hand hygiene compliance increased for one of the studies where it was measured by direct observation, but the results from the other study were not conclusive. *Provider outcomes:* One of the education campaigns found an increase in hand hygiene while the other did not. The simple substitutions were not associated with an increase in product use. The campaigns based on the Swiss model showed an increase in product use in two of the three units where applied. Product use also	-/+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					increased in the units with the social marketing campaign and the campaign with staff involvement. *Process outcomes:* not reported	
Harvey et al 2002[77]	27	18 studies: 16 RCT's, 1 CBA, 2 CCT	Assumed all settings; Existence and effectiveness of interventions to improve health professionals' management of obesity or the organisation of care for overweight and obese people	Qualitative reporting	There are few solid leads about improving obesity management, although reminder systems, brief training interventions, shared care, inpatient care and dietician-led treatments may all be worth further investigation. *Process outcomes:* satisfaction with provider practice or health care provision; patient behaviour (attendance levels at weight management or physical exercise programmes). None of the included studies reported.	-/+
Kastner et al 2008[78]	29	13 studies: 13 RCT's	Assumed to be in the hospital; Effectiveness of tools that support clinical decision making in osteoporosis disease management	Qualitative reporting	*Patient outcomes:* Reminders plus education targeted to physicians and patients: increased BMD testing (RR range 1.43 to 8.67) and osteoporosis medication use (RR range 1.60 to 8.67). Physician reminder plus a patient risk assessment strategy: reduced fractures [RR 0.58, 95% confidence interval (CI) 0.37 to 0.90] and increased osteoporosis therapy (RR 2.44, CI 1.43 to 4.17). Compared to control, multi-componentintervention increased BMD testing (RR 1.43, CI 1.11 to 1.86) and osteoporosis medication use (RR 1.60, CI 1.07 to 2.41) *Process outcomes:* not reported	+
Ostini et al 2009[79]	25	29 studies: 21 RCT's, 4 CBA's, 1 ITS, 3 CCT's	Community settings; evidence about strategies that are likely to encourage the adoption of appropriate, safe, and cost-effective prescribing	Qualitative reporting	*Patient outcomes:* Patient-mediated intervention was not consistently effective. *Provider outcomes:* Audit and feedback, together with educational outreach visits were the most effective in improving prescribing practice. Research identified in the areas of manual reminders, local consensus processes, and multidisciplinary teams has not altered the status	+

Reference	R-AMSTAR score*	Number of studies	Study setting; Outcomes;	Data- synthesis/ report of findings	Key findings	Overall effect rating
					of knowledge in these areas, and there is still insufficient evidence to draw conclusions about their efficacy. *Process outcomes:* not reported	

*R-AMSTAR, a tool for assessment of multiple systematic reviews, consists of 11 items, each with various criteria which have to be satisfied with a minimum score of 11 and maximum of 44 points

RCT=randomized controlled trial; RD= risk difference; OR= odds ratio

2.3 WP2 STEP 1 DISCUSSION AND CONCLUSION

In this review of reviews, the aim was to gain insight in effective implementation strategies across a range of lifestyle interventions and preventive activities. Many of the implementation oriented reviews had heterogeneous results. Nevertheless, the majority of the papers were in favour of using professional education, e-health or multi-component implementation interventions. Multi-component oriented had the strongest positive effects. Only few reviews however reported details about possible effective elements of implementation strategies. Nevertheless, we were able to create synergy by searching for possible effective elements not only within reviews, but also across reviews.

With regard to educational oriented implementation strategies, we concluded that the majority of the reviews were supporting the use of educational activities. Locating education in practice settings, delivery by peer trainers and applying a stepwise solving approach for health problems seem to strongly stimulate positive outcomes. Locating educational sessions for care providers in practice settings seems the most logical, as this is stays close to their comfort zone. When they have to act on role plays with collegues from other practices for example, it can be hypothesised that providers are less likely to take a vulnerable position in front of unfamiliar colleagues. The evidence was insufficient to take conclusions about optimal group compositions. We did not see comparisons of e.g. solely GPs or solely nurses, compared to GPs and nurses mixed in an educational session.

Financial oriented implementation interventions showed very mixed results. In addition however, identified reviews were identified from our search and the ones included in this review had very heteregeneous interventions included. Therefore, it is not possible to draw valid conclusions on whether singly financial oriented strategies are effective.

Looking at e-health oriented interventions aiming at patient or citizen behavior change, they do seem to have either positive or strong positive effects. Effective elements of e-health interventions seem to be interactive, tailored and motivational approaches. Nonetheless, it is important to mind that not all reviews reported (significant) positive effects.

With regard to implementation strategies including combinations of at least professional education, financial or e-health, we see synergy effects. From this review it can be concluded that multi-component interventions are more effective than stand-alone implementation strategies, especially when identified implementation barriers were addressed.

Strengths and limitations

We were able to include a number of 44 reviews, although the methodological quality of the included review was moderate, following the R-AMSTAR criteria [3]. The methodological quality was 28 on a scale from 11 to 44. The moderate overall quality also limited possibilities for doing a narrative analysis. Furthermore, the degree of heterogeneity was high. Of the 44 included reviews, 30% of the reviews were homogeneous enough to pool the studies. Moreover, aims of preventive lifestyles amongst included reviews varied greatly, as we primarily focused on applied implementation strategies rather than setting or lifestyle/disease topic.

Lastly, one of the most important limitations of the included reviews is that they in general very sparsely described effective elements of studies. This makes it difficult for us to identify and to do recommendations about effective as well as ineffective elements.

Implications for research

To date, the included reviews in the first review of this workpackage showed that details of applied implementation are sparsely described. Future research should focus on comparing reviews with supporting outcomes, to reviews with ineffective outcomes. In that way we might be able to identify determinants of effective practice. Therefore we recommend, with the exception of financial oriented implementation strategies as this might need more robust evidence, researchers to move their focus from the *strength* of positive effects, to *determinants* that cause the positive outcomes from implementation strategies. If more evidence is available from these mechanisms, we can better explain the difference in outcomes from the various and hetergeneous reviews.

Conclusion

None of the categories of educational, financial, e-health or multi-component oriented interventions showed purely consistent positive effects. However, based on our narrative data synthesis strong trends were identified from the various reviews. Reviews of multi-component implementation strategies show that synergy is created in terms of implementation effectiveness by combining elements from different types of implementation strategies. Furthermore, the evidence base with regard to educational and e-health interventions is very clear in the positive results on provider level and patient level respectively. The effect of financial oriented interventions remains unsure and and needs to be investigated further.

2.4 WP2 STEP 1 APPENDIX

SEARCH STRATEGY PUBMED WP2 STEP 1

((((("meta-analysis"[Publication Type] OR "meta-analysis as topic"[MeSH Terms] OR "meta-analysis"[All Fields]) OR ("review"[Publication Type] OR "review literature as topic"[MeSH Terms] OR "systematic review"[All Fields])) AND (("quality improvement"[MeSH Terms] OR ("quality"[All Fields] AND "improvement"[All Fields]) OR "quality improvement"[All Fields]) OR improvement[All Fields] OR ((Improving[All Fields] AND ("Intervention (Amstelveen)"[Journal] OR "Interv Sch Clin"[Journal] OR "intervention"[All Fields])) AND s[All Fields]) OR ((Improving[All Fields] AND ("Intervention (Amstelveen)"[Journal] OR "Interv Sch Clin"[Journal] OR "intervention"[All Fields])) AND s[All Fields]) OR Educational[All Fields] OR e-learning[All Fields] OR (Internet-based[All Fields] AND ("learning"[MeSH Terms] OR "learning"[All Fields])) OR ICT[All Fields] OR ("information science"[MeSH Terms] OR ("information"[All Fields] AND "science"[All Fields]) OR "information science"[All Fields] OR ("information"[All Fields] AND "technology"[All Fields]) OR "information technology"[All Fields]) OR ("economics"[MeSH Terms] OR "economics"[All Fields] OR "financial"[All Fields]) OR ("reimbursement, incentive"[MeSH Terms] OR ("reimbursement"[All Fields] AND "incentive"[All Fields]) OR "incentive reimbursement"[All Fields] OR ("pay"[All Fields] AND "performance"[All Fields]) OR "pay for performance"[All Fields]) OR Reimbursement[All Fields] OR ("contracts"[MeSH Terms] OR "contracts"[All Fields] OR "contracting"[All Fields]) OR Transparency[All Fields])) AND (("smoking"[MeSH Terms] OR "smoking"[All Fields]) OR ("ethanol"[MeSH Terms] OR "ethanol"[All Fields] OR "alcohol"[All Fields] OR "alcohols"[MeSH Terms] OR "alcohols"[All Fields]) OR ("exercise"[MeSH Terms] OR "exercise"[All Fields]) OR ("diet"[MeSH Terms] OR "diet"[All Fields])))

SEARCH STRATEGY CENTRAL WP2 STEP 1

1. (quality improvement) or (improvement) or (improving interventions (s)) or (educational) or (e-learning) or (internet-based learning) or (ICT) or (information technology) or (financial) or (pay for performance) or (reimbursement) or (contracting) or (transparency)
2. (smoking) or (alcohol) or (exercise) or (diet)
3. #1 and #2
4. #3 and (prevent$ or (health near/2 promotion))

Screening for inclusion/exclusion in ODHIN systematic review (step 1 of 3-stepped approach)

Comments can be made either at the question itself or on a separate sheet (please specify question number)

Name reviewer:

Overall variables to score:

Author	Aim	Topic (lifestyle, prevention or other)	Setting	Patients	Implementation strategy	Participants	N studies	Results	Conclusion of authors	Remarks for ODHIN?	R-AMSTAR scores on q1 to q11	Measurements of process measures

Optimizing Delivery of Health Care Interventions (ODHIN)

Knowledge base of successful implementation of screening and brief intervention for lifestyle issues in every day routine primary health care practice

Deliverable 2.1, Work Package 2: Knowledge base, Step 2: Review of trials

WP-LEADER

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December 2013

3. WP2 Step 2: review of trials

3.1 WP2 Step 2 Methods

This review of trials included a narrative as well as a meta-analysis and meta-regression analysis of literature examining the effect of different types of implementation strategies to increase the use of SBI programmes for hazardous and harmful alcohol consumption in primary care settings. To do so, we focused on the following outcomes: SBI rates of professionals, alcohol consumption of patients, as well as costs and cost-effectiveness outcomes reported.

Identification of studies

We searched the following computerized databases: MEDLINE (1966-May 2013), EMBASE (1980-May 2013), Cinahl (1982-May 2013) and Cochrane Central Register of Controlled Trials (CENTRAL, from 1966-May 2013). The EPOC search strategy (pre-2008 and current) formed the basis for our search (see section 3.4 Appendix). We added our study specific search strategy focusing at alcohol related papers, adults and primary care setting. This additional search was designed in consultation with an information specialist of the Radboud university medical center. The appendix in section 3.4 presents our complete search strategy. In addition, reference lists of review articles and books were screened, and ODHIN partners and other global experts in the field were contacted in order to identify additional studies (grey literature and recent published study not yet indexed).

Two independent reviewers (MK and ML) screened on relevant titles and abstracts. Then, full text copies of potentially relevant studies were obtained and independently screened for inclusion by two reviewers (MK and ML). Disagreements between the reviewers were resolved through discussion, or a third reviewer was contacted to make the final decision (PA or IvdG).

Some studies produced multiple papers. We defined one as primary paper if that specific paper provided our main primary outcomes. Identified papers were included as secondary papers when they were part of the same study and reported additional data.

Study selection and study characteristics

This systematic review was built on the systematic review carried out by Anderson et al in 2004 [80]. We defined the following inclusion criteria:

- Studies that addressed hazardous and harmful alcohol consumption but not alcohol dependence as defined by WHO [81] and the ICD-10 Classification of Mental and Behavioral Disorders [82]
- Design: Studies that fit the design criteria of the EPOC [83], (cluster) randomised controlled trials or controlled (clinical) trials
- Setting: Primary Health Care including general practice, family practice, health centres, and outpatient (primary) clinics, all of which usually provides first-contact health care

- Participants: Health care professionals including physicians, nurses, psychologists, doctors' assistants and receptionists working in primary health care (including general practice, family practice, health centres, and outpatient clinics, all of which usually provides first-contact health care). Furthermore, adult patients in Primary Health Care Settings at risk for hazardous and harmful alcohol consumption will be included.
- Interventions: All kinds of patient and professional oriented (behavioural), organisational oriented, structural and regulatory or financial strategies aimed at the implementation of SBI will be included in the review. We include strategies exclusively focused on alcohol, as well as prevention and health promotion activities including alcohol consumption as one of the health behaviours
- Outcomes in one of the following domains: i) health professional performance including measurement of alcohol intake by patients, screening, brief advice, brief interventions, counselling, making a follow-up and referral; and ii) patient outcomes, including numbers screened, numbers counselled, numbers referred, changes in alcohol consumption over time, numbers drinking within recommended alcohol consumption limits, and physiological measures.

  Where information is available relevant data on the costs of the SBI and of dissemination and implementation strategies, and on health care costs will be collected.
- Studies in English or Dutch

Data extraction

Endnote was used as the reference management system. A pre-structured data extraction form based on the template of the EPOC was developed and tested [83]. Data for each included study was extracted on: SBI procedures; implementation strategies; participants; setting; methods; outcomes (screening, brief intervention, alcohol consumption, costs) and study quality. Two reviewers in different combinations (MK, MB, DN, EK, PA, ML, JB, and IvdG) independently extracted the data. Any disagreement was resolved by discussion or by asking a third reviewer when consensus was not reached between the two reviewers.

Methodological quality of papers was assessed by using the EPOC checklist for quality criteria [83]. This predesigned table was applied to ensure standardized scoring and to identify the risk of bias. The quality assessment was based on concealment of allocation, presence of professionals' behaviour or patient (alcohol consumption) follow-up, blinded assessment of primary outcome, baseline measurement of primary outcome, reliable (objective) primary outcome measures and protection against contamination. Any disagreement on fulfilling the criteria was resolved by discussion. However, outcome of quality was not an exclusion criterion.

In addition, we used the GRADE checklist for grading quality of evidence and strengths of recommendations, ranging from very low quality to high quality [84]. Inclusion of papers was not determined by methodological quality.

Data synthesis and narrative analysis

All study outcomes were organised in tabular form. The narrative analysis was made based on design and study duration, setting, participants, implementation strategy, types of outcomes and methodological quality. All studies were categorised in type of outcome measure (screening; brief intervention; and/or alcohol consumption) and type of EPOC implementation strategy.

To assess a quantitative synthesis on the pooled effects of included studies, we carried out meta-analyses with MetaEasy version 1.0.4 [85]. Many of our included papers did not report effect sizes. MetaEasy has the capacity to calculate an effect size and its standard error, from the specific combination of input parameters supplied by the different studies for each outcome, following methods described by the Cochrane Collaboration [86]. Standardised effect sizes were calculated, both for dichotomous and continuous outcomes. A fixed effects model was applied for all meta-analyses. In case of substantial heterogeneity, however, we used a DerSimonian and Laird (DL) random-effects model [87]. In addition, we will try to explain heterogeneity looking at characteristics of included studies and with meta-regression analysis. Meta-regression was applied with use of SPSS version 20. The independent variables comprised 1) use of a single type of EPOC implementation strategy versus the use of multiple EPOC implementation strategies; 2) the type of EPOC implementation strategy; 3) whether or not the programme included multiple components within their implementation strategy; and 4) Study duration ≤ 12 months versus study duration >12 months. We used weighted random effects least squares regression, weighted by the inverse of the variance to identify relationships between predictors in explaining effect sizes [88]. Each of the unweighted program was corrected by its weight.

3.2 WP2 STEP 2 RESULTS

Search results

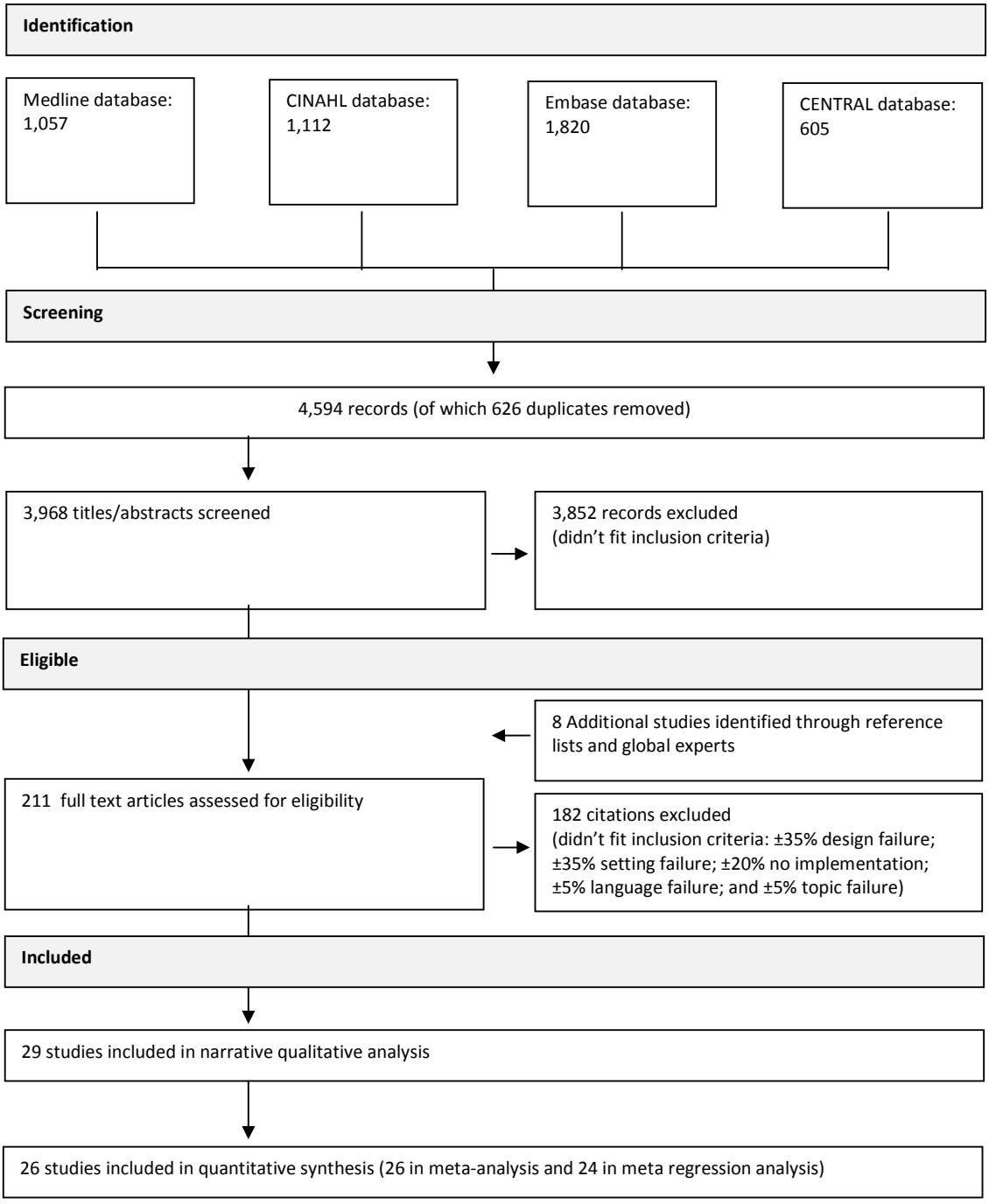
Our literature search identified 4,594 citations (Figure 1), of which 1,057 were in Medline, 1,112 in Cinahl, 1,820 in Embase and 605 in Central Database. 626 duplicates were removed, leaving 3,968 titles and abstract to be screened. The title and abstract screening resulted in a reduction of the number of studies to 211. Of this set, eight additional papers were identified by manual review of the reference lists of the studies and by consultation of global experts. Full text was obtained for 211 studies. After reading full text 29 studies fit the inclusion criteria and were included. The other 182 studies were excluded as they did not meet the inclusion criteria. Thus, our final set consisted of 29 published studies (35 papers) of which data was extracted from.

Methodological quality and study characteristics

Table 1 shows the characteristics of the included studies. All studies were RCT (86%) or quasi-experimental studies (14%).

According to the GRADE-qualification, the methodological quality of the studies was low to moderate (see Table 1). Overall, 7% (n=2) of the studies scored high quality, 52% moderate quality (n=15), 38% low quality (n=11), and 3% very low quality (n=1).

Figure 1 Flow chart of study selection



Analyses of quality assessment criteria demonstrated the following main limitations of the included studies. Concealment of allocation was not done in 8 studies (28%) and not clear in 7 studies (24%). Secondly, we assessed whether 80-100% of the randomised participants within the study were measured at follow-up.

In 10 studies (34%) follow-up was not clear or not obtained. Blinded assessment of primary outcomes was not done in 16 studies (55%) and not clear in a further 5 studies (17%). Because blinding of assessors and participants is difficult to accomplish in the study of lifestyle interventions, the majority of the studies scored 'not done' or 'not clear' on this quality criterion. Fourth, in 8 studies (28%) there were substantial differences present across study groups in terms of participant characteristics, or baseline measurements of primary outcomes were not obtained. Furthermore, no reliable primary outcome measures were obtained in 11 studies (38%), and this was not clear for 10 studies (34%). Outcome measures were regarded as not reliable when patients' or providers' self report of behaviour only was measured by a non-validated instrument. Also when outcome measures were not rated by two or more raters – for example in the case of assessing video of consultations – this was regarded as not reliable. Finally, protection against contamination was not done in 11 studies (38%) and not clear in 5 studies (17%). In the studies were this was not applicable, we scored 'done'.

Most studies were carried out in the United States (59%); then in Oceania (17%), Europe (17%), and Canada (7%). The study settings were predominantly general practices (76%). Participating providers were mostly GPs or (family) physicians (13 studies), or GPs or (family) physicians in combination with nurses, research assistants, practice assistants or other healthcare providers (8 studies), and in 8 studies the profession of participating providers was not reported. The study setting can give implications for the types of providers, however we did not report this assumption. In the majority of the studies the patient group was not specified, with the exception of age (mostly between 30-69 years). In three studies patients were students attending a student primary care health service of the university (mean age of 20 years). In three studies patients were veterans or older veterans (mean age between 58, 62 and 72 years, with more than 90% male). With regard to other characteristics: one study included hypertensive patients; one study cardiovascular patients, one study emergency department patients and one study was targeted at elderly patients.

In most studies, the unit of analysis was at the level of the patient (19 studies); then at the level of the provider (5 studies); for three studies analysis were both at the level of patient and provider, for 1 study the unit of analysis was at the level of the practice, and 1 study analyzed mean number of utterances (alcohol-related quotations with respect to motivational interviewing) per patient. Of the 21 trials that included outcomes at the patient level, but with randomization at the practice/provider level, 13 studies were statistically corrected for clustering [89-101].

The included studies reported various primary outcome measures, in different combinations. A number of 19 studies reported alcohol consumption (patient outcome) [90, 92-98, 100-110]. Next to that, studies reported one or more outcomes related to the process

of care (provider outcome), that is: screening rate in 12 studies [89-91, 99, 100, 111-117] and brief intervention (BI) rate in 13 studies [89, 94, 95, 99, 100, 102, 108, 111-115, 117]. Only two studies reported outcomes related to costs or cost-effectiveness [113, 114].

Table 1 Characteristics of included studies WP2 step 2

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
Professional oriented implementation strategies						
Bonevski 1999 [90]	RCT, study duration assumed to be 5 months	- Australia - Primary care practice - GPs	General practitioners N=19 Patients N=575 (Group 1 N=154; Group 2 N=143; Group 3 N=138; Group 4 N=140)	Intervention: Computerized feedback about: guidelines and consensus standards of care, individual goals, calculated performance rates. Practitioner feedback about patients' smoking status, benzodiazepine use, blood pressure screening, cholesterol screening, and the delivery of program elements. Control: Usual care	Screening	Moderate
Borgiel et al 1999 [91]	RCT, study duration 2 years	- Canada - Primary care practice - Physicians	Family physicians N=56 (Intervention group N=29; Control group N=27)	Intervention: Practice assessment report, continuing Medical Education with additional plan and follow-up visit by mentors. Control: Usual care	Screening	Moderate
Bradley et al 2002 [111]	CCT, study duration 6 months	- United States - Primary care practice - Resident or fellow MD, Faculty/staff	General internal medicine clinic N=17(6 resident or fellow MDs; 6 faculty/staff MDs; 5 family nurse practitioners); Patients N=47 (Intervention group	Intervention: Educational meeting; feedback report. Control: Professional oriented: Single educational meeting	Screening; BI	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
		MD, family nurse practitioner	N=17; Control group N=30)			
Chossis et al 2007 [94]	RCT, study duration assumed to be 9 months	- Switzerland - Outpatient clinic (i.e. ambulatory care provided by specialists/ hospitals) - GPs	Primary care residents N=26 (Intervention group N=13; Control group N=13)	Intervention: Two educational meetings on an interactive Brief Alcohol Intervention, with theory, role-play exercises, checklists, and a textbook. Educational materials for professionals handing out to the patient. Control: Professional oriented: Lipid management workshop, including alcohol use	BI; Alcohol consumption	Moderate
Friedmann et al 2006 [112]	RCT, study duration 2 years	- United States - Primary care practice - GPs (15 physicians and 3 mid-level clinicians)	Physicians N=18 (Intervention group N= 12; Control group N=6)	Intervention: Three educational meetings (initial training about the care model, a luncheon 6 weeks later, a booster training session 6 months later. Educational materials clipped to the charts of eligible patients. Control: Usual care	Screening; BI	Low
Funk et al 2005 [113] (including secondary	RCT, study duration unknown, implementatio	- Australia, New Zealand, England,	General practitioners N=727 (Intervention group 1 N=255; Intervention group 2	Two Intervention groups. Group 1: Outreach training session relating to a brief intervention program. Group 2: Outreach training session relating to a	Screening; BI; cost-effectiveness	High

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
studies [118-120]	n period of 12 weeks	Belgium, Catalonia, Denmark; - Primary care practice; - GPs	N=263; Control group N=209)	brief intervention program and ongoing support and advice regarding program implementation issues through biweekly telephone calls (England) and/or practice visits (Australia). Control: Usual care		
Kaner 2003 [114]	RCT, study duration 3 months	- United Kingdom; - Primary care practice; - Nurses	Practices N=128. (Intervention group 1 N=50; Intervention group 2 N=48; Control group N=30). N participating nurses unclear.	Two Intervention groups. Group 1: Educational outreach visits about the programme, SBI procedures and practical problems. Group 2: Same educational outreach visits as above + two-weekly telephone calls for support and advice. Control: Professional oriented: written implementation guidelines	Screening; BI; costs; cost-effectiveness	Moderate
Lockyer et al 1996 [115]	RCT, study duration assumed to be 4 months	- Canada; - Primary care practice; - Family physicians and general practitioners	Family physicians and general practitioners N=54 (Intervention group N=26; Control group N=28)	2 intervention groups. Group 1: family physicians; Group 2: general practitioners. Intervention: Educational program: one day education including visits to five local treatment facilities and their therapeutic programs; and three evening sessions. Control: Assumed to be usual care.	Screening; BI	Moderate
Rose et al 2008 [99]	RCT, study duration 2	- United States;	22 practice units (Intervention group	Intervention: Written materials, on site academic detailing, performance feedback through practice	Screening; BI	Moderate

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
	years	- Primary care practice; - Assumed to be GPs	N=11; Control group N=11). N individual providers not clear	reports, network meetings. Control: Professional oriented: written materials.		
Saitz et al 2003 [108]	RCT, study duration 1,5 years	- United States; - Primary care practice; - GPs	Faculty and resident primary care physicians N=41 (Intervention group N=20; Control group N=21) Patients N=312 (Intervention group N=168; Control group N=144)	Intervention: Feedback patients' alcohol screening results to physicians with recommendations. Control: Usual care	BI; Alcohol consumption	High
Williams et al 2010 [101]	RCT, study duration 3 years	- United States; - Outpatient clinic; - Physicians, residents, nurse practitioners physician assistants	Physicians, residents, nurse practitioners, and physician assistants (N= not clear) Patients N = 1,358 (Intervention group N=692; Control group N=666)	Intervention: Reminder for primary care provider after patients' positive alcohol screen; e-mail alerts to providers. Control: Assumed to be usual care	Alcohol consumption	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
Organisational oriented implementation strategies						
Brown et al 2007 [92]	RCT, study duration 12 months	- United States; - Primary care practice; - Counsellors. Type of health care providers not reported	Patients N= 897. Sub set of n=472 patients with alcohol abuse (Intervention group n=231; Control group: n=241)	Intervention: Delivery of counseling via telephone and mail Control : Usual care	Alcohol consumption	Moderate
Vinson et al 2000 [109]	RCT, study duration 12 months	- United States; - Primary care practice; - GPs	Patients N=80 (N participants per group not reported)	Intervention: Computer-Generated Written Behavioral Contracts. Physician reviewed the contract briefly with the patient, signed it, and encourage compliance with its terms. Control: Usual care	Alcohol consumption	Moderate
Wilson et al 1992 [117]	CCT, study duration not clear	- United Kingdom; - Primary care practice; - GPs	Physicians N=16. Allocation at the level of days/sessions (N sessions Intervention group N=1,411; Control group 1 N=1,478; Control group 2 N= 1,432)	Intervention: Expanding consultation time from on average 7.5 minutes to 10 minutes per patient. Control group 1: matched for time of day and day of the week, drawn from the period before the trial. Control group 2: matched for time of day and day of the week, during the trial phase, in the alternate weeks when an experimental session was not scheduled.	Screening; BI	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
Patient oriented implementation strategies						
Wang et al 2010 [110]	RCT, study duration 1 month	- United States; - Emergency department setting	Patients N=252 (Intervention group N=95; Control group N=93)	Intervention: Subjects in the intervention group were given a brochure titled, "Alcohol, How Much is Too Much?" Control: Assumed to be usual care	Alcohol consumption	Low
Professional and organisational oriented implementation strategies						
Adams et al 1998 [89]	RCT, study duration 32 months	- Assumed to be in United States; - Primary care practice; - Physicians, nurses	Physicians N=21; Resident N=1 resident; Nurse practitioners N=7; Patients N=344 (Intervention group N=200; Control group N=144)	Intervention: Educational meetings: Training in motivational interviewing and topics about alcohol (2,5 hours). + intervention algorithm Control: Usual care	Screening; BI	Moderate
Ferrer 2009 [102]	RCT, study duration median time = 360 days (range 159-565; 10th percentile 215; 90th percentile 441)	- United States; - Primary care practice; - GPs and medical assistants	GPs (N unclear); Medical Assistants (N=100); Patients N=864 (Intervention group N=437 of which N=57 drinking; Control group N=427 of which N=67 drinking)	Intervention: Professional role revision: assessments and referrals were performed by medical assistants; Educational meetings: three training sessions about how to assess, inform, encourage and refer patients. Control: Usual care	BI; alcohol consumption	Low
Oslin et al 2003 [97]	RCT, study duration 24	- United States;	Clinicians from different primary care	Intervention: Patient Telephone disease management by a behavioral health specialist +	Alcohol consumption	Moderate

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
	weeks	- General practice/ primary care clinic/ family practice - Clinicians	settings N=37; patients N=97 (Intervention group; N=46 control group N=51)	educating providers Control: Usual care		
Oslin et al 2006 [107]	RCT, study duration 9 months	- United States; - Primary care practice; and Community based care/ community health centres	Patients N=560 (Intervention group 1 N= 227; Intervention group 2 N= 239; no control group)	Two intervention groups, no control group. Group 1. Integrated care model: participants receive mental health or substance abuse services in the primary care clinic from a mental health or substance abuse provider + education Group 2. Enhanced specialty referral model includes referral from primary care and provides mental health or substance abuse services in a specialty mental health or substance abuse clinic.	Alcohol consumption	Moderate
Reiff-Hekking 2005 [98] (including secondary study [121])	RCT, study duration 3 years	- United States; - Ambulatory primary care setting; - Physicians; nurses	Physicians N=38; Nurses N=8; Patients N=530 (Intervention group N=248; Control group N=233)	Intervention: Training; Individual tutorial (including education materials); role-play; office support system (lifestyle interview summary sheet; intervention algorithm) Control: Professional oriented: Encouraged to identify and intervene with patients with alcohol related issues; Encouraged to attend weekly conference series	Alcohol consumption	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
Rodney et al 1985 [116]	CCT, study duration 5 years	- United States; - Primary care practice; - Physicians, Nurses, Psychologist, social worker, dietician	Physicians N= assumed to be 22 residents (medicine) and 32 family physicians; Nurses N=2; Psychologist N=1; licensed clinical social worker N=1; dietician N=1; Patients N=390 (Intervention group N=114; Control group N=110)	Intervention: Education, educational materials + reminders (face sheet on record) Control: Professional and organisational oriented: year 1-3: similar intervention group. Year 4-5: chart review sessions in which residents reviewed three to five of their records during July, November and April	Screening	Very low
Professional and patient oriented Implementation strategies						
Fink et al 2005 [96]	RCT, study duration 2,5 years	- United States; - Primary care practice; - Physicians	Physicians (N= not clear) and patients N=665 (Intervention group 1 N= 245; Intervention group 2 N=198; Control group N=222)	Two intervention groups. Group 1: Combined report, in which physicians and patients received reports of patients' drinking classifications and patients also received education; Group 2: patient report, in which patients received reports and education, but their physicians did not receive reports. Control: Usual care	Alcohol consumption	Low
Drevenhorn 2012 [95] (secondary study included [122])	RCT, study duration 2 years	- Sweden; - ? - Nurses	Nurses N=33 (intervention group N=19; Control group N=14). Patients N=213 (Intervention group N=153; Control group N=60)	Intervention: educational outreach visits, with education in stages of change, Motivational Interviewing and applying guidelines for cardiovascular prevention, lifestyle factors and pharmacological treatment. Distribution of educational materials for nurses. Educational materials for patient to support patients' self-management. Control: Usual care	BI; alcohol consumption	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
Organisational and patient oriented implementation strategies						
Kypri et al 2004 [106]	RCT, study duration 6 months	- New Zealand; - Community based care/ community health centres	Patients N=104 (Intervention N=42; Control N=41)	Intervention: Web-based screening and brief intervention including patient feedback Control: Organisational oriented: 'Alcohol Facts and Effects' leaflet was given by the research assistant	Alcohol consumption	Moderate
Kypri et al 2005 [105]	RCT, study duration 6 weeks	- New Zealand; - General practice/ primary care clinic/ family practice	Patients N=218 (Intervention Group 1: N=72; Intervention Group 2 N=74; Control: N=72)	Two intervention groups. Group 1. Computerized assessment + feedback and advice on patients' fruit and vegetable consumption, physical activity, alcohol consumption, and smoking Group 2. Computerized assessment only. Control: Untargeted activity: Minimal contact at baseline	Alcohol consumption	Moderate
Kypri et al 2008 [104]	RCT, study duration 12 months	- New Zealand; - General practice/ primary care clinic/ family practice	Patients N=429 (Intervention Group 1: N=138; Intervention Group 2: N=145; Control: N=146)	Two intervention groups. Group 1. Web-based motivational intervention Group 2. Web-based motivational intervention with further interventions 1 and 6 months later (including personalized feedback) Control: Patient oriented: Information pamphlet on health effects of alcohol consumption	Alcohol consumption	Moderate
Professional, organisational and patient oriented implementation strategies						
Beurden van 2012 [100] (secondary	RCT, study duration 2 years	- Netherlands; - Primary care	General practitioners N=119 (Intervention group N=47; Control group N=47);	Intervention: Distribution of the guideline; a reminder-card to display on the desk of the GP; educational training session tailored to professionals' attitudes; feedback report on patient	screening; BI; alcohol consumption	Low

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
study included [123])		practice; - GPs	Patients N=712 (Intervention group N=346; Control group N=366)	alcohol consumption risk level; facilitation of the cooperation with local addiction services for support and referral; outreach visits by a trained facilitator tailored to needs of practice; patient information letters, leaflets and self-help booklets about alcohol offered to general practices to be distributed to patients; poster in the waiting room; personal feedback to the patient based on their alcohol consumption risk category. Control: Guidelines were mailed to GPs; information letters about problematic alcohol consumption were sent to patients. Patients also received personal feedback on alcohol consumption after closure of the intervention period.		
Butler et al 2003 [93]	CCT, study duration not clear	- United States; - Primary care practice; - Physicians, nurse practitioners, nurses, practice assistants	Physicians N=33; Nurse practitioners N=7; Nurses N=5; Practice assistants N=3 (Intervention group providers N=62; Control group providers N=66); Patients (N=2053)	Intervention: Computerized health assessment, and training how to use this, and tailored feedback to patients. Control: Usual care	Alcohol consumption	Low
Organisational, patient and financial oriented implementation strategies						
Helzer et al 2008 [103]	RCT, study duration 6	- United States;	Healthcare providers (profession not	Three intervention groups. Group 1: daily phone calls for 6 months to an	Alcohol consumption	Moderate

Study, year (ref)	Design, study duration	Setting (country; setting; type of healthcare providers)	Participants	Implementation strategy vs Control	Outcomes*	Methodological quality
	months	- Primary care practice; - Type of healthcare providers not reported	reported) N=112 (Intervention group 1 N=75; Intervention group 2 N=75; Intervention group 3 N=53; Control N=81); Patients N=338	automated Interactive voice response system to report alcohol consumption. Group 2: as group 1 + monthly patient feedback. Group 3: as group 2 + financial compensation based on frequency of participants' daily calls. Control: Usual care		

* Outcomes were categorised into screening, brief interventions, alcohol consumption and cost effectiveness

Intervention characteristics of included studies

Table 2 shows the wide variation of implementation strategies that were carried out in the included studies. Eleven studies used professional oriented implementation strategies, three studies reported organisational oriented strategies, and one study reported a patient oriented strategy. Six studies reported a combination of professional oriented and organisational oriented interventions. The other eight studies reported various combinations of professional oriented, organisational oriented, patient oriented and financial oriented strategies. Within these categories, also a great variation of strategy components – for example, varying from audit and feedback to educational meetings – were identified, as shown in table 2.

The content of the control conditions differed across trials. In 18 studies the comparison group was a usual care group, i.e. the control group didn't receive specifically oriented implementation strategies. In eleven studies the comparison group was a less intensive intervention.

Table 2 Implementation strategies and their components

Combinations of implementation strategy components (EPOC sub category)	Nr of studies
Professional oriented implementation strategies	
Audit and feedback	1
Audit and feedback; educational meeting; educational outreach visits	1
Audit and feedback; educational meeting	1
Educational meetings; educational materials	1
Educational meetings; reminders	1
Educational outreach visits	2
Educational meetings; educational outreach visits	1
Educational outreach visits; distribution of educational materials; audit and feedback; educational meetings	1
Patient mediated interventions	1
Reminders	1
Organisational oriented implementation strategies	
Changes to the setting/ site of service delivery	1
Changes in scope and nature of benefits and services	2
Patient oriented implementation strategies	
Printed educational materials for patients	1
Professional and organisational oriented implementation strategies	
Educational meetings; changes in medical record system	1
Educational meetings; skill mix changes	2
Educational meetings; formal integration of services	1
Educational meetings; educational materials; changes in medical record system	1
Educational meetings; educational materials; reminders; changes in medical record systems	1
Professional and patient oriented implementation strategies	
Educational outreach visits; Distribution of educational materials; Patient self-management education materials	1
Patient mediated interventions; patient feedback; patient education	1

Organisational and patient oriented implementation strategies	
Changes to the setting/ site of service delivery; patient feedback	3
Professional, organisational and patient oriented implementation strategies	
Distribution of educational materials; educational meetings; reminders; audit and feedback; formal integration of services; educational outreach visits; patient feedback	1
Educational outreach visits; changes to the setting/ site of service delivery; patient feedback	1
Organisational, patient and financial oriented implementation strategies	
Changes to the setting/ service delivery; provider incentives; patient feedback	1
Total	29

Narrative analysis

Table 3 shows the results of our narrative assessment. This table shows whether or not all included studies show significant effects in favour of the intervention group. When a study included patient oriented implementation strategies, alcohol consumption always was reported as outcome measure. This was in contrast to professional and organisational oriented implementation strategies, in which SBI rates were the main reported outcome measures. It seems that outcome measures depend on the type of implementation strategy. This may seem logical for the effect of the implementation strategy, however in many studies the effect of the patient level remains unknown.

Screening and brief interventions

In 13 studies the effect on screening and/or brief interventions was measured. When considering the studies with outcomes on provider behaviour (SBI), it is the category of studies with professional oriented implementation strategies that have relative most significant positive effects (8 out of 11 professional oriented studies). In these studies education is the most common implementation strategy. In addition, within the category of effective professional oriented implementation strategies, remaining components varied widely. Overall quality of the studies with significant positive results however was moderate. Of the professional oriented implementation strategies, SBI were overall the main outcome measures.

Within studies where a professional oriented strategy was part of a multi-component oriented implementation strategy, mixed effects were found.

If we compare studies with and without significant positive effects on SBI, we see that study durations were much longer in studies without significant positive effects. The study duration of studies that showed no positive effects varied from 1 to 5 years. Studies that showed positive effects in favour of the implementation strategies had much shorter duration, with most studies carried out in a time frame of six months. To test this hypothesis, this variable will be included in the meta-regression analysis.

In studies that combined organisational with patient oriented strategies, no outcomes on screening nor on brief intervention were reported. Subsequently, effects of these implementation strategies on provider behaviour remain unknown.

Table 3 Narrative outcomes

Author	*EPOC sub-category*	*Screening*	*Brief Intervention*	*Alcohol consumption*
Professional oriented implementation strategies				
Bonevski 1999 [90]	Audit and feedback	+	NM	NM
Borgiel et al 1999 [91]	Audit and feedback ; educational meeting ; educational outreach visits	-	NM	NM
Bradley et al 2002 [111]	Audit and feedback ; educational meeting	+	+	
Chossis et al 2007 [94]	Educational meetings ; educational materials	NM	+	-
Friedmann et al 2006 [112]	Educational meetings ; reminders	+	+	NM
Funk et al 2005 [113]	Educational outreach visits	+	+	NM
Kaner 2003 [114]	Educational outreach visits	+	+	NM
Lockyer et al 1996 [115]	Educational meetings ; educational outreach visits	+	+	NM
Rose et al 2008 [99]	Distribution of educational materials ; educational outreach visits; audit and feedback; educational meetings	+	+	NM
Saitz et al 2003 [108]	Patient mediated interventions	NM	-	NR
Williams et al 2010 [101]	Reminders	NM	NM	-
Organisational oriented implementation strategies				
Brown et al 2007 [92]	Changes to the setting/ service delivery	NM	NM	-
Vinson et al 2000 [109]	Changes in scope and nature of benefits and services	NM	NM	-
Wilson et al 1992 [117]	Changes in scope and nature of benefits and services	+	+	NM

Author	*EPOC sub-category*	*Screening*	*Brief Intervention*	*Alcohol consumption*
Patient oriented implementation strategies				
Wang 2010 [110]	Printed educational materials for patients	NM	NM	-
Professional and organisational oriented implementation strategies				
Adams et al 1998 [89]	Educational meetings ; changes in medical record system	+	+	NM
Ferrer 2009 [102]	Educational meetings ; Skill mix changes	NM	-	-
Oslin et al 2003 [97]	Skill mix changes ; educational meetings	NM	NM	-
Oslin et al 2006 [107]	Educational meetings ; formal integration of services	NM	NM	-
Reiff-Hekking 2005 [98]	Educational meetings ; educational materials ; changes in medical record system	NM	NM	+
Rodney et al 1985 [116]	Educational meetings ; educational materials ; reminders ; changes in medical record systems	-	NM	NM
Professional and patient oriented implementation strategies				
Drevenhorn 2012 [95]	Educational outreach visits; Distribution of educational materials ; Patient self-management education materials	NM	NR	NR
Fink 2005 [96]	Patient mediated interventions; patient feedback; patient education	NM	NM	+
Organisational and patient oriented implementation strategies				
Kypri et al 2004 [106]	changes to the setting/ site of service delivery ; patient feedback	NM	NM	-
Kypri et al 2005 [105]	changes to the setting/ site of service delivery; patient feedback	NM	NM	-
Kypri et al 2008 [104]	changes to the setting/ site of service delivery ; patient feedback	NM	NM	+
Professional, organisational and patient oriented implementation strategies				
Beurden van 2012 [100]	Distribution of educational materials ; educational meetings ; reminders ; audit and feedback ; formal integration of services ; educational outreach visits ; patient feedback	-	-	-
Butler 2003 [93]	educational outreach visits ; changes to the setting/ service delivery; patient feedback	NM	NM	-

Author	*EPOC sub-category*	*Screening*	*Brief Intervention*	*Alcohol consumption*
Organisational, patient and financial oriented implementation strategies				
Helzer 2008 [103]	Changes to the setting/ service delivery ; provider incentives ; patient feedback	NM	NM	NR

- = not significant
+ = significant
NM = outcome not measured in the study
NR = measured in the study, but no p-values or 95%-CI reported

Table 4 Cost outcomes

Author, year, ID	*EPOC sub-category*	*Unit of outcome reporting*	*Outcome intervention*	*Outcome control*	*Effect*	*P value or CI-95%*
Professional oriented interventions						
Funk et al 2005	Educational outreach visits		Cost per GP giving at least one intervention			
		Provider level – materials and instructions only			£74.29	
		Provider level – one educational outreach visit			£92.80	
		Provider level – one educational outreach visit and six telephone support contacts			£128.92	
			Cost per patient advised			
		Patient level – materials and instructions only			Aus$ 3.51	
		Patient level – one educational outreach			Aus$ 2.16	

Author, year, ID	*EPOC sub-category*	*Unit of outcome reporting*	*Outcome intervention*	*Outcome control*	*Effect*	*P value or CI-95%*
		visit Patient level – one educational outreach visit and six telephone support contacts			Aus$ 4.33	
			Cost per patient advised			
		Patient level – materials and instructions only			£8.19	
		Patient level – one educational outreach visit			£6.02	
		Patient level – one educational outreach visit and six telephone support contacts			£5.43	
Kaner 2003	Educational outreach visits	Median number of patients screened	Full cost for trained practice: £157 Full cost for trained and supported practice £163	Full cost of promoting and implementing SBI £93 per practice	When full costs of GP-led SBI were considered, nurses were more cost-effective at delivering brief interventions. However, if just promotional costs were considered, GPs' were more cost-effective.	p<.001

Patients'alcohol consumption

In 19 studies patients' alcohol consumption was reported. With regard to studies that report patients' alcohol consumption, the implementation strategies mostly had no significant effects. Just one study reported about a statisticial significant effect in favour of the control group, which means that the proportion of patients reducing their levels of alcohol consumption to low-risk levels was lower in the intervention group compared with the control group [100].

In nine of the 18 studies with alcohol consumption outcomes the focus of the implementation strategies was aimed at the patient directly, of which the half of these studies was aimed both at professional and patient. In the remaining nine studies, the implementation strategies focused on patients via their providers, for example with educational activities for providers. Of the studies in which patients were reached via their provider, six studies measured the effect of the implementation strategy solely on patient level. In the other studies, provider behaviour as well as patient alcohol consumption was measured. Within just one of these 5 studies, significant effects were found on provider level and in none of these studies statistically significant effects were found on patient level.

If we compare studies that were directly focused on the patient, with studies that focused on the patient via their provider, we see no differences in effects of implementation strategies. Both have little or no effect on patient alcohol consumption.

Cost outcomes

Just two studies reported on costs and cost-effectiveness of the implementation strategies [113, 114]. At the provider level, the cost of implementation increased with the increasing level of support. At the patient level, the cost per patient advised slightly increased with increasing level of support in the Australian study [119], but decreased in the English study [124] of Funk et al [113].

Quantitative analysis

In the quantitative analysis both a meta-analysis and meta-regression analysis were carried out. For screening, brief interventions and alcohol consumption the analyses were done separately, as they it varies amongst studies which outcome measures were reported. In total, 26 studies were included in the meta-analyses and 24 studies were included in the meta-regression.

Screening

A total of 10 out of 12 studies with outcomes on screening provided sufficient data to be included in our meta-analysis. Pooling of these studies showed strong significant heterogeneity (I^2=94%), which indicates the use of a DL random effects model. When all studies with screening outcomes were pooled, we saw an overall statistically significant positive effect of the implementation strategies on screening behaviour (standardised mean effect DL model 0.53; 95%-CI 0.28–0.78). Wilson et al [117] showed the least positive effect and Adams et al [89] had the strongest positive effect.

The forest plot in figure 1 confirms the heterogeneity of the studies. We compared characteristics of the studies that had close to no effect, to studies with significant effects. It seems that studies with significant effects concerned not only GPs, but also other health professionals like nurses and other primary care staff.

Within the meta-regression analysis, we added various co-variates to establish sources of heterogeneity. First, we looked at the effects of single (e.g. only professional oriented implementation strategies) versus multiple (e.g. professional combined with organisational oriented implementation strategies) types of EPOC implementation strategy types (see table 4). Multiple types of EPOC implementation strategies had a statistically significant positive effect compared to interventions based on a single type of EPOC implementation strategy. Secondly, different types and combinations of implementation strategies were compared to solely professional oriented implementation strategies. The results show that only the combination of professional and patient oriented strategies were of statistically significant additional value in comparison with only professinal oriented strategies. Other comparisons did not show significant differences. Studies with single components were compared with studies including multiple component interventions (e.g. a program that included more than one components within one type of implementation strategy) and did not show significant differences, nor were there differences identified for study durations less than a 12 months versus 12 months or longer.

As the occupational participants were hypothesised to be of influence on the effect, we also performed a meta-regression analysis on a post-hoc basis with the variable of only GP participants versus GPs and other occupations. In table 4 the hypothesis was confirmed: having mixed teams of primary care providers participating in the study, had statistically significant higher effects.

Table 4. Meta-regression analysis: predictors of effect on screening based on 11 outcomes from 10 studies

Comparison		**β**	**95%-CI**	***p***
1.	Single EPOC implementation strategy	0.158		
	Multiple EPOC implementation strategy	0.675	0.021 – 1.330	0.044
2.*	Organisational oriented	-0.129	-0.457 – 0.119	0.358
	Professional+organisational oriented	0.034	-0.774 – 0.841	0.919
	Professional+pat oriented oriented	1.231	0.562 – 1.900	0.005
	Professional+organisational+patient oriented	-0.114	-1.383 – 1.156	0.827
3.	Single component strategy	0.192		
	Multiple component strategy	0.121	-0.380 – 0.623	0.591
4.	Study duration ≤ 12 months	0.349		
	Study duration 12 months or longer	-0.051	-0.725 – 0622	0.862
5.	GP participants only	0.168		
	GP participants combined	0.767	0.24-1.295	0.010

* Professional oriented implementation strategy was the reference category

Brief intervention

A total of 13 studies reported about brief intervention behaviour, of which 9 studies were sufficient to include in the meta-analysis. Due to the heterogeneity (I^2=97%), we used a DL random effects model. Initially we reported no statistically significant effect of studies with implementation strategies reporting on brief intervention outcomes (standardised mean effect DL model 0.38; 95%-CI -0.05 – 0.83). However, also in this forest plot strong heterogeneity was confirmed. As shown in the forest plot in figure 2, study effects ranged from Ferrer et al [102] with a negative effect to and Lockyer et al [115] who had the most positive effect. Ferrer et al [102] was the only study reporting negative effects due to their intervention. However the intervention in the study of Ferrer et al differed from all of the other studies. This study was the only study in which patients got the opportunity to choose which lifestyle topic to tackle (besides alcohol, the study focused also on smoking, exercise and diet). The intervention concerning alcohol comprised referring risky drinkers, almost all patients however preferred to discuss other lifestyle factors, which resulted in very little referrals for risky drinking. Therefore we judged this approach to be substantially different from the other studies, and that the reported effect on the numbers of brief interventions was more due to the patients' choice than to the effect of the implementation strategy. For this reason we did a post-hoc meta-analysis without the study of Ferrer et al. The resulting forest plot is shown in figure 3. Excluding the study of Ferrer et al, resulted in a statistical significant positive effect of studies reporting on the number of brief interventions as a behavioural outcome (standardised mean effect DL model 0.64; 95%-CI 0.27 – 1.02).

Outcomes of the meta-regression analyses were shown in table 5 (in which Ferrer et al was excluded). Multiple types of EPOC implementation strategies have a statistical significant positive effect compared to interventions based on a single type of EPOC implementation strategy. The combination of professional and patient oriented implementation strategies, was of statistically significant additional value compared to solely professional oriented implementation strategies. Moreover, multiple component strategies were statistically significant more effective than single component strategies, which is different from the results on the studies with screening as a behavioural outcome. Lastly, we also performed a meta-regression analysis with the variable of study duration (< 12 months versus ≥12 months). Our hypothesis from the narrative analysis is not confirmed in table 5: longer study duration was of positive statistical significance compared to 12 months or shorter study durations.

Table 5. Meta-regression analysis: predictors of effect on brief interventions based on 10 outcomes from 8 studies

Comparison		β	95%-CI	*p*
1.	Single EPOC implementation strategy	0.169		
	Multiple EPOC implementation strategy	1.018	0.165 – 1.871	0.027
2.*	Organisational oriented	-0.077	-0.630 – 0.477	0.720
	Professional+pat oriented	1.262	0.243 – 2.281	0.026
	Professional+organisational+patient oriented	-0.091	-1.868 – 1.686	0.893
3.	Single component strategy	0.147		
	Multiple component strategy	0.985	0.310 – 1.660	0.012
4.	Study duration ≤ 12 months	-0.121		
	Study duration 12 months or longer	1.003	0.023 – 1.983	0.046

* Professional oriented implementation strategy was the reference category

Alcohol consumption

There were 19 studies reporting about alcohol consumption and 16 of them were included in the meta-analysis. Again, there was substantial heterogeneity (I^2= 86%). The DL random effects model showed that studies with interventions that focused on patient alcohol consumption outcomes, did not have a statistical significant effect (standardised mean effect DL model -0.02; 95%-CI -0.17 – 0.14). In the forest plot (figure 4) it is shown that individual studies reported negative as well as positive effects on patient alcohol consumption outcomes. Furthermore we see that Kypri et al 2004 [106] had very strong effects with regard to the reduction of alcohol consumption compared to the rest of the studies. It is hypothesised that this outlier is due to the unique outcome measure – Kypri et al 2004 is the only study that reports on the 'alcohol consumption in the last two weeks', whereas the remaining studies report on e.g. changes in drinking classification, scores on the AUDIT screening test, or mean weekly alcohol consumption. Therefore we also conducted an post-hoc analysis without this study. Pooling without Kypri et al 2004 resulted in the forest plot shown in figure 5. When we left the study of Kypri et al (2004) out, heterogeneity decreased (I^2=56%). The forest plot however maintains to present that there was no statistical significant effect (standardised mean effect DL model 0.07; 95%-CI -0.02 – 0.16), although we did see a positive trend. Heterogeneity primarily can be explained by the results from the meta-regression analysis (in which the study of Kypri et al 2004 was not included), since there were three combinations of strategy-types significant more effective than solely professional oriented implementation strategies (see table 6). The more effective strategies concerned 1) Professional combined with organisational oriented implementation strategies; 2) Professional combined with patient oriented implementation strategies; and 3) Organisational combined with patient oriented implementation strategies. So to improve alcohol consumption it is not necessarily to focus directly on the patient, also a combination of professional and organisation oriented strategies resulted in a reduction of patients'alcohol consumption. The number of components within a strategy nor the number of types of EPOC implementation strategies or the study duration less or more than 12 months, seemed to have a distinctive effect on alcohol consumption.

Table 6. Meta-regression analysis: predictors of effect on alcohol consumption based on 21 outcomes from 15 studies

Comparison		β	95%-CI	*p*
1.	Single EPOC implementation strategy	-0.022		
	Multiple EPOC implementation strategy	0.108	-0.068 – 0.284	0.206
2.*	Organisational oriented	0.202	-0.014 – 0.417	0.063
	Patient oriented	0.071	-0.193 – 0.336	0.543
	Professional+organisational oriented	0.258	0.116 – 0.400	0.004
	Professional+patient oriented	0.258	0.091 – 0.426	0.008
	Organisational+patient oriented	0.154	0.037 – 0.271	0.017
	Professional+organisational+patient oriented	-0.165	-0.332 – 0.002	0.053
3.	Single component strategy	-0.022		
	Multiple component strategy	0.108	-0.068 – 0.284	0.206
4.	Study duration ≤ 12 months	0.056		
	Study duration 12 months or longer	-0.046	-0.361 – 0.270	0.758

* Professional oriented implementation strategy was the reference category

Figure 1. Forest plot for screening behaviour outcomes

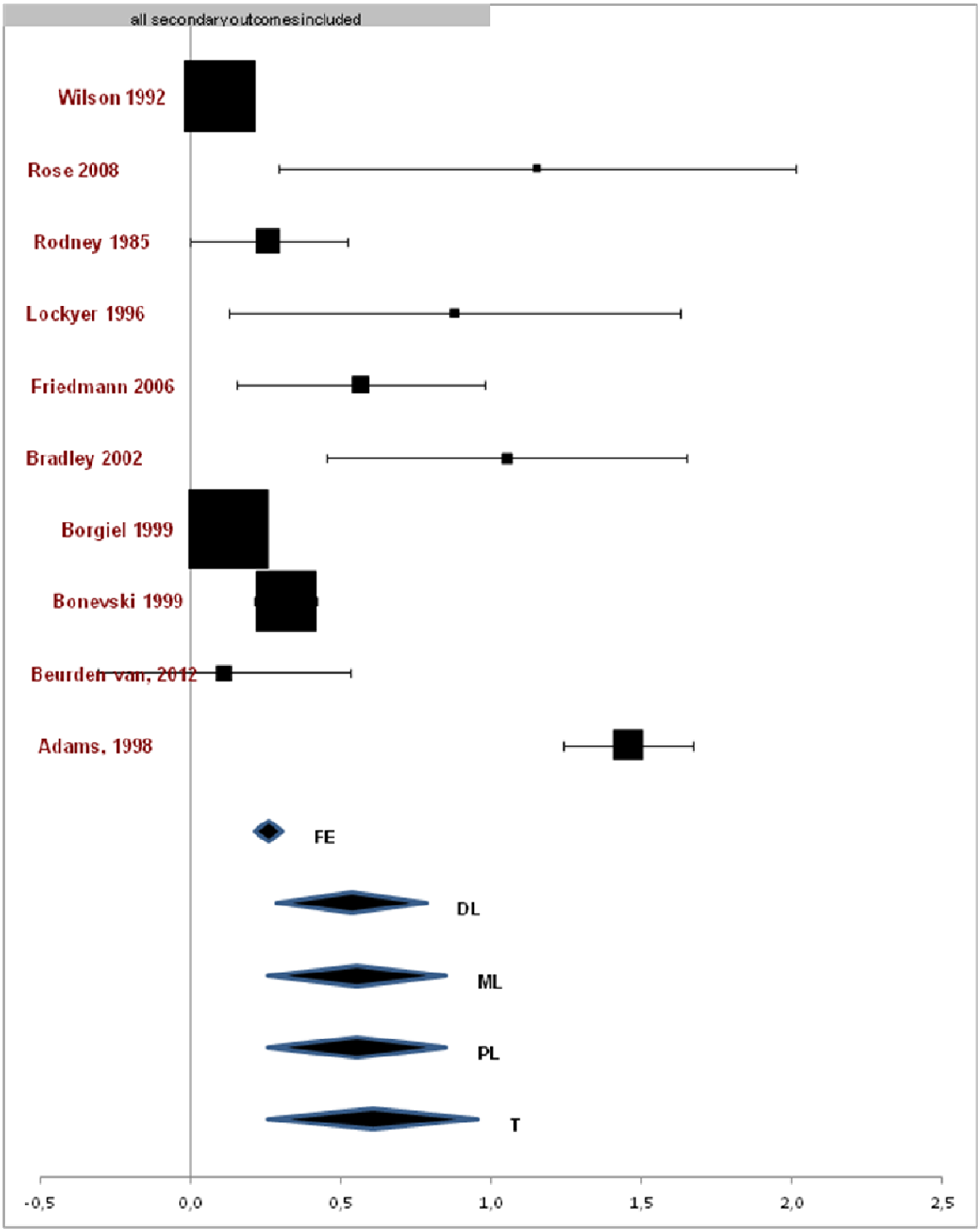


Figure 2. Forest plot for brief intervention behaviour outcomes

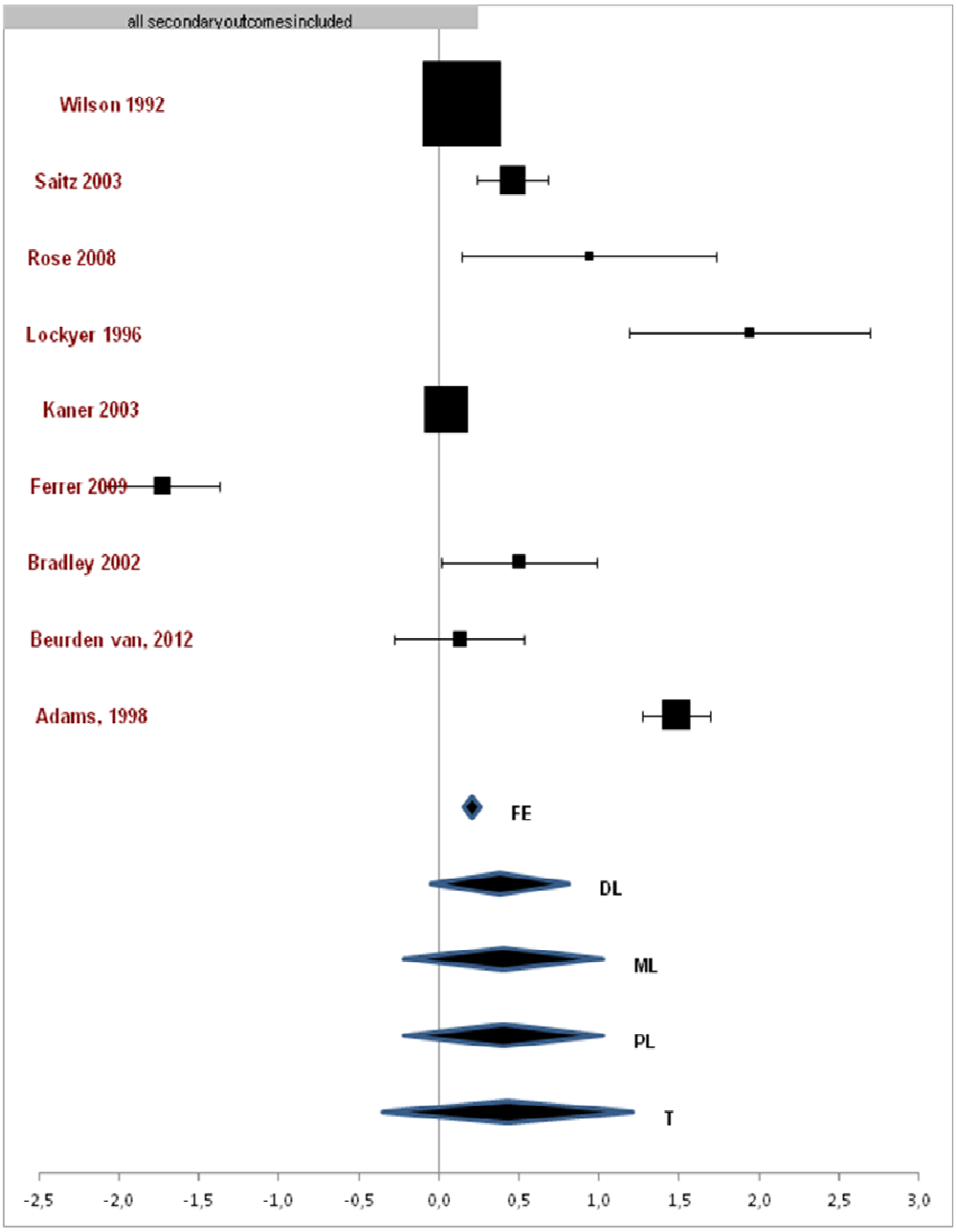


Figure 3. Forest plot for brief intervention behaviour outcomes, with Ferrer et al excluded

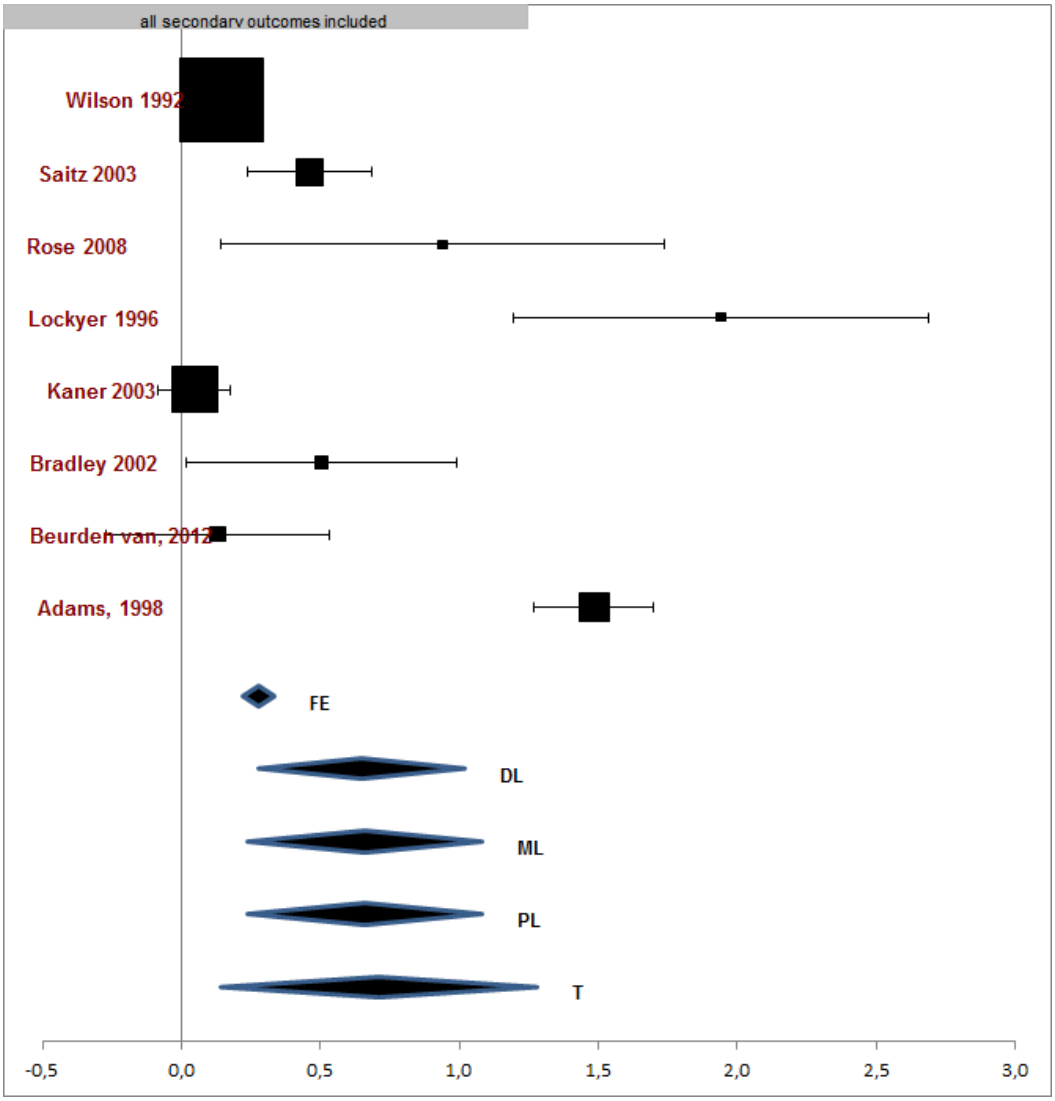


Figure 4. Forest plot for alcohol consumption outcomes

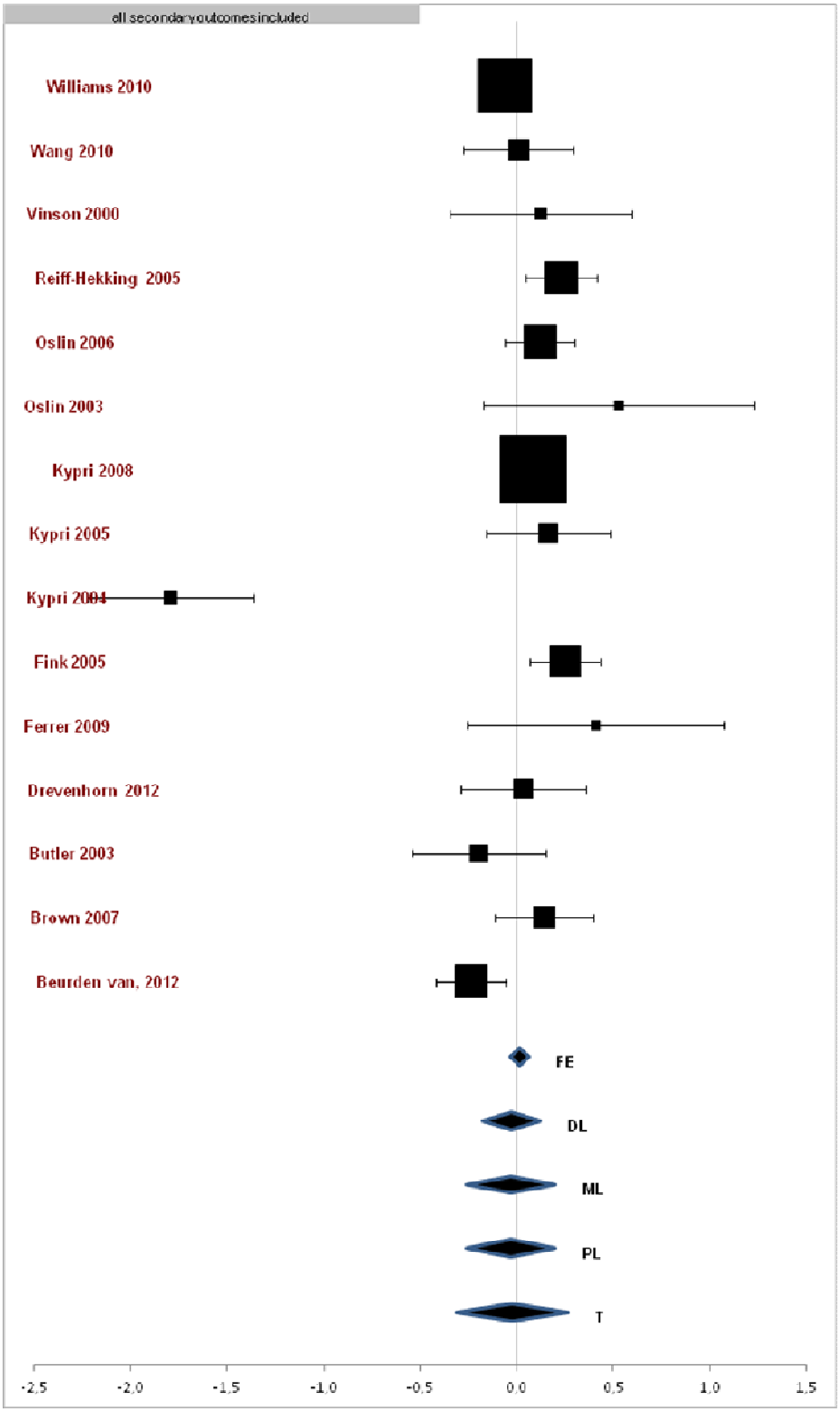
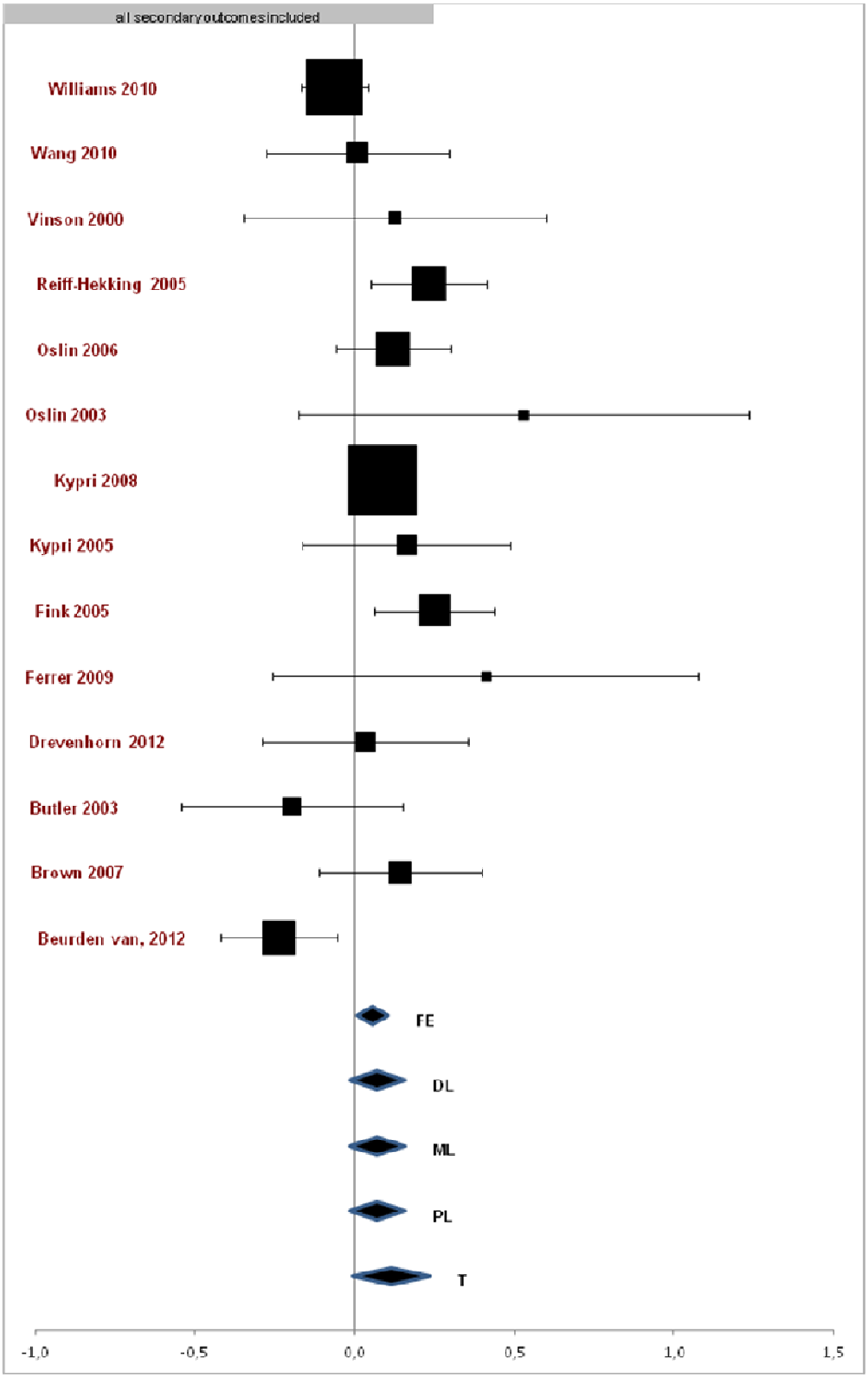


Figure 5. Forest plot for alcohol consumption outcomes, with Kypri et al 2004 excluded



Most of our presumptions from the narrative analyses were confirmed in the quantitative analyses (meta-analyses and meta-regression analyses). Education was the most common implementation strategy among the studies with significant positive outcomes. A more in-depth assessment to all studies without significant positive effects on SBI implied that study durations of studies without significant positive effects were much longer than studies that show significant positive effects. However, the analyses from the meta-regression analysis could not confirm this for any of the outcomes. In fact, in studies with outcomes for brief interventions, study durations of longer than 12 months was statistically significant more effective than study with a 12 months or shorter duration.

From the meta-analysis it can be concluded that implementation strategies of included studies had a statistical significant positive effect on screening as well as on brief intervention behaviour. The meta-regression analysis showed that combinding different types of EPOC implementation strategies caused statistical significant positive effects compared to a single type of EPOC implementation strategy. With regard to screening outcomes in specific, patient oriented combined with professional oriented implementation strategies showed strongest effects on screening behaviour. Futhermore, having mixed teams of primary care providers participating in the study had statistically significant higher effects compared to having only GP participants. With regard to brief intervention outcomes, implementation strategies had more effect when multiple components of any type of implementation strategy were applied.

On the patient level of alcohol consumption outcomes, there was no statistical significant positive effect on decreasing alcohol consumption, though there was a strong positive trend. However, the heterogeneity again was explained by a number of factors. Three different combinations of EPOC implementation strategies had statistically significant more impact than solely professional oriented implementation studies: 1) Professional combined with organisational oriented implementation strategies; 2) Professional combined with patient oriented implementation strategies; and 3) Organisational combined with patient oriented implementation strategies. This implies that causing real differences on the level of the patient, on which all included studies of this review is about, there is more required than solely professional oriented implementation strategies.

The meta-analysis results should be interpreted with caution, since it primarily informs us about the fact that implementation strategies are effective on SBI behaviour, and have high potential to cause effect on patient level. The restriction of the analysis is that it cannot tell us the effect size of the pooled studies, as we have standardized outcomes.

Strengths and limitations of the study

This review of trials was able to include the high number of 29 studies which all had a RCT or clinical controlled trial design. With the majority of these studies, we were able to perform meta-analysis and meta-regression analysis. With the exception of Anderson et al [80] on which this systematic review was built, as far as we know this is the only systematic review that included a meta-regression analysis besides the meta-analysis.

The meta-analysis should be interpreted with caution for two reasons. Firstly, it does not give information about effect sizes, as standardised effect sizes were used. Second, there was substantial heterogeneity which prevents us from mentioning intrinsic interpretable values. None the less, the meta-regression analyses helped in explaining the heterogeneity.
Furthermore, likewise as in the review of reviews of this workpackage, we experienced limited description of interventions within the papers. That makes it complicated to identify effective elements of the applied intervention strategies.

Comparison with other studies

From the review of Kaner et al (2007) it was identified that SBIs are effective in reducing alcohol consumption in primary care patients [8]. Studies that look at the intensity effect of SBIs can be identified as efficacy studies. This review of trials can be interpreted as an effectiveness study, in which the effect of SBI is investigated as a result of implementation strategies in the real practice setting [125]. We know that SBIs not only are effective but also cost-effective[8], it is evident that costs of implementing these SBIs also are taken into account. This still is a gap in the evidence, as we identified just two studies that reported about the effectiveness of the implementation strategy, as well as on the costs of the implementation strategy [113, 114]. Moreover and very important, the long-term effect of the implementation strategies remains unkown.

As mentioned, this systematic review builds on the systematic review that was done before on the same topic earlier by Anderson and colleagues [80]. It is the outcomes of their meta-regression analysis that is especially appropriate for comparing outcomes. Although the current reviews differs from their review in the number of trials that were included, we can see striking agreements. Both reviews main finding was that programs that were alcohol specific and that were multi-component seemed to be the most promising. No differences were found between educational interventions and office-based interventions. In the current review, we were did not add alcohol-specific versus not alcohol-specific to the meta-regression, though it was identified in the narrative analysis. Furthermore, we also concluded that solely professional oriented strategies did not significant differ from solely organisational oriented implementation strategies in all three outcome types. Moreover, multi-component was in both reviews of significant added value compared to monocomponent strategies. The current review even goes in more detail than Anderson et al (2004) in the sense that we were able to identify which combinations of strategies were the most effective in changing screening, brief intervention, or alcohol consumption behaviour.

Another review focused on implementing screening brief interventions for hazardous and harmful alcohol use in primary care (Nilsen et al [52]) which also was included in the review of reviews of this workpackage. Their main finding was that the implementation strategy effectiveness generally increased with the intensity of the intervention effort, i.e. the amount of training and/or support provided. This is slightly different from our finding of multi-component implementation strategies to be more effective than monocomponent strategies, in the sense that we took the number of components into account and Nilsen et al took the intensity of a single strategy on itself into account. However, their included studies were too heterogeneous to provide conclusive answers [52].

In the systematic review of Williams et al [126] the authors applied a different method from assessing individual studies, i.e. the Consolidated Framework for Implementation Research (CFIR). This framework is composed of five major domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation [127]. The main findings of Williams et al was that comparisons were limited due to heterogeneity between studies. Nevertheless, one implementation program reported a high rate of screening relative to other programs (93%) and could be distinguished by its use of strategies that related to the Inner Setting, Outer Setting, and Process of Implementation domains of the CFIR. It is difficult to compare these findings with the results of this review, due to very different methods of analysis [126]. Still, also the Williams et al review emphasises the use of multiple types of implementation strategies, just as it was identified from our review.

There are many sources that identified a number of barriers and facilitators for implementing (screening and) brief interventions for hazardous and harmful alcohol use in primary care, such as the qualitative review of Johnson et al [128]: adequate resources, training and the identification of those at risk without stereotyping seemed to be the main facilitators in primary care. Our systematic review can partly confirm this. Respectively, the facilitators are organisational, professional and patient oriented strategies. Based on the outcomes of our review we would recommend to combine these strategies, as it was shown that combined strategies have more effect compared to one domain of implementation strategy.

In one of our study outcomes, which was brief interventions, a study caused that much heterogeneity that it maked the pooled effect insignificant [102]. The study was excluded with the rationale that the effect of the study was more due to the patients' choice of which risky lifestyle to address, than on the effect of the implementation strategy. In a post-hoc meta-analysis without the study, it was shown that the implementation strategies actually were of statistical significant effect on brief interventions. We saw a comparative finding from the Anderson et al review, in which was shown that studies with alcohol specific implementation strategies were significantly more effective than studies that focused with the implementation strategy on multiple lifestyles [80].

Implications for research

It was shown that positive outcomes on professional behaviour do not automatically result in a reduction of patients' alcohol consumption. Therefore, future studies on implementing SBI in order to reduce hazardous and harmful alcohol consumption, should include outcome measures on different levels. Another knowledge gap was identified for the causal factors of making positive effects on screening, brief intervention and alcohol consumption behaviour enduring in the long term. This implies that it is possible to change behaviour (both on professional as well as on patient level), but it is hard to maintain these changes in the long term. In addition, in studies that combined organisational with patient oriented strategies, no outcomes on screening nor on brief intervention were reported. As a result, effects of this implementation strategy on provider behaviour remain unknown.

From our meta-regression analysis it was identified that implementation strategies focused on having mixed teams of primary care providers participating in the study had statistically significant higher effects compared to having only GP participants. It is worthwhile investigating to what extent other providers in primary healthcare can be involved and evaluate the effects on SBI and patients' alcohol consumption. Also more research on cost and cost-effectiveness is necessary. Only two of the included studies reported on cost outcomes, and therefore we were not able to draw conclusions on cost and cost-effectiveness. Besides, the effects of negative or penalising interventions remain unknown.

Lastly, our experience from this second as well as the review of reviews of this workpackage, were the shortcomings of many studies to describe applied implementation strategy very sparsely. For future research we subsequently recommend to describe in detail components of implementation strategies, in order for future researchers to be able to identify effective elements of implementation strategies.

Conclusion

These results show that SBI behaviour can be statistically significant improved, but in our meta-analysis we were unable to give implications about the strength of this effect. However, the meta-regression analysis showed that multiple types of EPOC implementation strategies caused statistical significant positive effects compared to a single type of EPOC implementation strategy. With regard to specifically the screening outcome, we identified a significant positive added value by having mixed teams of primary care providers participating in the study compared to solely GP participants. Additionally, patient oriented combined with professional oriented implementation strategies showed strongest effects on screening as well as on brief intervention behaviour.

On the patient level of alcohol consumption outcomes, there was no statistical significant positive effect on decreasing alcohol consumption, though there was a strong positive trend. The heterogeneity primarily was explained by the type of (combined) implementation strategies. Three different combinations of EPOC implementation strategies had statistically significant more impact than solely professional oriented implementation studies: 1) Professional combined with organisational oriented implementation strategies; 2) Professional combined with patient oriented implementation strategies; and 3) Organisational combined with patient oriented implementation strategies.

We saw that having positive effects on SBI behaviour, does not automatically imply that the patient actually will decrease its' alcohol consumption. The meta-analysis results should be interpreted with caution, since it primarily informs us about the fact that implementation strategies are effective on SBI behaviour, and have high potential to cause effect on patient level.

We were not able to identify endurance of effects on the long term and any negative or penalising intervention strategies for behaviour change were not identified. For example, penalising providers when certain thresholds of screening rates are not achieved.

3.4 WP2 STEP 2 APPENDIX

Medline pre-2008 EPOC search:

1. exp *education,continuing/
2. (education$ adj2 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or Visit?)).tw.
3. (behavio?r$ adj2 intervention?).tw.
4. pamphlets/
5. (leaflet? or booklet? or poster? or pamphlet?).tw.
6. ((written or printed or oral) adj information).tw.
7. (information$ adj2 campaign).tw.
8. (education$ adj1 (method? or material?)).tw.
9. *advance directives/
10. outreach.tw.
11. ((opinion or education$ or influential) adj1 leader?).tw.
12. facilitator?.tw.
13. academic detailing.tw.
14. consensus conference?.tw.
15. *guideline adherence/
16. practice guideline?.tw.
17. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$)).tw.
18. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.
19. *reminder systems/
20. reminder?.tw.
21. (recall adj2 system$).tw.
22. (prompter? or prompting).tw.
23. algorithm?.tw.
24. *feedback/ or feedback.tw.
25. chart review$.tw.
26. ((effect? or impact or records or chart?) adj2 audit).tw.
27. compliance.tw.
28. marketing.tw.
29. or/1-28

30. exp *reimbursement mechanisms/
31. fee for service.tw.
32. *capitation fee/
33. *"deductibles and coinsurance"/
34. cost shar$.tw.
35. (copayment? or co payment?).tw.
36. (prepay$ or prepaid or prospective payment?).tw.
37. *hospital charges/
38. formular$.tw.
39. fundhold$.tw.
40. *medicaid/
41. *medicare/
42. blue cross.tw.
43. or/30-42

44. *nurse clinicians/
45. *nurse midwives/
46. *nurse practitioners/
47. (nurse adj (rehabilitator? or clinician? or practitioner? or midwi$)).tw.
48. *pharmacists/
49. clinical pharmacist?.tw.
50. paramedic?.tw.
51. *patient care team/
52. exp *patient care planning/
53. (team? adj2 (care or treatment or assessment or consultation)).tw.
54. (integrat$ adj2 (care or service?)).tw.

55. (care adj2 (coordinat$ or program$ or continuity)).tw.
56. (case adj1 management).tw.
57. exp *ambulatory care facilities/
58. *ambulatory care/
59. or/44-58

60. *home care services/
61. *hospices/
62. *nursing homes/
63. *office visits/
64. *house calls/
65. *day care/
66. *aftercare/
67. *community health nursing/
68. (chang$ adj1 location?).tw.
69. domiciliary.tw.
70. (home adj1 treat$).tw.
71. day surgery.tw.
72. *medical records/
73. *medical records systems, computerized/
74. (information adj2 (management or system?)).tw.
75. *peer review/
76. *utilization review/
77. exp *health services misuse/
78. or/60-77

79. *physician's practice patterns/
80. quality assurance.tw.
81. *process assessment/ [health care]
82. *program evaluation/
83. *length of stay/
84. (early adj1 discharg$).tw.
85. discharge planning.tw.
86. offset.tw.
87. triage.tw.
88. exp *"Referral and Consultation"/ and "consultation"/
89. *drug therapy,computer assisted/
90. near patient testing.tw.
91. *medical history taking/
92. *telephone/
93. (physician patient adj (interaction? or relationship?)).tw.
94. *health maintenance organizations/
95. managed care.tw.
96. (hospital? adj1 merg$).tw.
97. or/79-96

98. ((standard or usual or routine or regular or traditional or conventional or pattern) adj2 care).tw.
99. (program$ adj2 (reduc$ or increas$ or decreas$ or chang$ or improv$ or modify$ or monitor$ or care)).tw.
100. (program$ adj1 (health or care or intervention?)).tw.
101. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 treatment program$).tw.
102. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 care program$).tw.
103. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 screening program$).tw.
104. ((effect? or impact or evaluat$ or introduc$ or compara$) adj2 prevent$ program$).tw.
105. (computer$ adj2 (dosage or dosing or diagnosis or therapy or decision?)).tw.
106. ((introduc$ or impact or effect? or implement$ or computer$) adj2 protocol?).tw.
107. ((effect? or impact or introduc$) adj2 (legislation or regulations or policy)).tw.
108. or/98-107

109. 29 or 43 or 59 or 78 or 97 or 108

110. randomized controlled trial.pt.
111. random$.tw.
112. control$.tw.
113. intervention?.tw.
114. evaluat$.tw.
115. or/110-114
116. animal/
117. human/
118. 116 not (116 and 117)
119. 115 not 118

120. 109 and 119

Medline paper specific search terms added to pre-2008 EPOC search:

121. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
122. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
123. Exp Alcohol drinking/
124. 121 or 122 or 123
125. Limit 124 to "all adult (19 plus years)"
126. Exp Physicians-Family /
127. Exp Primary-Health-Care /
128. Exp Family-Practice /
129. Exp Rural-Health /
130. Exp Rural-Health-Services /
131. Exp Community-Health-Services /
132. Exp Comprehensive-Health-Care
133. 126 or 127 or 128 or 129 or 130 or 131 or 132
134. 124 and 132
135. 133 and 120

Medline current EPOC search

1. intervention?.ti. or (intervention? adj6 (clinician? or collaborat$ or community or complex or DESIGN$ or doctor? or educational or family doctor? or family physician? or family practitioner? or financial or GP or general practice? or hospital? or impact? or improv$ or individuali?e? or individuali?ing or interdisciplin$ or multicomponent or multi-component or multidisciplin$ or multi-disciplin$ or multifacet$ or multi-facet$ or multimodal$ or multi-modal$ or personali?e? or personali?ing or pharmacies or pharmacist? or pharmacy or physician? or practitioner? or prescrib$ or prescription? or primary care or professional$ or provider? or regulatory or regulatory or tailor$ or target$ or team$ or usual care)).ab.
2. (pre-intervention? or preintervention? or "pre intervention?" or post-intervention? or postintervention? or "post intervention?").ti,ab. [added 2.4]
3. (hospital$ or patient?).hw. and (study or studies or care or health$ or practitioner? or provider? or physician? or nurse? or nursing or doctor?).ti,hw.
4. demonstration project?.ti,ab.
5. (pre-post or "pre test$" or pretest$ or posttest$ or "post test$" or (pre adj5 post)).ti,ab.
6. (pre-workshop or post-workshop or (before adj3 workshop) or (after adj3 workshop)).ti,ab.
7. trial.ti. or ((study adj3 aim?) or "our study").ab.
8. (before adj10 (after or during)).ti,ab.
9. ("quasi-experiment$" or quasiexperiment$ or "quasi random$" or quasirandom$ or "quasi control$" or quasicontrol$ or ((quasi$ or experimental) adj3 (method$ or study or trial or design$))).ti,ab,hw.
10. ("time series" adj2 interrupt$).ti,ab,hw.
11. (time points adj3 (over or multiple or three or four or five or six or seven or eight or nine or ten or eleven or twelve or month$ or hour? or day? or "more than")).ab.
12. pilot.ti.
13. Pilot projects/
14. (clinical trial or controlled clinical trial or multicenter study).pt.

15. (multicentre or multicenter or multi-centre or multi-center).ti.
16. random$.ti,ab. or controlled.ti.
17. (control adj3 (area or cohort? or compare? or condition or design or group? or intervention? or participant? or study)).ab. not (controlled clinical trial or randomized controlled trial).pt.
18. evaluation studies as topic/ or prospective studies/ or retrospective studies/ [Added Jan 2013]
19. (utili?ation or programme or programmes).ti. [Added Jan 2013]
20. (during adj5 period).ti,ab. [Added Jan 2013]
21. ((strategy or strategies) adj2 (improv$ or education$)).ti,ab. [Added Jan 2013]
22. "comment on".cm. or review.pt. or (review not "peer review$").ti. or randomized controlled trial.pt. [Changed Jan 2013]
23. (rat or rats or cow or cows or chicken? or horse or horses or mice or mouse or bovine or animal?).ti.
24. exp animals/ not humans.sh.
25. (or/1-21) not (or/22-24)

Medline paper specific search terms added to current EPOC search:

26. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
27. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
28. Exp Alcohol drinking/
29. 26 or 27 or 28
30. limit 29 to "all adult (19 plus years)"
31. (Comprehensive Health* or Rural Health* or Suburban Health* or Community Health* or Family Practic* or General Practic* or General Practitioner* or Family Physician* or Primary Physician* or Primary Health* or Primary Care* or Community Care).ti,ab.
32. Comprehensive Health Care/ or Rural Health Services/ or Suburban Health Services/ or Community Health Planning/ or Community Health Services/ or Community Health Centers/ or Family Practice/ or General Practice/ or General Practitioners/ or Physicians, Family/ or Physicians, Primary Care/ or Primary Health Care/
33. 31 or 32
34. 33 and 29
35. 34 and 25

Embase pre-2008 EPOC search:

1. (education$ adj2 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or visit?)).tw.
2. (behavio?r$ adj2 intervention?).tw.
3. (leaflet? or booklet? or poster or posters).tw.
4. ((written or printed or oral) adj information).tw.
5. (information$ adj2 campaign).tw.
6. (education$ adj1 (method? or material?)).tw.
7. outreach.tw.
8. ((opinion or education$ or influential) adj1 leader?).tw.
9. facilitator?.tw.
10. academic detailing.tw.
11. consensus conference?.tw.
12. practice guideline?.tw.
13. 13. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$ or compli$)).tw.
14. ((introduc$ or impact or effect? or implement$ or computer$ or compli$) adj2 protocol?).tw.

15. ((introduc$ or impact or effect? or implement$ or computer$ or compli$) adj2 algorithm?).tw.
16. clinical pathway?.tw.
17. critical pathway?.tw.
18. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.
19. reminder?.tw.
20. (recall adj2 system$).tw.
21. (prompter? or prompting).tw.
22. advance directive?.tw.
23. feedback.tw.
24. chart review$.tw.
25. ((effect? or impact or records or chart?) adj2 audit).tw.
26. (compliance and (physician? or doctor? or practitioner? or pharmacist? or nurse? or health)).tw.
27. marketing.tw.
28. ((cost or clinical or medical) adj information).tw.
29. medical education/
30. medical audit/
31. continuing education/
32. postgraduate education/
33. or/1-32 professional oriented interventions
34. fee for service.tw.
35. cost shar$.tw.
36. (copayment? or co payment?).tw.
37. (prepay$ or prepaid or prospective payment?).tw.
38. formular$.tw.
39. fundhold$.tw.
40. (blue cross or bluecross).tw.
41. voucher?.tw.
42. (free adj2 care).tw.
43. exp health insurance/
44. health care costs/
45. health care financing/
46. medical fee/
47. prospective payment/
48. or/34-47 financial interventions

49. (nurse adj (rehabilitator? or clinician? or practitioner? or midwi$)).tw.
50. ((nurse or midwi$ or practitioner) adj managed).tw.
51. clinical pharmacist?.tw.
52. paramedic?.tw.
53. exp paramedical personnel/
54. general practitioner/
55. physician/
56. (team adj2 (care or treatment or assessment or consultation)).tw.
57. (integrat$ adj2 (care or service?)).tw.
58. (care adj2 (coordinat$ or program$ or continuity)).tw.
59. (case adj1 management).tw.
60. patient care/
61. (chang$ adj1 location?).tw.
62. domiciliary.tw.
63. (home adj1 (treat$ or visit?)).tw.
64. day surgery.tw.
65. exp primary health care/
66. ambulatory surgery/

67. nursing home/
68. day hospital/
69. outpatient care/
70. terminal care/
71. group practice/
72. general practice/
73. rural health care/
74. community mental health center/
75. information system/
76. medical record/
77. (information adj2 (management or system?)).tw.
78. peer review/
79. professional standards review organization/
80. clinical practice/
81. quality assurance.tw.
82. exp health care delivery/
83. health care quality/
84. professional practice/
85. (early adj1 discharg$).tw.
86. discharge planning.tw.
87. offset.tw.
88. triage.tw.
89. near patient testing.tw.
90. patient referral/
91. (physician patient adj (interaction? or relationship?)).tw.
92. managed care.tw.
93. health care organization/
94. health maintenance organization/
95. health care system/
96. health care access/
97. (hospital? adj1 merg$).tw.
98. (computer$ adj2 (dosage or dosing or diagnosis therapy or decision?)).tw.
99. (computer$ adj2 (diagnosis or therapy)).tw.
100. gatekeep$.tw.
101. or/49-100

102. ((standard or usual or routine or regular or traditional or conventional or pattern) adj2 care).tw.
103. (program$ adj2 (reduc$ or increas$ or decreas$ or chang$ or improv$ or modif$ or monitor$ or care)).tw.
104. (program$ adj1 (health or care or intervention?)).tw.
105. ((effect or impact or introduc$) adj2 (legislation or regulations or policy)).tw.
106. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 treatment program$).tw.
107. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 care program$).tw.
108. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 screening program$).tw.
109. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 prevention program$).tw.
110. or/102-109

111. 33 or 48 or 101 or 110

112. Randomized controlled trial/
113. random$.tw.
114. control$.tw.
115. intervention$.tw.

116. evaluat$.tw.
117. or/112-116
118. nonhuman/
119. 117 not 118
120. 111 and 119

Embase paper specific search terms added to pre-2008 EPOC search:

121. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
122. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
123. Exp Alcohol drinking/
124. 123 or 124 or 125
125. limit 126 to (adult <18 to 64 years> or aged <65+ years>)

126. Exp Physicians-Family /
127. Exp Family-Medicine /
128. Exp Primary-Health-Care /
129. Exp Family-Practice /
130. Exp Rural-Health /
131. Exp Rural-Health-Services /
132. Exp Community-Health-Services /
133. 128 or 129 or 130 or 131 or 132 or 133 or 134 or 135

134. 127 and 136 Combining these terms

135. 137 and 122

Embase current EPOC search:

1. intervention?.ti. or (intervention? adj6 (clinician? or collaborat$ or community or complex or DESIGN$ or doctor? or educational or family doctor? or family physician? or family practitioner? or financial or GP or general practice? or hospital? or impact? or improv$ or individuali?e? or individuali?ing or interdisciplin$ or multicomponent or multi-component or multidisciplin$ or multi-disciplin$ or multifacet$ or multi-facet$ or multimodal$ or multi-modal$ or personali?e? or personali?ing or pharmacies or pharmacist? or pharmacy or physician? or practitioner? or prescrib$ or prescription? or primary care or professional$ or provider? or regulatory or regulatory or tailor$ or target$ or team$ or usual care)).ab.
2. (pre-intervention? or preintervention? or "pre intervention?" or post-intervention? or postintervention? or "post intervention?").ti,ab. [added 2.4]
3. (hospital$ or patient?).hw. and (study or studies or care or health$ or practitioner? or provider? or physician? or nurse? or nursing or doctor?).ti,hw.
4. demonstration project?.ti,ab.
5. (pre-post or "pre test$" or pretest$ or posttest$ or "post test$" or (pre adj5 post)).ti,ab.
6. (pre-workshop or post-workshop or (before adj3 workshop) or (after adj3 workshop)).ti,ab.
7. trial.ti. or ((study adj3 aim?) or "our study").ab.
8. (before adj10 (after or during)).ti,ab.
9. (time points adj3 (over or multiple or three or four or five or six or seven or eight or nine or ten or eleven or twelve or month$ or hour? or day? or "more than")).ab.
10. pilot.ti. or (pilot adj (project? or study or trial)).ab.
11. (multicentre or multicenter or multi-centre or multi-center).ti.
12. random$.ti,ab. or controlled.ti.
13. (control adj3 (area or cohort? or compare? or condition or design or group? or intervention? or participant? or study)).ab.
14. ((evaluation or prospective or retrospective) adj study).ti,ab. [Added Jan 2013]
15. (utili?ation or programme or programmes).ti. [Added Jan 2013]
16. (during adj5 period).ti,ab. [Added Jan 2013]
17. ((strategy or strategies) adj2 (improv$ or education$)).ti,ab. [Added Jan 2013]
18. *experimental design/ or *pilot study/ or quasi experimental study/

19. ("quasi-experiment$" or quasiexperiment$ or "quasi random$" or quasirandom$ or "quasi control$" or quasicontrol$ or ((quasi$ or experimental) adj3 (method$ or study or trial or design$))).ti,ab.
20. ("time series" adj2 interrupt$).ti,ab.
21. or/1-20
22. (rat or rats or cow or cows or chicken? or horse or horses or mice or mouse or bovine or animal?).ti.
23. (exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/) and (human/ or normal human/ or human cell/)
24. (exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/) not 23
25. 21 not (or/22,24) [EPOC Filter 2.5--Added Lines Jan. 2013]

Embase paper specific search terms added to current EPOC search:

26. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
27. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
28. Exp Alcohol drinking/
29. 26 or 27 or 28
30. limit 29 to (adult <18 to 64 years> or aged <65+ years>)

31. (Comprehensive Health* or Rural Health* or Suburban Health* or Community Health* or Family Practic* or General Practic* or General Practitioner* or Family Physician* or Primary Physician* or Primary Health* or Primary Care* or Community Care).ti,ab.
32. Exp Rural health care/ or Exp community care/ or exp general practice/ or exp general practitioner/ or Exp primary health care/

33. 31 or 32

34. 30 and 33

35. 34 and 25

CINAHL pre-2008 EPOC search:

1. (MM education, continuing or MM education, interdisciplinary+) or (education* N2 (program* or intervention# or meeting# or session# or strateg* or workshop# or visit#)) or (behavio#r* N2 intervention#) or (MM pamphlets) or (leaflet# or booklet# or poster or posters) or ((written N1 information) or (printed N1 information) or (oral N1 information)) or (information* N2 campaign) or (education* N1 (method# or material#)) or (MM advance directives or MM living wills) or (outreach) or ((opinion N1 leader#) or (educational* N1 leader#) or (influential N1 leader#)) or (facilitator#) or (academic detailing) or (consensus conference#) or (practice guideline#) or (guideline# N2 (introduc* or issu* or impact or effect# or disseminat* or distribut*)) or ((effect# N2 training program*) or (impact N2 training program*) or (evaluat* N2 training program*) or (introduc* N2 training program*) or (compar* N2 training program*)) or (MM reminder systems) or (reminder#) or (recall N2 system*) or (prompter# or prompting) or (algorithm#) or (MM feedback or feedback) or (chart review*) or ((effect# N2 audit) or (impact N2 audit) or (records N2 audit) or (chart# N2 audit)) or (compliance) or (marketing)

2. (MM reimbursement mechanisms+) or (fee for service) or (MM “fees and charges”+) or (cost shar*) or (Copayment# or co payment#) or (prepay* or prepaid or prospective payment#) or (MM managed care programs+) or (formular*) or (fundhold*) or (MM medicaid) or (MM medicare) or (blue cross)

3. (MM advanced practice nurses+) or (MM nurse consultants) or (nurse N1 (rehabilitator# or clinician# or practitioner# or midwi*)) or (MM pharmacists) or (clinical pharmacist#) or (paramedic#) or (MM multidisciplinary care team) or (MM protocols+) or (team# N2 (care or treatment or assessment or consultation)) or (integrat* N2 (care or service#)) or (MM health care delivery, integrated) or (care N2 (coordinat* or program* or continuity)) or (MM continuity of patient care+) or (MM case managers) or (case N1 management)

4. (MM ambulatory care facilities+) or (MM ambulatory care) or (MM home health care+) or (MM hospices) or (MM nursing homes+) or (MM office visits) or (MM office nursing) or (MM home visits) or (MM day

care) or (MM after care) or (MM community health nursing+) or (chang* N1 location#) or (domiciliary) or (home N1 treat*) or (day surgery)

5. (MM medical records) or (MM decision making, computer assisted+) or (MM computerized patient record) or (MM nursing records) or (MM problem oriented records) or (information N2 (management or system#)) or (MM health service misuse) or (MM quality assessment+) or (quality assurance) or (MM length of stay) or (early N1 discharg*) or (discharge planning) or (offset) or (triages) or (MM "Referral and consultation"+) or (gatekeep*) or (MM drug therapy, computer assisted) or (near patient test*) or (MM patient history taking+) or (MM telephone) or (MM telehealth+) or (physician patient N1 (interaction# or relationship#)) or (MM health maintenance organizations) or (managed care) or (hospital# N1 merg*)

6. ((standard N2 care) or (usual N2 care) or (routine N2 care) or (regular N2 care) or (traditional N2 care) or (conventional N2 care) or (pattern N2 care)) or (program* N2 (reduc* or increase* or decreas* or chang* or improve* or modify* or monitor* or care)) or (program* N1 (health or care or intervention#)) or ((effect# N2 (legislation or regulations or policy)) or (impact N2 (legislation or regulations or policy)) or (introduce* N2 (legislation or regulations or policy))) or ((effect# N2 treatment program*) or (impact N2 treatment program*) or (evaluat* N2 treatment program*) or (introduce* N2 treatment program*) or (compare* N2 treatment program*)) or ((effect# N2 care program*) or (impact N2 care program*) or (evaluat* N2 care program*) or (introduce* N2 care program*) or (compare* N2 care program*)) or ((effect# N2 screening program*) or (impact N2 screening program*) or (evaluat* N2 screening program*) or (introduce* N2 screening program*) or (compare* N2 screening program*)) or ((effect# N2 prevent* program*) or (impact N2 prevent* program*) or (evaluat* N2 prevent* program*) or (introduce* N2 prevent* program*) or (compare* N2 prevent* program*)) or ((computer* N2 dosage) or (computer* N2 dosing) or (computer* N2 diagnosis) or (computer* N2 therapy) or (computer* N2 decision#)) or ((introduc* N2 protocol#) or (impact N2 protocol#) or (effect# N2 protocol#) or (implement* N2 protocol#) or (computer* N2 protocol#))

7. S1 or S2 or S3 or S4 or S5 or S6

8. (MH clinical trials) or (control*) or (random*) or (MH comparative studies) or (experiment*) or (time N1 series) or (impact) or (intervention#) or (evaluat*) or (effect#) or (MH pretest-posttest design+) or (MH quasi-experimental studies+)

9. S7 and S8

10. JN "cochrane database of systematic reviews"

11. S9 not S10

Cinahl paper specific search terms added to pre-2008 EPOC search:

12. ((alcohol N1 (drink* or consumption or intoxication)) not (dependence or dependent)) or (((alcohol N1 (abuse or hazardous or harmful)) not (dependence or dependent))) or (MH alcohol drinking)
Limiter= age group: 'all adult'

13. (MH "Physicians, Family") or ("Family Medicine") or (MH "Primary Health Care") or (MH "Family Practice") or (MH "Rural Health") or (MH "Rural Health Services") or (MH "Community Health Services+") or (Comprehensive Health Care)

14. S12 and S13

15. S14 and S11

CINAHL current EPOC search:

1. (MH "Quasi-Experimental Studies")
2. TI (intervention* or multiintervention* or multi-intervention* or postintervention* or post-intervention* or preintervention* or pre-intervention*) or AB (intervention* or multiintervention* or multi-intervention* or postintervention* or post-intervention* or preintervention* or pre-intervention*)

3. TI (pre-test* or pretest* or posttest* or post-test*) or AB (pre-test* or pretest* or posttest* or "post test*) OR TI (preimplement*" or pre-implement*) or AB (pre-implement* or preimplement*)
4. MH Experimental Studies or Community Trials or Community Trials or Pretest-Posttest Design + or Quasi-Experimental Studies + Pilot Studies or Policy Studies + Multicenter Studies
5. TI ((comparative N2 study) or (comparative N2 studies) or evaluation study or evaluation studies) or AB ((comparative N2 study) or (comparative N2 studies) or evaluation study or evaluation studies)
6. MH "Multiple Time Series" or MH "Time Series"
7. TI pre w7 post or AB pre w7 post
8. TI ((quasi-experiment* or quasiexperiment* or quasi-random* or quasirandom* or quasi control* or quasicontrol* or quasi* W3 method* or quasi* W3 study or quasi* W3 studies or quasi* W3 trial or quasi* W3 design* or experimental W3 method* or experimental W3 study or experimental W3 studies or experimental W3 trial or experimental W3 design*)) or AB ((quasi-experiment* or quasiexperiment* or quasi-random* or quasirandom* or quasi control* or quasicontrol* or quasi* W3 method* or quasi* W3 study or quasi* W3 studies or quasi* W3 trial or quasi* W3 design* or experimental W3 method* or experimental W3 study or experimental W3 studies or experimental W3 trial or experimental W3 design*))
9. TI ((time point*) or (period* n4 interrupted) or (period* n4 multiple) or (period* n4 time) or (period* n4 various) or (period* n4 varying) or (period* n4 week*) or (period* n4 month*) or (period* n4 year*)) or AB ((time point*) or (period* n4 interrupted) or (period* n4 multiple) or (period* n4 time) or (period* n4 various) or (period* n4 varying) or (period* n4 week*) or (period* n4 month*) or (period* n4 year*))
10. AB (before* n10 during or before n10 after) or AU (before* n10 during or before n10 after)
11. TI time series
12. AB time series
13. AB "before-and-after"
14. (MH "Pilot Studies")
15. TI pilot
16. TI (collaborativ* or collaboration* or tailored or personalised or personalized) or AB (collaborativ* or collaboration* or tailored or personalised or personalized)
17. (intervention n6 clinician*) or (intervention n6 community) or (intervention n6 complex) or (intervention n6 design*) or (intervention n6 doctor*) or (intervention n6 educational) or (intervention n6 family doctor*) or (intervention n6 family physician*) or (intervention n6 family practitioner*) or (intervention n6 financial) or (intervention n6 GP) or (intervention n6 general practice*) Or (intervention n6 hospital*) or (intervention n6 impact*) Or (intervention n6 improv*) or (intervention n6 individualize*) Or (intervention n6 individualise*) or (intervention n6 individualizing) or (intervention n6 individualising) or (intervention n6 interdisciplin*) or (intervention n6 multicomponent) or (intervention n6 multi-component) or (intervention n6 multidisciplin*) or (intervention n6 multi-disciplin*) or (intervention n6 multifacet*) or (intervention n6 multi-facet*) or (intervention n6 multimodal*) or (intervention n6 multi-modal*) or (intervention n6 personalize*) or(intervention n6 personalise*) or (intervention n6 personalizing) or (intervention n6 personalising) or (intervention n6 pharmaci*) or (intervention n6 pharmacist*) or (intervention n6 pharmacy) or (intervention n6 physician*) or (intervention n6 practitioner*) Or (intervention n6 prescrib*) or (intervention n6 prescription*) or (intervention n6 primary care) or (intervention n6 professional*) or (intervention* n6 provider*) or (intervention* n6 regulatory) or (intervention n6 regulatory) or (intervention n6 tailor*) or (intervention n6 target*) or (intervention n6 team*) or (intervention n6 usual care)
18. TI (demonstration project OR demonstration projects OR preimplement* or pre-implement* or post-implement* or postimplement*) or AB (demonstration project OR demonstration projects OR preimplement* or pre-implement* or post-implement* or postimplement*)
19. TI (pre-workshop or preworkshop or post-workshop or postworkshop or (before n3 workshop) or (after n3 workshop)) or AB (pre-workshop or preworkshop or post-workshop or postworkshop or (before n3 workshop) or (after n3 workshop))
20. TI (trial or (study n3 aim) or "our study") or AB ((study n3 aim) or "our study")
21. TI random* OR controlled
22. TI (multicentre or multicenter or multi-centre or multi-center) or AB random*

23. TI ((control w3 area) or (control w3 cohort*) or (control w3 compar*) or (control w3 condition) or (control w3 group*) or (control w3 intervention*) or (control w3 participant*) or (control w3 study)) or AB ((control w3 area) or (control w3 cohort*) or (control w3 compar*) or (control w3 condition) or (control w3 group*) or (control w3 intervention*) or (control w3 participant*) or (control w3 study))
24. TI ((time points n3 over) or (time points n3 multiple) or (time points n3 three) or (time points n3 four) or (time points n3 five) or (time points n3 six) or (time points n3 seven) or (time points n3 eight) or (time points n3 nine) or (time points n3 ten) or (time points n3 eleven) or (time points n3 twelve) or (time points n3 month*) or (time points n3 hour*) or (time points n3 day*) or (time points n3 "more than")) or AB ((time points n3 over) or (time points n3 multiple) or (time points n3 three) or (time points n3 four) or (time points n3 five) or (time points n3 six) or (time points n3 seven) or (time points n3 eight) or (time points n3 nine) or (time points n3 ten) or (time points n3 eleven) or (time points n3 twelve) or (time points n3 month*) or (time points n3 hour*) or (time points n3 day*) or (time points n3 "more than"))
25. S1 or S2 or S3 or S4 or S5 or S6 or S7 or S8 or S9 or S10 or S11 or S12 or S13 or S14 or S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 or S24

Cinahl paper specific search terms added to current EPOC search:

26. ((alcohol N1 (drink* or consumption or intoxication)) not (dependence or dependent)) or (((alcohol N1 (abuse or hazardous or harmful)) not (dependence or dependent))) or (MH alcohol drinking)
    Limiter= age group: 'all adult'
27. TI (Comprehensive Health* OR Rural Health* OR Suburban Health* OR Community Health* OR Family Practic* OR General Practic* OR General Practitioner* OR Family Physician* OR Primary Physician* OR Primary Health* OR Primary Care* OR Community Care) OR AB (Comprehensive Health* OR Rural Health* OR Suburban Health* OR Community Health* OR Family Practic* OR General Practic* OR General Practitioner* OR Family Physician* OR Primary Physician* OR Primary Health* OR Primary Care* OR Community Care)
28. (MH "Rural Health Services") OR (MH "Community Health Services+") OR (MH "Community Health Centers") OR (MH "Family Practice") OR (MH "Physicians, Family") OR (MH "Primary Health Care")
29. S27 OR S28
30. S26 AND S29
31. S30 AND S25

CENTRAL pre-2008 EPOC search:

1. SR-EPOC (*THAT SEARCH TERM INCLUDES THE FOLLOWING:)*
   EDUCATION-CONTINUING*:ME
   EDUCATION* near PROGRAM*
   EDUCATION* near INTERVENTION*
   EDUCATION* near MEETING*
   EDUCATION* near SESSION*
   EDUCATION* near STRATEG*
   BEHAVIOR near INTERVENTION*
   BEHAVIOUR near INTERVENTION*
   PAMPHLETS:ME
   (LEAFLET* OR BOOKLET* OR POSTER OR POSTERS)
   WRITTEN next INFORMATION
   PRINTED next INFORMATION
   ORAL next INFORMATION
   FACILITATOR*
   ACADEMIC next DETAILING
   CONSENSUS next CONFERENCE
   PRACTICE next GUIDELINE*
   FEEDBACK*1:ME
   (FEEDBACK:TI or FEEDBACK:AB)

(COMPLIANCE:TI or COMPLIANCE:AB)
(MARKETING:TI or MARKETING:AB)
(REMINDER*:TI or REMINDER*:AB)
(ALGORITHM*:TI or ALGORITHM*:AB)
(OUTREACH:TI or OUTREACH:AB)
OPINION next LEADER*
EDUCATION* next LEADER*
INFLUENTIAL next LEADER*
CHART next REVIEW*
COUNSEL*:TI OR COUNSEL*:AB
REMINDER-SYSTEMS:ME
PATIENT-EDUCATION:ME
INFORMATION* near CAMPAIGN
EFFECT* near AUDIT
IMPACT near AUDIT
RECORDS near AUDIT
CHART* near AUDIT
PROMPTER* OR PROMPTING
RECALL near SYSTEM*
TRAINING next PROGRAM*
GUIDELINE* near INTRODUC*
GUIDELINE* near ISSU*
GUIDELINE* near IMPACT
GUIDELINE* near EFFECT*
GUIDELINE* near DISSEMINAT*
GUIDELINE* near DISTRIBUT*

REIMBURSEMENT-MECHANISMS*:ME
"FEE FOR SERVICE"
CAPITATION-FEE:ME
DEDUCTIBLES-AND-COINSURANCE:ME
COST next SHAR*
COPAYMENT*
CO next PAYMENT*
PREPAY
PREPAID
PROSPECTIVE NEXT PAYMENT*
HOSPITAL-CHARGES:ME
FORMULAR*
FUNDHOLD*
MEDICAID:ME
MEDICARE:ME
BLUE next CROSS

NURSE-CLINICIANS:ME
NURSE-MIDWIVES:ME
NURSE-PRACTITIONERS:ME
NURSE next REHABILITATOR*
NURSE next CLINICIAN*
NURSE next PRACTITIONER*
NURSE next MIDWI*
PHARMACISTS:ME
CLINICAL next PHARMACIST*

PARAMEDIC*
PATIENT-CARE-TEAM:ME
TEAM near CARE
TEAM near TREATMENT
INTEGRAT* near CARE
INTEGRAT* near SERVICE*
CASE next MANAGEMENT
CARE near COORDINAT*
CARE near PROGRAM*
CARE near CONTINUITY
AMBULATORY-CARE-FACILITIES*:ME
AMBULATORY-CARE:ME

HOME-CARE-SERVICES:ME
HOSPICES:ME
NURSING-HOMES:ME
OFFICE-VISITS:ME
DAY-CARE:ME
AFTERCARE:ME
COMMUNITY-HEALTH-NURSING:ME
CHANG* next LOCATION*
DOMICILIARY
HOME next TREAT*
DAY next SURGERY
MEDICAL-RECORDS:ME
MEDICAL-RECORDS-SYSTEMS-COMPUTERIZED:ME
INFORMATION near MANAGEMENT
INFORMATION near SYSTEM*
UTILIZATION-REVIEW:ME

PHYSICIAN'S-PRACTICE-PATTERNS:ME
QUALITY next ASSURANCE
PROCESS-ASSESSMENT-(HEALTH-CARE):ME
PROGRAM-EVALUATION:ME
LENGTH-OF-STAY:ME
EARLY next DISCHARGE
OFFSET
TRIAGE
MEDICAL-HISTORY-TAKING:ME
TELEPHONE:ME
HEALTH-MAINTENANCE-ORGANIZATIONS:ME
MANAGED next CARE
PHYSICIAN next PATIENT

STANDARD near CARE
USUAL near CARE
ROUTINE near CARE
REGULAR near CARE
TRADITIONAL near CARE
CONVENTIONAL near CARE
PATTERN near CARE
INTRODUC* near PROTOCOL*
IMPACT near PROTOCOL*
EFFECT* near PROTOCOL*
IMPLEMENT* near PROTOCOL*
COMPUTER* near PROTOCOL*
COMPUTER near DOSAGE
COMPUTER near DOSING
COMPUTER near DIAGNOSIS

COMPUTER near DECISION*
PROGRAM* near TREATMENT
PROGRAM* near CARE
PROGRAM* near SCREENING
PROGRAM* near PREVENTION
PROGRAM* near HEALTH
PROGRAM* near INTERVENTION*
LEGISLATION
REGULATIONS

Adding theme specific search terms:

2. ((alcohol next (drink* or consumption or intoxication)) not (dependence or dependent)) OR ((alcohol next (abuse or hazardous or harmful)) not (dependence or dependent)) OR (Exp Alcohol drinking)
3. (Exp Physicians-Family) OR (Exp Family-Medicine) OR (Exp Primary-Health-Care) OR (Exp Family-Practice) OR (Exp Rural-Health) OR (Exp Rural-Health-Services) OR (Exp Community-Health-Services) OR (physicians family or family medicine or primary health care or family practice or rural health or rural health services or community health services)
4. #2 AND #3
5. 5. #1 AND #4

CENTRAL current EPOC search:

1. MeSH descriptor: [Alcohol Drinking] explode all trees
2. alcohol next (drink* or consumption or intoxication):ti,ab,kw (Word variations have been searched)
3. alcohol next (abuse or hazardous or harmful):ti,ab,kw (Word variations have been searched)
4. #1 or #2 or #3 in Trials (Word variations have been searched)
5. MeSH descriptor: [Physicians, Family] explode all trees
6. MeSH descriptor: [Primary Health Care] explode all trees
7. MeSH descriptor: [Family Practice] explode all trees
8. MeSH descriptor: [General Practice] explode all trees
9. MeSH descriptor: [Rural Health] this term only
10. MeSH descriptor: [Rural Health Services] this term only
11. MeSH descriptor: [Community Health Services] explode all trees
12. MeSH descriptor: [Physicians, Primary Care] this term only
13. MeSH descriptor: [General Practitioners] this term only
14. MeSH descriptor: [Community Health Centers] explode all trees
15. MeSH descriptor: [Community Health Planning] this term only
16. MeSH descriptor: [Suburban Health Services] this term only
17. MeSH descriptor: [Comprehensive Health Care] explode all trees
18. (Comprehensive next Health*) or (Rural next Health*) or (Suburban next Health*) or (Community next Health*) or (Family next Practic*) or (General next Practic*) or (Family next Physician*) or (Primary next Physician*) or (Primary next Health*) or (Primary next Care*) or (Community Care):ti,ab,kw (Word variations have been searched)
19. (or 5-18) in Trials (Word variations have been searched)
20. 4 and 19 in Trials (Word variations have been searched)
21. SR-EPOC (Word variations have been searched)
22. 20 and 21 in Trials (Word variations have been searched)

Optimizing Delivery of Health Care Interventions (ODHIN)

Knowledge base of successful implementation of screening and brief intervention for lifestyle issues in every day routine primary health care practice

Deliverable 2.1, Work Package 2: Knowledge base, Step 3: Comparison review

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December 2013

4. WP2 Step 3: Narrative comparison review

4.1 WP2 Step 3 methods

Identification of studies

This study comprises a narrative comparison review to gain up-to-date insight into the published evidence in the field of implementing SBI with regard to smoking, diet and exercise in the primary healthcare setting, and to compare the results with the evidence found in step 2 on the effectiveness of implementation strategies for SBI concerning alcohol consumption. To do so, we conducted searches in Pubmed and the Cochrane Central register of controlled trials from October 2008 till November 2013.

The search was split up and combined into four sets by the Boolean operator AND:

Set 1: primary health care

Set 2: systematic reviews; meta-analysis

Set 3: smoking; exercise; diet; (food; nutrition)

Set 4: 5 year limitation

The search strings for both Pubmed and Cochrane Library are attached in section 4.4 WP2 step 3: Appendices.

Furthermore, we screened included studies from the review of review in this work package, and we contacted global experts with a request to send relevant reviews.

Study selection

Two reviewers (MK, MH) independently screened resulting citations based on title and abstract. Reviews were considered eligible if they included studies concerning implementation strategies aimed at (qualified) health professionals working in the field of primary health care. Included reviews had to be based on a systematically literature search. Reviews were excluded if they didn't measure professional or patient outcomes in an empirical way or if they were narrative literature overviews.

Subsequently, the eligible reviews were obtained full text and independently assessed by two reviewers (MK, MH).

Data extraction and narrative analysis

From each eligible review, data were captured on first author, aim of the review, implementation strategy, participants, number of studies included, results, conclusions of authors and our own remarks for this workpackage.

Data synthesis and analysis

All papers were assessed with narrative analyses. In more detail, papers firstly were assessed on a) general study characteristics; b) the method of reporting effectiveness, c) key findings and, if applicable, outcomes for which an effect and statistical significance could be calculated; d) effects for subgroups or subcomponents of reviewed implementation strategies outcomes and in the absence of an overall effect. We present findings of effectiveness for each of the above described implementation strategies.

4.2 WP2 STEP 3 RESULTS

The search strategy resulted in 441 hits including the Pubmed and Cochrane databases, of which 14 were duplicates and 1 withdrawn article. The remaining 426 unduplicated citations of reviews were screened on the basis of title and abstract. Only 13 reviews were obtained full text for further assessment. One article could not be obtained full text and was subsequently excluded, also based on a second discussion about the information retrieved from the abstract. Furthermore 8 reviews did not meet the inclusion criteria after reading the full text and were also excluded. Eventually, only 3 reviews were included from this search and one review was included from the search from reviews of reviews in step 1. No reviews were included from contacting global experts. So, in total 4 reviews were included.

Three included reviews [129-131] from the current search concerned smoking cessation and were found with the Pubmed Search, the review included from step 1 concerned weight reduction [75] and was published in the Cochrane Library. The final selection of 4 reviews accounted for 71 individual studies. The 3 reviews on smoking cessation counted for 65 individual studies, of which 33 were Randomised Controlled Trials (RCTs) and 32 observational or quasi experimental studies. The Cochrane review comprised 6 RCT's. Characteristics of the included reviews are shown in table 1. Three out of four included reviews concerned implementation strategies to enhance smoking cessation interventions in primary care [129-131]. The fourth review was about assessing effectiveness of strategies to change behaviour of health professionals and organisation to promote weight reduction in a selected group of overweight and obese people [75].

The first review on smoking concerned effectiveness of financial incentives [130]. Financial incentives, for reporting smoking status and cessation advice, as a part of Quality Outcomes Framework, seem to be effective in primary care. However, it is difficult to compare with step 2 because of the lack of financial oriented trials in step 2 review of trials. To follow, Boyle et al (2010) concerned the effectiveness of electronic medical records in which tobacco status was added as a 'vital sign' as implementation strategies [129]. Effectiveness of the use of Electronic Medical Records could not be established for results on smoking cessation advice or quit rates. This agrees with some findings from step 2 (see table 3 from step 2), in which the use of electronic clinical reminders neither was significant effective (despite the trend). The third review on smoking cessation [131] comprised a variety of implementation strategies including multi-component strategies on patient, practitioner, practice and system level. As showed in table 2, only multi-component strategies appeared to be effective on smoking abstinence *and* the 5A's performance (Ask, Advice, Assess, Assist & Arrange) by GP's. No single component strategy was found to be effective on smoking abstinence. Practice level strategies had significant effects on 3 out of 5 elements of the 5A's; Ask, Assist and Advice. Practitioner performer feedback as a practitioner level strategy only had a significant effect on 'Assist'. Finally 'Adjunct counselling' as a patient level strategy had a significant effect on 'Assist' & 'Arranging follow up'. Effectiveness of multi-component interventions agrees with the findings from step 2, as shown in table 3 from step 2.

In the review on weight reduction several professional oriented and organisational oriented strategies were used; educational strategies aimed at GPs and organisational strategies in which interventions were delivered by dieticians alone or dieticians combined with GPs compared with standard care [75]. Three trials that evaluated educational interventions aimed at GPs suggested that, compared to standard care, such interventions could reduce the average weight of patients after a year (by 1.2 kg, 95% CI -0.4 to 2.8 kg); however, there was moderate unexplained heterogeneity between their results (I^2 = 41%). One trial investigated mail or phone interventions in reducing a patient's weight but found no significant effect. The strategy of sending reminders was

effective in changing doctor's practice and resulted in a significant reduction in weight among men, but not among women. Care provided by a dietician or by a combination of a GP and a dietician also showed significant weight reduction compared to usual care. In summary, there is evidence that some implementation strategies, such as educational interventions, are effective. However, the authors suggested further investigation before it will be possible to recommend them as effective strategies. Despite, positive effects from educational and organisational interventions are in line with our main findings from step 2 (see table 3 from step 2), regardless of Ferrer and Oslin from step 2 that both were not effective.

No reviews were identified concerning implementation strategies in primary care for IBI on exercise or healthy diet.

Table 1 Characteristics of included reviews in step 3, to compare with findings from step 2 (review of trials)

Author	Aim	Implementation strategy	Participants	N studies	Results	Conclusion of authors
Hamilton et al 2013 [130]	To examine evidence for the effectiveness of providing financial incentives to healthcare professionals on the provision and impact of **smoking** cessation interventions	Financial incentives	Healthcare providers, mainly from general practice	18 (3 RCT's; 15 observational) → 10 studies Quality of Outcomes Framework (QOF), targeting quality measures for chronic disease management including smoking recording or cessation activities in primary care	All scored in the mid-range for quality. 8 studies examined smoking cessation activities alone and 10 studies the UK's QOF targeting quality measures for chronic disease management including smoking recording or cessation activities. 5 non-QOF studies examined the effects of financial incentives on individual doctors and three examined effects on groups of healthcare professionals based in clinics and general practices. QOF paid to general practices → Improvements in recording smoking status ranged from 19% to 52%. Increased smoking advice by between 12.2% to 16.4%. Other interventions do also target other settings; therefore they are not reported here.	Financial incentives appear to improve recording of smoking status, and increase the provision of cessation advice and referrals to stop smoking services. Currently there is not sufficient evidence to show that financial incentives lead to reductions in smoking rates.
Boyle et al 2010 [129]	To identify studies that address the relationship	Organisational: electronic medical records	Healthcare providers from primary care	10 (2 RCT's; 8 observational or quasi-	Adding tobacco status as a vital sign resulted in an increase in some clinical	While the use of EMRs to prompt or provide feedback

	between Electronic Medical Records (EMRs) and the use or impact of **tobacco-cessation** clinical guidelines		clinics	experimental)	guideline recommended actions, particularly documentation of smoking status. There was insufficient evidence to quantify the effect of the use of an EMR on changes in patient smoking behaviors (promising results).	on the clinical treatment of tobacco dependence demonstrates some promising results, substantial additional research is needed to understand the effects of EMRs on provider and patient behavior
Papadakis et al 2010 [131]	To evaluate evidence-based strategies for increasing the delivery of **smoking cessation** treatments in primary care clinics	Various; Adjunct counselling & multi component interventions.	Primary care setting; physicians, nurses, medical assistants	37 (12 RCT patient level; 3 cluster RCT physician level; 13 cluster RCT practice level; 9 before-after controlled study)	Evidence from multiple large-scale trials was found to support the efficacy of multi-component interventions in increasing “5As” delivery. The pooled OR for multi-component interventions compared to control was 1.79 [95% CI 1.6–2.1] for “ask”, 1.6 [95% CI 1.4–1.8] for “advice”, 9.3 [95% CI 6.8–12.8] for “assist” (quit date) and 3.5 [95% CI 2.8–4.2] for “assist” (prescribe medications). Evidence was also found to support the value of practice-level interventions in increasing 5As delivery. Adjunct counseling [OR 1.7;	Multi-component interventions improve smoking outcomes in primary care settings. Future trials should attempt to isolate which components of multi-component interventions are required to optimize cost-effectiveness.

					95% CI 1.5–2.0] and multi-component interventions [OR 2.2; 95% CI 1.7–2.8] were found to significantly increase smoking abstinence.	
Flodgren et al 2010 [75]	To assess the effectiveness of strategies to change the behaviour of health professionals and the organisation of care to promote **weight reduction** in overweight and obese people	Various; professional and organization targeted interventions	Primary care, outpatient clinics and community settings. Fully qualified health professionals, working with overweight or obese adults	6 RCTs (involving more than 246 health professionals and 1324 overweight or obese patients) → primary care involved by 3 professional oriented; 1 organisational oriented	Meta-analysis of three trials that evaluated educational interventions aimed at GPs suggested that, compared to standard care, such interventions could reduce the average weight of patients after a year (by 1.2 kg, 95% CI -0.4 to 2.8 kg); however, there was moderate unexplained heterogeneity between their results (I2 = 41%). Organizational oriented study in which interventions were delivered by dietitians alone or in combination with GPs→ patients who received an intervention delivered by a doctor and dietitian lost 6.7 kg (95% CI, 5.9 to 7.5 kg) more weight than patients in the standard care group; those who received an intervention delivered by a dietitian lost 5.6 kg (95% CI, 4.8 to 6.4 kg) more weight than patients in	All of the evaluated interventions would need further investigation before it was possible to recommend them as effective strategies.

	the standard care group.

Table 2: Findings of Papadakis et al [131] summarised; effectiveness of strategies aiming at 5A's delivery for smoking cessation

Level & Strategies	Effects on Smoking Abstinence	Effects on 5A's Provider Performance
Patient level		
• Adjunct counselling;	Significant	Significant on Assisting with prescribing medication & Arranging follow-up
• Tailored print materials	Not Significant	NA
Practitioner level		
• Training	Not Significant	Not Significant
• Practitioner performance feedback	NA	Significant on Assisting; Non significant effects on Asking & Advising
Practice level		
• Screeners vital stamp	Not Significant	Significant on Asking
• Checklists	NA	Significant on Assistance
• Electronic prompts	NA	Significant on Asking
• Academic detailing	NA	Significant on Advising
• Increasing length of physician consult	NA	Significant on Advice
System level		
• Provider incentives	NA	Not Significant
• Cost free cessation medications	NA	NA
Multi component		
• Multi component	Significant	Significant - on all 5A's

NA=Not applicable

4.3 WP2 STEP 3 DISCUSSION AND CONCLUSION

In this third step of the workpackage, we narratively compared findings from the review of trials in step 2 to comparative reviews focused on other lifestyle issues suchs as smoking, unhealthy diet and non-exercise. Mainly educational, electronical and financial oriented implementation strategies were found. This means that a lot of implementation strategies from the EPOC spectrum [83] are not used or evaluated in order to improve lifestyle of patients.

Of the available evidence, we conclude that financial incentives to primary care practices were likely to have a positive effect of smoking-cessation with patients. However, in our review of trials financial oriented implementation strategies were hardly reported in included studies and thus there is no comparison possible. We actually were able to compare the use of electronic medical records as part of organisational oriented strategies. In both step two and step three, it was concluded that there were promising results, but not strong enough to statistically support the use of it. Furthermore, we saw in a smoking cessation implementation-oriented review that multi-component interventions were more likely to be effective. This is very much in line with the findings from the alcohol-focused review (step 2). Fourth, and last, we concluded that educational oriented (professional oriented) implementation strategies are likely to be effective amongst a range of lifestyles. Evidence about organisational oriented strategies remain to be insufficient to compare.

4.4 WP2 STEP 3 APPENDICES

Pubmed Search Strategy

((((((((((comprehensive health[Title/Abstract] OR comprehensive healthcare[Title/Abstract]) OR (rural health[Title/Abstract] OR rural healthcare[Title/Abstract])) OR suburban health[Title/Abstract]) OR (community health[Title/Abstract] OR community healthcare[Title/Abstract] OR community health[Title/Abstract])) OR (family practice[Title/Abstract] OR family practices[Title/Abstract])) OR (general practicability[Title/Abstract] OR general practice[Title/Abstract] OR general practices[Title/Abstract] OR general practician[Title/Abstract] OR general practicians[Title/Abstract] OR general practicioner[Title/Abstract] OR general practicioners[Title/Abstract] OR general practitioner[Title/Abstract] OR general practitioners[Title/Abstract])) OR (family physician[Title/Abstract] OR family physicians[Title/Abstract])) OR (primary health[Title/Abstract] OR primary healthcare[Title/Abstract])) OR (primary care[Title/Abstract] OR primary caregiver[Title/Abstract] OR primary caregivers[Title/Abstract] OR primary caregiving[Title/Abstract] OR primary careness[Title/Abstract] OR primary careproviders[Title/Abstract] OR primary carer[Title/Abstract] OR primary carers[Title/Abstract] OR primary cares[Title/Abstract] OR primary caretaker[Title/Abstract] OR primary caretakers[Title/Abstract])) OR Community Care[Title/Abstract]) AND ((diet[tiab] OR nutrition[tiab] OR food[tiab] OR smoking[tiab]) OR exercise[tiab] OR "smoking"[MeSH Terms] OR "diet"[MeSH Terms] OR "exercise"[MeSH Terms] OR "food"[MeSH Terms] OR ("nutritional status"[MeSH Terms] OR "nutritional sciences"[MeSH Terms])) AND (Review[ptyp] AND "2008/11/14"[PDAT] : "2013/11/12"[PDAT])

CENTRAL Search strategy

MeSH descriptors: [Physicians, Family] explode all trees, [Primary Health Care] explode all trees, [Family Practice] explode all trees, [General Practice] explode all trees, [Rural Health] this term only, [Rural Health Services] this term only, [Rural Health Services] explode all trees, [Physicians, Primary Care] this term only, [General Practitioners] this term only, [Community Health Centers] explode all trees, [Community Health Planning] this term only, [Suburban Health Services] this term only, [Comprehensive Health Care] explode all trees,

(Comprehensive next Health*) or (Rural next Health*) or (Suburban next Health*) or (Community next Health*) or (Family next Practic*) or (General next Practic*) or (Family next Physician*) or (Primary next Physician*) or (Primary next Health*) or (Primary next Care*) or (Community Care):ti,ab,kw (Word variations have been searched)

Topics: smoking (ti,ab,kw) OR diet (ti,ab,kw) OR exercise (ti,ab,kw) (Word variations have been searched)

From 2007 to 2013, in Cochrane Reviews (Reviews only)

5.GENERAL DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

The objective of this workpackage was to complete literature reviews to assess the impact of different behavioural, organisational and financial strategies in changing healthcare provider behaviour across a range of clinical lifestyle interventions.

To sufficiently achieve this objective, we split up this workpackage in three reviews. Firstly, the (cost-) effectiveness of professional educational and reimbursement strategies on lifestyle and prevention targeted at health professionals were reviewed (review of reviews) as well as the (cost-) effectiveness of e-health strategies on lifestyle and prevention targeted at patients/citizens. Secondly, a review and meta-regression of trials on implementing screening and brief interventions for hazardous and harmful alcohol consumption in primary healthcare was completed. Thirdly, results of the review of trials were compared with other reviews on lifestyle issues such as smoking, non-exercise and unhealthy diet.

The review of reviews (step 1) showed that none of the categories of educational, financial, e-health or multi-component oriented interventions was consistently effective. Nevertheless, overall trends were identified across the reviews. There were implications for educational-related implementation strategies to be more effective when located in the practice setting, include peer trainers and applied a stepwise problem-solving approach. The data was not sufficient to take conclusions about optimal educational intensity. Reviews describing financial-oriented implementation strategies were sparse and varied a lot in included studies, which makes it difficult to draw conclusions on. With regard to e-health-related implementation strategies, we saw trends of e-health activities being interactive, tailored to users, addressing determinants of health behaviour, and motivational interventions toward professionals, to be effective. Reviews including multi-component implementation strategies seemed to report the strongest effects. In the multi-component oriented implementation reviews we identified many implementation facilitators, though tailoring to identified implementation barriers seems to be the strongest implementation facilitator amongst the reported ones. Reviews of multi-component implementation strategies show that synergy is created in terms of implementation effectiveness by combining elements from different types of implementation strategies. Furthermore, the evidence base with regard to educational and e-health interventions is very clear in showing positive results on provider level and patient level respectively. The effect of financial oriented interventions remains inconclusive and needs further investigation.

In the review of trials (step 2), we carried out a meta-analysis as well as a meta-regression analysis in order to examine the effect of different types of implementation strategies to increase the use of SBI programmes for hazardous and harmful alcohol consumption in primary care settings. The results confirmed our presumption that implementation strategies had a significant effect on the uptake of screening and brief interventions by healthcare providers. In patients' alcohol consumption level we saw a positive trend which was not statistical significant. In all three models, there was substantial

heterogeneity. With regard to screening as well as on brief intervention outcomes, the meta-regression suggested that combining different types of EPOC implementation strategies caused statistical significant positive effects compared to a single type of EPOC implementation strategy. More specific with regard to screening outcomes, patient oriented combined with professional oriented implementation strategies showed strongest effects on screening behaviour. Furthermore, having mixed teams of primary care providers participating in the study had statistically significant higher effects on screening behaviour compared to having only GP participants. With regard to brief intervention outcomes, implementation strategies had more effect when multiple components of any type of implementation strategy were applied. With regard to patient alcohol consumption outcomes, the meta-regression analysis showed that three different combinations of EPOC intervention types had statistically significant more impact than solely professional oriented implementation studies: 1) Professional combined with organisational oriented implementation strategies; 2) Professional combined with patient oriented implementation strategies; and 3) Organisational combined with patient oriented implementation strategies. This implies that for causing real differences on the level of the patient, on which the complete ODHIN project is about, there is more required than solely professional oriented implementation strategies. We did not identify any negative or penalising intervention strategies for behaviour change – for example penalising providers when certain threshold of screening rates are not achieved.

In the comparative narrative review (step 3), we compared findings from the review of trials with comparative reviews, but focused on other lifestyle issues than hazardous and harmful alcohol consumption; like unhealthy diet, non-exercise and smoking. In our comparison we mentioned that financial incentives to primary care practices were likely to have positive effects on smoking-cessation with patients. However, we were not able to make the comparison as the only financial oriented study in our alcohol-focused review reimbursed on the patient level. On the contrary, we actually were able to compare the use of electronic medical records. In both reviews, it was concluded that there were promising results, but not strong enough to statistically support the use of it. Furthermore, we saw in a smoking cessation implementation-oriented review that multi-component interventions were more likely to be effective. This is very much in line with the finding from the alcohol-focused review. Fourth, and last, we concluded that educational oriented (professional oriented) implementation strategies are likely to be effective amongst a range of lifestyles. Evidence about organisational oriented strategies remain to be insufficient to compare.

5.2 Conclusions

When we combine the results of the three reviews in this workpackage, we can make several conclusions. Several implementation strategies do have a statistical significant effect on the provision of prevention and health promotion activities of care providers. On the patient level, only some implementation strategies are effective. Multi-component implementation strategies seem to have the most effect on provider as well as on patient behaviour. Tailoring to identified implementation barriers is evident for making implementation strategies work in practice, especially as they focus on professionals with various professional background like in general practice. Many studies solely measure effects on the provider level, though the

rationale of testing implementation strategies is to see an effect at the patient level in the end. That is eventually what all the efforts were done for. Evidence from the review of trials for example, indicates that combining patient oriented as well as professional and/or organisational oriented implementation strategies were of significant added value on the patient alcohol consumption, compared to only professional oriented strategies. In addition, especially in the review of reviews it was concluded that there were strong implications that education is effective, however the effect size varies per lifestyle topic. Besides, optimal education intensity was not identifiable. However, it is important to mention that most effective education was delivered in the practice setting and applied a stepwise problem solving approach. Combining education with other level of implementation such as organisational oriented and patient oriented strategies are likely to have clinical relevant positive results.

We also identified a number of knowledge gaps. We identified very little evidence about financial oriented implementation strategies. Of the little number of studies that we identified, most were in the field of smoking cessation services. This automatically implies the sparcity of financial oriented reviews to make comparisons. Secondly, we conclude that there is a serious shortness of reviews focused at implementing specific lifestyle prevention or health promotion oriented strategies in primary care, since we had not many reviews to include in the comparative narrative review. We currently know from the evidence some overall effects of implementation strategies, but it is significant to know more in depth the effects of implementation strategies on specific primary care patient risky lifestyles. This is required to optimalise implementation of these services.

5.3. RECOMMENDATIONS

The knowledge base that was built in this workpackage, gives strong support for the use of multi-component oriented implementation strategies. Especially implementation strategies aimed at different measurement levels seem to work, i.e. patient oriented interventions combined with professional and/or organisational oriented implementation strategies. Education is a very common implementation strategy to combine with others.

Future research should focus even more on determinants of effective implementation strategies. In other words, one knows that for example educational interventions work in general. But what still is lacking, is the optimal intensity. Moreover, in the field of financial oriented implementation strategies there is more knowledge required about its' effectiveness in various kinds of health promotion and disease prevention fields, such as in hazardous and harmful alcohol consumption, unhealthy diet and non-exercise. Lastly, in the field of e-health (organisational oriented implementation strategies), the effective factors of e-health strategies that determine effects on the patient level, still were not identified.

Recommendations for practice:

- Successfully changing professional behaviour with regard to SBI does not automatically result in a reduction of patients' alcohol consumption. Therefore we recommend the use of multi-component oriented implementation strategies including the patient level as well as the professional and/or organisation level.

- Involving professionals with various backgrounds in the professional oriented implementation strategy is likely to be more effective on screening behaviour than the involvement of just one professional discipline.

Recommendations for further research:

- Evaluate effects on both the levels of provider screening and brief interventions as well as patients' alcohol consumption.
- It needs some time to firstly change healthcare provider behaviour and subsequently influencing patient behaviour. This requires long-term trials, measuring the effects on the short term, after 3 and 6 months and long-term after 12, 18 and even 24 months.
- Investigate effectiveness of financial oriented implementation strategies, as there is a clear knowledge gap in that field.
- Investigate to what extent other providers in primary healthcare besides GP's can be involved in, since many trials involve solely GPs.
- Cost-effectiveness of different implementation strategies should be further investigated.
- Determinants of effective implementation strategies should be further investigated. For example: what is the optimal intensity of an educational intervention aimed at nurses and GPs to stimulate screening and brief interventions for hazardous and harmful alcohol use; what is the optimal intensity of financially incentivising general practices in stimulating them to do screening and brief interventions; what factors of e-health strategies determine the effectiveness at patient level. In addition, applied implementation strategies in studies should be described in more detail.

6. REFERENCES

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7.APPENDICES

Appendice I: Study protocol

Title
A systematic literature study: the identification of effective dissemination and implementation strategies to increase the use of screening and brief intervention programmes for hazardous alcohol consumption in primary care settings.

Background
Systematic reviews (University of Sheffield 2009a[i]; Kaner et al 2009[ii]) have shown that screening and brief interventions (SBI) reduce the level of alcohol consumption when implemented in normal clinical settings. However, screening and brief interventions for hazardous and harmful alcohol consumption are not routinely implemented.
Although a series of reviews have been conducted on dissemination and implementation strategies, these do not address specifically prevention of risky lifestyle or unhealthy behaviour. Improvement of healthcare is expected to be more likely when strategies for dissemination and implementation of best evidence are linked to specific features of the innovation, the target population and the setting. Various strategies may be necessary depending on the phases of the change process (Grol & Wensing, 2004[iii]; Grol et al, 2005[iv]): Orientation, insight, acceptance, change and maintenance.
To fill a gap in the evidence base, it is proposed to undertake a series of systematic reviews of dissemination and implementation strategies to engage primary health care providers in the management of alcohol problems. Estimates of the effect sizes of the strategies will be made, predictors of effect will be studied, and, where they are available, cost and cost effectiveness of the strategies will be reported.

This review primarily builds on the systematic review carried out by Anderson et al (2004)[v].

Objective
To complete, by month 24, a series of systematic reviews investigating the impact of different behavioural, organizational and financial strategies in changing provider behaviour across a range of clinical lifestyle interventions.

Strategy
A three-stepped approach will be used. The outcomes of this review will primarily be used to fine tune the strategies used in WP5, our cluster Randomised Controlled Trial.

We first focus on (cost-) effectiveness of strategies of Continuing Medical Education (CME) and reimbursement strategies targeted at health professionals, and e-health targeted at patients/citizens, as these are the strategies intended to be used in WP5 cluster Randomised Controlled Trial. In first instance, we focus at lifestyle issues and prevention. If this result is unsatisfactory, we will apply a wide perspective, looking at all kinds of subjects.

The proposed search strategy in this first step primarily draws upon a former report, Knowledge of Implementation Programme (KIP)[vi], which focuses on systematic reviews of implementation strategies effect studies. Firstly, two reviewers will independently prioritize the included studies of the KIP report relevant for ODHIN. To follow, the report will be updated by searching Pubmed and Cochrane Library from January 2010 till April 2011. We slightly modified the search strategy used for KIP, the following search terms are used:

- Set 1: identification of dissemination and implementation strategies of our interest
  Quality improvement
  Improvement
  Improving intervention(s)
  Educational
  e-learning
  Internet-based learning
  ICT

Information technology
Financial
Pay for performance
Reimbursement
Contracting
Transparency

- Set 2: Identification of literature reviews
  Systematic reviews
  Meta-analysis
- Depending on the number of papers identified a third set will be used to limit the number of papers
  Set 3:
  Lifestyle
  Smoking
  Non-exercise
  Exercise
  Unhealthy diet
  Diet

Next, two reviewers will independently prioritize the identified papers, and select the papers reporting on 'Financial', 'Continuing Medical Education', 'e-health', or multifaceted studies including one of these strategies related to lifestyle prevention, prevention or other topics (depending on the number of literature reviews identified).
Subsequently, the eligible papers will be obtained full text and will independently scored by two reviewers using a data-extraction template (Author, Aim of the review, Topic, Setting, Patients group, Implementation strategy, Participants, Number of Studies included, Results, and Conclusion).

In our second step, we focus on individual papers reporting the effects on hazardous and harmful alcohol consumption. The guidelines for performing a systematic literature review will be applied (Higgins & Green, 2011[vii]; Center for Reviews and Dissemination, 2009[viii]). To ensure the quality of reports of meta-analyses we will use the guidelines as described by the PRISMA (formerly QOUROM statement) (Moher, Liberati, Tetzlaff, Altman, 2009[ix]). The second step is worked out in detail below.

Thirdly, the outcomes of our review on hazardous and harmful alcohol consumption will be compared with (systematic) literature reviews on other lifestyle issues such as smoking, non-exercise and unhealthy diet. This third step will be worked out in detail later on, to fine tune it to resulting studies from step one and two.

ODHIN participants
The review will be carried out by Scientific Institute for Quality of Healthcare (IQ healthcare, RUNMC):

- Myrna Keurhorst, junior researcher/PhD student: first responsible person to conduct the review and independent reviewer
- Miranda Laurant, senior researcher: supervision of the review and independent reviewer
- Jozé Braspenning, senior researcher: independent reviewer and advisor

Other partners involved:

- University of Maastricht: Peter Anderson, independent reviewer and advisor
- University of NewCastle: Eileen Kaner, independent reviewer and advisor
- Barcelona University: Michaela Bitarello, independent reviewer and advisor

Besides ODHIN partners, we will also contact global experts to be involved as experts to identify grey literature, unpublished papers and conference abstracts/proceedings and possibly to extract non-English literature.

BELOW, ONLY THE SECOND STEP IS WORKED OUT IN DETAIL AS THIS IS THE CORE OF WP2
SYSTEMATIC REVIEW ON SBI FOR HAZARDOUS AND HARMFUL ALCOHOL CONSUMPTION IN PRIMARY HEALTH CARE

Type of study design
(cluster) Randomised controlled trials
Controlled (clinical) trials
Controlled Before-after studies
Interrupted Time Series

Setting
Primary Health Care including general practice, family practice, health centres, and outpatient (primary) clinics, all of which usually provides first-contact health care.

Type of participants
Health care professionals including physicians, nurses, psychologists, doctors' assistants and receptionists working in primary health care (including general practice, family practice, health centres, and polyclinics, all of which usually provides first-contact health care). Furthermore, patients in Primary Health Care Settings at risk for hazardous and harmful alcohol consumption will be included.

Types of intervention
All kinds of patient and professional oriented (behavioural), organisational oriented, structural and regulatory or financial strategies aimed at the dissemination and implementation of SBI will be included in the review. Strategies exclusively focused on alcohol as well as prevention and health promotion activities including alcohol will be included.

Type of outcomes
The containing outcome measures are objective measurements in the following domains:
i) health professional performance including measurement of alcohol intake, screening, counselling, making a follow-up and referral; and
ii) client outcomes, including numbers screened, numbers counselled, numbers referred, changes in alcohol consumption over time, numbers drinking within recommended alcohol consumption limits, and physiological measures.
Where information is available relevant data on the costs of the SBI and of dissemination and implementation strategies, and on health care costs will be collected.

In-/exclusion criteria
The following inclusion criteria were adopted:
• studies that addressed hazardous and harmful alcohol consumption, but not alcohol dependence as defined by the World Health Organization (Babor et al. 1994[x]) and the ICD 10 Classification of Mental and Behavioural Disorders (World Health Organization 1992[xi])
• studies that included interventions that were exclusively focused on alcohol as well as alcohol related interventions that were a part of broader prevention
• studies in English and other languages that at least two reviewers could manage (Dutch and Spanish)
• studies that addressed the adult population (≥ 18)
• studies that were published from onset of literature databases searched till april 2011

Search methods for identification of studies
It is proposed to use a range of methods to identify studies, including:
• Searching computerized databases:
MEDLINE, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL)
• Scanning reference lists of appropriate review articles and books;
• Contacting ODHIN partners and other global experts in the field.

To overcome the problem of publication bias, the review will attempt to identify some of the grey literature in this area, including conference abstracts and some unpublished findings.

Selection of relevant papers
Identified references, key words and abstracts will be entered into Reference Manager and reviewed by two independent reviewers. Hard copies of potentially relevant studies will be obtained and screened for inclusion independently by two reviewers. Studies that do not fulfil the inclusion criteria will be marked

as not eligible and listed by excluded studies. Disagreements between the reviewers will be resolved through discussion, or a third reviewer will be contacted.

Data extraction
A data extraction form will be developed and tested. Each paper will be reviewed and data extracted by two independent reviewers. Differences will be resolved through discussion. Less experienced (junior) researchers will not be coupled together, and there will be no constant pairs during the data extraction (preventing selection bias).

Furthermore, the included articles will be screened for barriers and facilitators for SBI in Primary Health Care Units. This will be done by screening discussion sections; fragments in text describing the process of implementation; references to relevant authors of cited articles; references to strengths and weaknesses of the (implementation) studies. To describe the results of the screening for barriers and facilitators, the implementation theory of Grol[xii] will be applied.

Methodological quality
The methodological quality of studies included in the review will be assessed using a criteria list derived from EPOC template, the GRADE checklist[xiii] for quality of evidence and strengths of recommendations of studies, and "a checklist of items to include when reporting a systematic review or meta-analysis" derived from the PRISMA statement[ix].

Data analyses
Where possible, standardized effect sizes will be calculated and a formal meta-analysis of the research findings will be undertaken according to the methods outlined in the Cochrane Handbook (Deeks 2009[xiv]) and PRISMA statement. Comparisons that randomize or allocate clusters (professionals or health care organizations) but do not account for clustering during analysis have 'potential unit of analysis errors' resulting in artificially extreme p-values and over narrow confidence intervals (Ukoumunne 1999[xv]).We will attempt to reanalyze studies with potential unit of analysis errors where possible and include them within the meta-analysis. If re-analysis is not possible we exclude the studies from the meta-analysis and report the effect size of any studies separately (without p-values or confidence intervals) in tabular form. If meta-analysis is not possible due to substantial heterogeneity, we will present the results of included studies in a tabular form and undertake a qualitative analysis based upon the study quality, the size and direction of effect observed and the statistical significance of the studies will be presented.
Exploring heterogeneity:
Sub-group analyses will be undertaken to explore the effect of differences in interventions (for example: educational approaches versus organisational approaches), the intensity of the interventions (high, moderate and low) and the target population of SBI (for example: young versus old, large practices versus small practices, etc.).

Proposed search strategy
We use the 'gold standard' set of studies known to be within the scope of EPOC (i.e. dissemination and implementation strategies to improve quality of healthcare), combined with alcohol consumption and primary health care setting. Below we report the search strategy used to search MEDLINE, EMBASE and CENTRAL and Cinahl (to be added) database. By EPOC described search string for the CINAHL search will be translated to the EBSCO database, since RUNMC does not have entrance to CINAHL via Ovid SP.

OVID- MEDLINE Search Strategy:
1. exp *education,continuing/
2. (education$ adj2 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or visit?)).tw.
3. (behavio?r$ adj2 intervention?).tw.
4. pamphlets/
5. (leaflet? or booklet? or poster? or pamphlet?).tw.
6. ((written or printed or oral) adj information).tw.
7. (information$ adj2 campaign).tw.
8. (education$ adj1 (method? or material?)).tw.
9. *advance directives/

10. outreach.tw.
11. ((opinion or education$ or influential) adj1 leader?).tw.
12. facilitator?.tw.
13. academic detailing.tw.
14. consensus conference?.tw.
15. *guideline adherence/
16. practice guideline?.tw.
17. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$)).tw.
18. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.
19. *reminder systems/
20. reminder?.tw.
21. (recall adj2 system$).tw.
22. (prompter? or prompting).tw.
23. algorithm?.tw.
24. *feedback/ or feedback.tw.
25. chart review$.tw.
26. ((effect? or impact or records or chart?) adj2 audit).tw.
27. compliance.tw.
28. marketing.tw.
29. or/1-28 **Professional oriented interventions**

30. exp *reimbursement mechanisms/
31. fee for service.tw.
32. *capitation fee/
33. *"deductibles and coinsurance"/
34. cost shar$.tw.
35. (copayment? or co payment?).tw.
36. (prepay$ or prepaid or prospective payment?).tw.
37. *hospital charges/
38. formular$.tw.
39. fundhold$.tw.
40. *medicaid/
41. *medicare/
42. blue cross.tw.
43. or/30-42 **financial interventions**

44. *nurse clinicians/
45. *nurse midwives/
46. *nurse practitioners/
47. (nurse adj (rehabilitator? or clinician? or practitioner? or midwi$)).tw.
48. *pharmacists/
49. clinical pharmacist?.tw.
50. paramedic?.tw.
51. *patient care team/
52. exp *patient care planning/
53. (team? adj2 (care or treatment or assessment or consultation)).tw.
54. (integrat$ adj2 (care or service?)).tw.
55. (care adj2 (coordinat$ or program$ or continuity)).tw.
56. (case adj1 management).tw.
57. exp *ambulatory care facilities/
58. *ambulatory care/
59. or/44-58 **Organizational oriented interventions**

60. *home care services/
61. *hospices/
62. *nursing homes/
63. *office visits/
64. *house calls/

65. *day care/
66. *aftercare/
67. *community health nursing/
68. (chang$ adj1 location?).tw.
69. domiciliary.tw.
70. (home adj1 treat$).tw.
71. day surgery.tw.
72. *medical records/
73. *medical records systems, computerized/
74. (information adj2 (management or system?)).tw.
75. *peer review/
76. *utilization review/
77. exp *health services misuse/
78. or/60-77 **structural interventions**

79. *physician's practice patterns/
80. quality assurance.tw.
81. *process assessment/ [health care]
82. *program evaluation/
83. *length of stay/
84. (early adj1 discharg$).tw.
85. discharge planning.tw.
86. offset.tw.
87. triage.tw.
88. exp *"Referral and Consultation"/ and "consultation"/
89. *drug therapy,computer assisted/
90. near patient testing.tw.
91. *medical history taking/
92. *telephone/
93. (physician patient adj (interaction? or relationship?)).tw.
94. *health maintenance organizations/
95. managed care.tw.
96. (hospital? adj1 merg$).tw.
97. or/79-96 **structural interventions**

98. ((standard or usual or routine or regular or traditional or conventional or pattern) adj2 care).tw.
99. (program$ adj2 (reduc$ or increas$ or decreas$ or chang$ or improv$ or modify$ or monitor$ or care)).tw.
100. (program$ adj1 (health or care or intervention?)).tw.
101. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 treatment program$).tw.
102. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 care program$).tw.
103. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 screening program$).tw.
104. ((effect? or impact or evaluat$ or introduc$ or compara$) adj2 prevent$ program$).tw.
105. (computer$ adj2 (dosage or dosing or diagnosis or therapy or decision?)).tw.
106. ((introduc$ or impact or effect? or implement$ or computer$) adj2 protocol?).tw.
107. ((effect? or impact or introduc$) adj2 (legislation or regulations or policy)).tw.
108. or/98-107 **improving health care**

109. 29 or 43 or 59 or 78 or 97 or 108 **combining above**

110. randomized controlled trial.pt.
111. random$.tw.
112. control$.tw.
113. intervention?.tw.
114. evaluat$.tw.
115. or/110-114 **study design**
116. animal/
117. human/

118. 116 not (116 and 117)
119. 115 not 118 **study design**

120. 109 and 119 **combining 'interventions' with study design**

Adding theme specific search terms:
121. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
122. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
123. Exp Alcohol drinking/
124. 121 or 122 or 123
125. limit 124 to "all adult (19 plus years)" **Alcohol consumption and related terms**

126. Exp Physicians-Family /
127. Exp Family-Medicine /
128. Exp Primary-Health-Care /
129. Exp Family-Practice /
130. Exp Rural-Health /
131. Exp Rural-Health-Services /
132. Exp Community-Health-Services /
133. Exp Comprehensive-Health-Care
134. 126 or 127 or 128 or 129 or 130 or 131 or 132 or 133 **Setting**

135. 125 and 134 **Combining these terms**

136. 135 and 120 **Combining MEDLINE dissemination and implementation strategies with theme of systematic review**

OVID- EMBASE EPOC Search Strategy:
1. (education$ adj2 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or visit?)).tw.
2. (behavio?r$ adj2 intervention?).tw.
3. (leaflet? or booklet? or poster or posters).tw.
4. ((written or printed or oral) adj information).tw.
5. (information$ adj2 campaign).tw.
6. (education$ adj1 (method? or material?)).tw.
7. outreach.tw.
8. ((opinion or education$ or influential) adj1 leader?).tw.
9. facilitator?.tw.
10. academic detailing.tw.
11. consensus conference?.tw.
12. practice guideline?.tw.
13. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$ or compli$)).tw.
14. ((introduc$ or impact or effect? or implement$ or computer$ or compli$) adj2 protocol?).tw.
15. ((introduc$ or impact or effect? or implement$ or computer$ or compli$) adj2 algorithm?).tw.
16. clinical pathway?.tw.
17. critical pathway?.tw.
18. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.
19. reminder?.tw.
20. (recall adj2 system$).tw.
21. (prompter? or prompting).tw.
22. advance directive?.tw.
23. feedback.tw.
24. chart review$.tw.
25. ((effect? or impact or records or chart?) adj2 audit).tw.
26. (compliance and (physician? or doctor? or practitioner? or pharmacist? or nurse? or health)).tw.
27. marketing.tw.
28. ((cost or clinical or medical) adj information).tw.

29. medical education/
30. medical audit/
31. continuing education/
32. postgraduate education/
33. or/1-32 **professional oriented interventions**

34. fee for service.tw.
35. cost shar$.tw.
36. (copayment? or co payment?).tw.
37. (prepay$ or prepaid or prospective payment?).tw.
38. formular$.tw.
39. fundhold$.tw.
40. (blue cross or bluecross).tw.
41. voucher?.tw.
42. (free adj2 care).tw.
43. exp health insurance/
44. health care costs/
45. health care financing/
46. medical fee/
47. prospective payment/
48. or/34-47 **financial interventions**

49. (nurse adj (rehabilitator? or clinician? or practitioner? or midwi$)).tw.
50. ((nurse or midwi$ or practitioner) adj managed).tw.
51. clinical pharmacist?.tw.
52. paramedic?.tw.
53. exp paramedical personnel/
54. general practitioner/
55. physician/
56. (team adj2 (care or treatment or assessment or consultation)).tw.
57. (integrat$ adj2 (care or service?)).tw.
58. (care adj2 (coordinat$ or program$ or continuity)).tw.
59. (case adj1 management).tw.
60. patient care/
61. (chang$ adj1 location?).tw.
62. domiciliary.tw.
63. (home adj1 (treat$ or visit?)).tw.
64. day surgery.tw.
65. exp primary health care/
66. ambulatory surgery/
67. nursing home/
68. day hospital/
69. outpatient care/
70. terminal care/
71. group practice/
72. general practice/
73. rural health care/
74. community mental health center/
75. information system/
76. medical record/
77. (information adj2 (management or system?)).tw.
78. peer review/
79. professional standards review organization/
80. clinical practice/
81. quality assurance.tw.
82. exp health care delivery/
83. health care quality/
84. professional practice/

85. (early adj1 discharg$).tw.
86. discharge planning.tw.
87. offset.tw.
88. triage.tw.
89. near patient testing.tw.
90. patient referral/
91. (physician patient adj (interaction? or relationship?)).tw.
92. managed care.tw.
93. health care organization/
94. health maintenance organization/
95. health care system/
96. health care access/
97. (hospital? adj1 merg$).tw.
98. (computer$ adj2 (dosage or dosing or diagnosis therapy or decision?)).tw.
99. (computer$ adj2 (diagnosis or therapy)).tw.
100. gatekeep$.tw.
101. or/49-100 **organizational oriented interventions**

102. ((standard or usual or routine or regular or traditional or conventional or pattern) adj2 care).tw.
103. (program$ adj2 (reduc$ or increas$ or decreas$ or chang$ or improv$ or modif$ or monitor$ or care)).tw.
104. (program$ adj1 (health or care or intervention?)).tw.
105. ((effect or impact or introduc$) adj2 (legislation or regulations or policy)).tw.
106. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 treatment program$).tw.
107. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 care program$).tw.
108. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 screening program$).tw.
109. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 prevention program$).tw.
110. or/102-109 **improving health care**

111. 33 or 48 or 101 or 110 **combining above**

112. Randomized controlled trial/
113. random$.tw.
114. experiment$.tw.
115. (time adj series).tw.
116. (pre test or pretest or post test or posttest).tw.
117. impact.tw.
118. intervention?.tw.
119. chang$.tw.
120. evaluat$.tw.
121. effect?.tw.
122. compar$.tw.
123. control$.tw.
124. or/112-123 **study design**
125. Nonhuman/
126. 124 not 125 **study design**

127. 111 and 126 **combining interventions with study design**

Adding specific search terms:
128. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
129. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
130. Exp Alcohol drinking/
131. 128 or 129 or 130
132. limit 131 to (adult <18 to 64 years> or aged <65+ years>) **Alcohol consumption and related terms**

133. Exp Physicians-Family /
134. Exp Family-Medicine /

135. Exp Primary-Health-Care /
136. Exp Family-Practice /
137. Exp Rural-Health /
138. Exp Rural-Health-Services /
139. Exp Community-Health-Services /
140. Exp Comprehensive-Health-Care /
141. 133 or 134 or 135 or 136 or 137 or 138 or 139 or 140 **Setting**

142. 132 and 141 **Combining these terms**

141. 142 and 127 **Combining EMBASE dissemination and implementation strategies with theme specific of systematic review**

CENTRAL Search strategy:

1. SR-EPOC

(*THAT SEARCH TERM INCLUDES THE FOLLOWING:)*
EDUCATION-CONTINUING*:ME
EDUCATION* near PROGRAM*
EDUCATION* near INTERVENTION*
EDUCATION* near MEETING*
EDUCATION* near SESSION*
EDUCATION* near STRATEG*
BEHAVIOR near INTERVENTION*
BEHAVIOUR near INTERVENTION*
PAMPHLETS:ME
(LEAFLET* OR BOOKLET* OR POSTER OR POSTERS)
WRITTEN next INFORMATION
PRINTED next INFORMATION
ORAL next INFORMATION
FACILITATOR*
ACADEMIC next DETAILING
CONSENSUS next CONFERENCE
PRACTICE next GUIDELINE*
FEEDBACK*1:ME
(FEEDBACK:TI or FEEDBACK:AB)
(COMPLIANCE:TI or COMPLIANCE:AB)
(MARKETING:TI or MARKETING:AB)
(REMINDER*:TI or REMINDER*:AB)
(ALGORITHM*:TI or ALGORITHM*:AB)
(OUTREACH:TI or OUTREACH:AB)
OPINION next LEADER*
EDUCATION* next LEADER*
INFLUENTIAL next LEADER*
CHART next REVIEW*
COUNSEL*:TI OR COUNSEL*:AB
REMINDER-SYSTEMS:ME
PATIENT-EDUCATION:ME
INFORMATION* near CAMPAIGN
EFFECT* near AUDIT
IMPACT near AUDIT
RECORDS near AUDIT
CHART* near AUDIT
PROMPTER* OR PROMPTING
RECALL near SYSTEM*
TRAINING next PROGRAM*
GUIDELINE* near INTRODUC*

GUIDELINE* near ISSU*
GUIDELINE* near IMPACT
GUIDELINE* near EFFECT*
GUIDELINE* near DISSEMINAT*
GUIDELINE* near DISTRIBUT* **professional oriented interventions**

REIMBURSEMENT-MECHANISMS*:ME
"FEE FOR SERVICE"
CAPITATION-FEE:ME
DEDUCTIBLES-AND-COINSURANCE:ME
COST next SHAR*
COPAYMENT*
CO next PAYMENT*
PREPAY
PREPAID
PROSPECTIVE NEXT PAYMENT*
HOSPITAL-CHARGES:ME
FORMULAR*
FUNDHOLD*
MEDICAID:ME
MEDICARE:ME
BLUE next CROSS **financial interventions**

NURSE-CLINICIANS:ME
NURSE-MIDWIVES:ME
NURSE-PRACTITIONERS:ME
NURSE next REHABILITATOR*
NURSE next CLINICIAN*
NURSE next PRACTITIONER*
NURSE next MIDWI*
PHARMACISTS:ME
CLINICAL next PHARMACIST*
PARAMEDIC*
PATIENT-CARE-TEAM:ME
TEAM near CARE
TEAM near TREATMENT
INTEGRAT* near CARE
INTEGRAT* near SERVICE*
CASE next MANAGEMENT
CARE near COORDINAT*
CARE near PROGRAM*
CARE near CONTINUITY
AMBULATORY-CARE-FACILITIES*:ME
AMBULATORY-CARE:ME **organizational oriented interventions**

HOME-CARE-SERVICES:ME
HOSPICES:ME
NURSING-HOMES:ME
OFFICE-VISITS:ME
DAY-CARE:ME
AFTERCARE:ME
COMMUNITY-HEALTH-NURSING:ME
CHANG* next LOCATION*
DOMICILIARY
HOME next TREAT*
DAY next SURGERY
MEDICAL-RECORDS:ME
MEDICAL-RECORDS-SYSTEMS-COMPUTERIZED:ME

INFORMATION near MANAGEMENT
INFORMATION near SYSTEM*
UTILIZATION-REVIEW:ME **structural oriented interventions**

PHYSICIAN'S-PRACTICE-PATTERNS:ME
QUALITY next ASSURANCE
PROCESS-ASSESSMENT-(HEALTH-CARE):ME
PROGRAM-EVALUATION:ME
LENGTH-OF-STAY:ME
EARLY next DISCHARGE
OFFSET
TRIAGE
MEDICAL-HISTORY-TAKING:ME
TELEPHONE:ME
HEALTH-MAINTENANCE-ORGANIZATIONS:ME
MANAGED next CARE
PHYSICIAN next PATIENT **structural oriented interventions**

STANDARD near CARE
USUAL near CARE
ROUTINE near CARE
REGULAR near CARE
TRADITIONAL near CARE
CONVENTIONAL near CARE
PATTERN near CARE
INTRODUC* near PROTOCOL*
IMPACT near PROTOCOL*
EFFECT* near PROTOCOL*
IMPLEMENT* near PROTOCOL*
COMPUTER* near PROTOCOL*
COMPUTER near DOSAGE
COMPUTER near DOSING
COMPUTER near DIAGNOSIS
COMPUTER near DECISION*
PROGRAM* near TREATMENT
PROGRAM* near CARE
PROGRAM* near SCREENING
PROGRAM* near PREVENTION
PROGRAM* near HEALTH
PROGRAM* near INTERVENTION*
LEGISLATION
REGULATIONS (**improving health care**)

Adding theme specific search terms:

2. ((alcohol next (drink* or consumption or intoxication)) not (dependence or dependent)) OR ((alcohol next (abuse or hazardous or harmful)) not (dependence or dependent)) OR (Exp Alcohol drinking) **Alcohol consumption and related terms**

3. (Exp Physicians-Family) OR (Exp Family-Medicine) OR (Exp Primary-Health-Care) OR (Exp Family-Practice) OR (Exp Rural-Health) OR (Exp Rural-Health-Services) OR (Exp Community-Health-Services) OR (Exp Comprehensive-Health-Care) OR (physicians family or family medicine or primary health care or family practice or rural health or rural health services or community health services or comprehensive health care) **Setting**

4. #2 AND #3 **Combining these terms**

5. #1 AND #4 **Combining CENTRAL dissemination and implementation strategies with theme specific of systematic review**

OVID- CINAHL EPOC Search Strategy:
1. exp *education,continuing/ or *education,interdisciplinary/
2. (education$ adj2 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or visit?)).tw.
3. (behavio?r$ adj2 intervention?).tw.
4. *pamphlets/
5. (leaflet? or booklet? or poster or posters).tw.
6. ((written or printed or oral) adj information).tw.
7. (information$ adj2 campaign).tw.
8. (education$ adj1 (method? or material?)).tw.
9. *advance directives/ or *living wills/
10. outreach.tw.
11. ((opinion or educational$ or influential) adj1 leader?).tw.
12. facilitator?.tw.
13. academic detailing.tw.
14. consensus conference?.tw.
15. practice guideline?.tw.
16. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$)).tw.
17. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.
18. *reminder systems/
19. reminder?.tw.
20. (recall adj2 system$).tw.
21. (prompter? or prompting).tw.
22. algorithm?.tw.
23. *feedback/ or feedback.tw.
24. chart review$.tw.
25. ((effect? or impact or records or chart?) adj2 audit).tw.
26. compliance.tw.
27. marketing.tw.
28. or/1-27 **Professional oriented interventions**

29. exp *reimbursement mechanisms/
30. fee for service.tw.
31. exp *"fees and charges"/
32. cost shar$.tw.
33. (copayment? or co payment?).tw.
34. (prepay$ or prepaid or prospective payment?).tw.
35. exp *managed care programs/
36. formular$.tw.
37. fundhold$.tw.
38. *medicaid/
39. *medicare/
40. blue cross.tw.
41. or/29-40 **financial interventions**

42. exp *advanced practice nurses/
43. *nurse consultants/
44. (nurse adj (rehabilitator? or clinician? or practitioner? or midwi$)).tw.
45. *pharmacists/
46. clinical pharmacist?.tw.
47. paramedic?.tw.
48. *multidisciplinary care team/
49. exp *protocols/
50. (team? adj2 (care or treatment or assessment or consultation)).tw.

51. (integrat$ adj2 (care or service?)).tw.
52. *health care delivery, integrated/
53. (care adj2 (coordinat$ or program$ or continuity)).tw.
54. exp *continuity of patient care/
55. *case managers/
56. (case adj1 management).tw.
57. or/42-56 **organisational oriented interventions**

58. exp *ambulatory care facilities/
59. *ambulatory care/
60. exp *home health care/
61. *hospices/
62. exp *nursing homes/
63. *office visits/
64. *office nursing/
65. *home visits/
66. *day care/
67. *after care/
68. exp *community health nursing/
69. (chang$ adj1 location?).tw.
70. domiciliary.tw.
71. (home adj1 treat$).tw.
72. day surgery.tw.
73. or/58-72 **structural interventions**

74. *medical records/
75. exp *decision making, computer assisted/
76. *computerized patient record/
77. *nursing records/
78. *problem oriented records/
79. (information adj2 (management or system?)).tw.
80. *health service misuse/
81. exp *quality assessment/
82. quality assurance.tw.
83. *length of stay/
84. (early adj1 discharg$).tw.
85. discharge planning.tw.
86. offset.tw.
87. triage.tw.
88. exp *"Referral and consultation"/
89. gatekeep$.tw.
90. *drug therapy,computer assisted/
91. near patient test$.tw.
92. exp *patient history taking/
93. *telephone/
94. exp *telehealth/
95. (physician patient adj (interaction? or relationship?)).tw.
96. *health maintenance organizations/
97. managed care.tw.
98. (hospital? adj1 merg$).tw.
99. or/74-98 **structural interventions**

100. ((standard or usual or routine or regular or traditional or conventional or pattern) adj2 care).tw.
101. (program$ adj2 (reduc$ or increas$ or decreas$ or chang$ or improv$ or modify$ or monitor$ or care)).tw.
102. (program$ adj1 (health or care or intervention?)).tw.
103. ((effect? or impact or introduc$) adj2 (legislation or regulations or policy)).tw.
104. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 treatment program$).tw.

105. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 care program$).tw.
106. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 screening program$).tw.
107. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 prevent$ program$).tw.
108. (computer$ adj2 (dosage or dosing or diagnosis or therapy or decision?)).tw.
109. ((introduc$ or impact or effect? or implement$ or computer$) adj2 protocol?).tw.
110. or/100-109 **improving health care**

111. 28 or 41 or 57 or 73 or 99 or 110 **combining above**

112. clinical trials/
113. control$.tw.
114. random$.tw.
115. comparative studies/
116. experiment$.tw.
117. (time adj series).tw
118. impact.tw.
119. intervention?.tw.
120. evaluat$.tw.
121. effect?.tw.
122. exp pretest-posttest design/
123. exp quasi-experimental studies/
124. or/112-123 **study design**
125. 111 and 124
126. "cochrane database of systematic reviews".jn.
127. 125 not 126 **study design**

Adding theme specific search terms:
128. ((alcohol adj1 (drink* or consumption or intoxication)) not (dependence or dependent)).mp
129. ((alcohol adj1 (abuse or hazardous or harmful)) not (dependence or dependent)).mp
130. Exp Alcohol drinking/
131. 121 or 122 or 123
132. limit 131 to "all adult (19 plus years)" **Alcohol consumption and related terms**

133. Exp Physicians-Family /
134. Exp Family-Medicine /
135. Exp Primary-Health-Care /
136. Exp Family-Practice /
137. Exp Rural-Health /
138. Exp Rural-Health-Services /
139. Exp Community-Health-Services /
140. Exp Comprehensive-Health-Care
141. 133 or 134 or 135 or 136 or 137 or 138 or 139 or 140 **Setting**

142. 132 and 141 **Combining these terms**

143. 142 and 127 **Combining CINAHL dissemination and implementation strategies with theme of systematic review**

Time schedule: 24 months

Month 1-2:	Writing concept protocol for systematic reviews, development of optimal search strategy.
	Discussion kick-off meeting: approval of the protocol
Month 3:	If necessary, adjustment of protocol for systematic reviews and establishment of a definitive protocol for systematic reviews
	Searches computerized databases
	Reference management

Month 4-5: Inclusion of papers (1st selection/screening) by 2 independent reviewers
Obtaining full text papers
Development of concept data-extraction form to be discussed (involved partners; 'core team') and establishment of a definitive data-extraction form

Month 6 - 10: Data-extraction by 2 independent reviewers, starting with:

- Reimbursement strategies
- Educational strategies
- E-health strategies
- Etc.

Reference lists, identification relevant papers
Comparison data-extraction, followed by discussion if necessary.

Month 11 -12: Preliminary analysis of relevant strategies (to be used in WP5 – RCT)
Presentation of preliminary analysis [ODHIN meeting]

Month 13-15: Hand searching relevant journals
Searching databases ongoing studies (e.g. clinical trial.gov, trial.nl)
Expert contact ODHIN partners (and others, to be decided)
Inclusion of papers (1st selection/screening) by 2 independent reviewers
Obtaining full text papers
Continuation data-extraction
Reference lists, identification relevant papers
Comparison data-extraction, followed by discussion if necessary.

Month 16-18: If necessary continuation data-extraction; reference lists, identification relevant papers; comparison data-extraction, followed by discussion if necessary.
Data-analysis

Month 18: Presentation of (preliminary) results [ODHIN meeting]

Month 18-24: Writing a series of scientific papers
Writing a guide for dissemination and implementation.

>>> Month 24: Finishing up series of scientific papers
Presentations at conferences and meetings.

Milestones

1) Finalized protocol WP2 (month 3)

Deliverables

1) Report summarizing the methods, results and policy implication of series of reviews, including a theory framework to explain why some interventions work or not and that qualitative studies could be taken into account. (month 24)
2) Series of scientific papers (>>> month 24)

[i] University of Sheffield (2009a) Guidance Title: Prevention and early identification of alcohol use disorders in adults and young people. Final draft of Report 2 to the National Institute for Health & Clinical Excellence. Sheffield: The University of Sheffield, School of Health and Related Research (ScHARR)

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Screening and brief interventions for hazardous and harmful alcohol use in primary care: a cluster randomised controlled trial protocol. BMC Public Health, 9: 287.

[iii] Grol R, Wensing M (2004). What drives change? Barriers and incentives for achieving evidence-based practice. MJA 180: 557-560.

[iv] Grol R, Wensing M, Eccles M. (eds.) (2005). Improving patient care. The implementation of change in clinical practice. Elsevier Limited.

[v] Anderson P, Laurant M, Kaner E, Wensing M, Grol R (2004). Engaging General Practitioners in the management of hazardous and harmful alcohol consumption: Results of a meta-analysis. Journal of Studies on Alcohol;65(2):191-199

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[viii] Center for Reviews and Dissemination. (2009). *Systematic Reviews, CRD's guidance for undertaking reviews in healthcare*. York: University of York

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[x] Babor T, Campbell R, Room R, Saunders J, eds. (1994). *Lexicon of alcohol and drug terms*, World Health Organization, Geneva

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[xii] Wensing M, Grol R. Determinants of effective change. (2005). In: Grol R, Wensing M, Eccles M (eds.) Improving Patient Care: The implementation of Change in Clinical Practice. London: Elsevier; 94-108

[xiii] GRADE working group. (2004). Grading quality of evidence and strengths of recommendations. BMJ;328:1490

[xiv] Deeks JJ, Higgins JPT, Altman DG (eds.) (2009). Analysing data and undertaking meta-analyses. *Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.2* [updated September 2009]; part 2, section 9. The Cochrane Collaboration, 2009.

[xv] Ukoumunne OC, Gulliford MC, Chinn S, Sterne JAC, Burney PGJ (1999). Methods for evaluating area-wide and organisation based interventions in health and health care: a systematic review. Health Technology Assessment; 3(5):1–108.

Appendice II: Study protocol amendment June 2012

In-/exclusion criteria
• Studies in English and other languages that at least two reviewers could manage (Dutch only)

Time schedule:

M1-4: Writing and submission of a protocol

M2-3: Development of search strategy and conduction of searches

M3-6: Endnote X3, screening identified papers and obtain full text papers

M4-12: Development data-extraction form, pilot test of extraction form, Inclusion of relevant papers

M 10-16: data extraction

M14: Conference meeting with participants (preliminary data).

M14-24-: Data-analysis

M18 and onwards: Writing a series of scientificp apers

M17 and onwards: Presentations at conferences

M24-36: Writing of guide for dissemination and implementation (deliverable D2.1)