

Published in final edited form as:

*Cochrane Database Syst Rev.* ; (3): CD005470. doi:10.1002/14651858.CD005470.pub2.

## Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes

Richard Baker<sup>1</sup>, Janette Camosso-Stefinovic<sup>1</sup>, Clare Gillies<sup>2</sup>, Elizabeth J Shaw<sup>3</sup>, Francine Cheater<sup>4</sup>, Signe Flottorp<sup>5</sup>, and Noelle Robertson<sup>6</sup>

<sup>1</sup>Department of Health Sciences, University of Leicester, Leicester, UK.

<sup>2</sup>University Division of Medicine for the Elderly, University of Leicester, Leicester, UK.

<sup>3</sup>National Institute for Health and Clinical Excellence, Manchester, UK.

<sup>4</sup>Institute of Health and Wellbeing, Glasgow Caledonian University, Glasgow, UK.

<sup>5</sup>Norwegian Knowledge Centre for the Health Services, Oslo, Norway.

<sup>6</sup>School of Psychology (Clinical Section), Leicester University, Leicester, UK

### Abstract

**Background**—In the previous version of this review, the effectiveness of interventions tailored to barriers to change was found to be uncertain.

**Objectives**—To assess the effectiveness of interventions tailored to address identified barriers to change on professional practice or patient outcomes.

**Search methods**—For this update, in addition to the EPOC Register and pending files, we searched the following databases without language restrictions, from inception until August 2007: MEDLINE, EMBASE, CINAHL, BNI and HMIC. We searched the National Research Register to November 2007. We undertook further searches to October 2009 to identify potentially eligible published or ongoing trials.

**Selection criteria**—Randomised controlled trials (RCTs) of interventions tailored to address prospectively identified barriers to change that reported objectively measured professional practice

---

Copyright © 2010 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd

Contact address: Richard Baker, Department of Health Sciences, University of Leicester, 22-28 Princess Rd West, Leicester, Leicestershire, LE1 6TP, UK. rb14@le.ac.uk.

#### CONTRIBUTIONS OF AUTHORS

Richard Baker, Francine Cheater and Elizabeth Shaw were responsible for the planning of the review.

Janette Camosso-Stefinovic was responsible for developing, editing and running search strategies for the review, in collaboration with three successive EPOC Trials Search Coordinators: Jessie McGowan, Doug Salzwedel and Michelle Fiander.

Janette Camosso-Stefinovic was responsible for obtaining full text articles.

All reviewers assessed whether studies were relevant and extracted study data.

Clare Gillies was responsible for the statistical analysis.

Richard Baker prepared the first draft of the review.

**Editorial group:** Cochrane Effective Practice and Organisation of Care Group.

**Publication status and date:** New search for studies and content updated (conclusions changed), published in Issue 3, 2010.

**Review content assessed as up-to-date:** 14 October 2009.

**DECLARATIONS OF INTEREST** Richard Baker, Francine Cheater and Signe Flottorp are authors of three of the included studies. Noelle Robertson is an author on two of the included studies. Other review authors completed data extractions for these studies.

or healthcare outcomes in which at least one group received an intervention designed to address prospectively identified barriers to change.

**Data collection and analysis**—Two reviewers independently assessed quality and extracted data. We undertook quantitative and qualitative analyses. The quantitative analyses had two elements.

1. We carried out a meta-regression to compare interventions tailored to address identified barriers to change with either no interventions or an intervention(s) not tailored to the barriers.
2. We carried out heterogeneity analyses to investigate sources of differences in the effectiveness of interventions. These included the effects of: risk of bias, concealment of allocation, rigour of barrier analysis, use of theory, complexity of interventions, and the reported presence of administrative constraints.

**Main results**—We included 26 studies comparing an intervention tailored to address identified barriers to change to no intervention or an intervention(s) not tailored to the barriers. The effect sizes of these studies varied both across and within studies.

Twelve studies provided enough data to be included in the quantitative analysis. A meta-regression model was fitted adjusting for baseline odds by fitting it as a covariate, to obtain the pooled odds ratio of 1.54 (95% CI, 1.16 to 2.01) from Bayesian analysis and 1.52 (95% CI, 1.27 to 1.82,  $P < 0.001$ ) from classical analysis. The heterogeneity analyses found that no study attributes investigated were significantly associated with effectiveness of the interventions.

**Authors' conclusions**—Interventions tailored to prospectively identified barriers are more likely to improve professional practice than no intervention or dissemination of guidelines. However, the methods used to identify barriers and tailor interventions to address them need further development. Research is required to determine the effectiveness of tailored interventions in comparison with other interventions.

### Medical Subject Headings (MeSH)

Outcome and Process Assessment (Health Care) [\*standards]; Professional Practice [\*standards]; Randomized Controlled Trials as Topic

### MeSH check words

Humans

---

## BACKGROUND

This review updates a previous Cochrane review (Shaw 2005) of the effects of tailored strategies, which we define as 'strategies to improve professional practice that are planned taking account of prospectively identified barriers to change'. Barriers to change are factors that could potentially impair the effectiveness of an intervention to improve professional practice, and have been classified by the Cochrane Effective Practice and Organisation of Care Group into nine categories (information management, clinical uncertainty, sense of

competence, perceptions of liability, patient expectations, standards of practice, financial disincentives, administrative constraints and other) (EPOC 2002).

Whether considered in the context of models for quality and safety improvement or guideline implementation initiatives (Ashford 1999; Grol 2005; Lomas 1994; Robertson 1996), systematic reviews of improvement interventions (Chaillet 2006; Grimshaw 2004) or guideline adoption (Cabana 1999), barriers are believed to influence the success of improvement strategies. If the barriers to improved performance are identified and strategies then chosen and implemented to overcome them, it would appear reasonable to expect performance to improve. Despite the attractiveness of this argument, however, the effects of attempts to translate research evidence into practice and improve performance remain inconsistent (Grimshaw 2004; McGlynn 2003).

Although there are a number of reviews in specific clinical fields (Chaillet 2006; Kroenke 2000) which have discussed the possibility that tailored strategies might be more effective than strategies selected without taking account of barriers, these reviews did not address the effect or costs of tailored interventions specifically. Bosch and colleagues (Bosch 2007) undertook a qualitative analysis of 20 quality improvement studies reporting investigation of barriers. Individual and group interviews of professionals were the most commonly used method of identifying barriers, but in many studies the reasons for believing a particular strategy would overcome a particular barrier were not explained. Again, the effectiveness of tailored strategies was not evaluated.

### **Why it is important to do this review**

We have not identified any reviews evaluating the effects of tailored strategies on professional performance other than our earlier version of this review, which concluded that the effectiveness of tailored interventions was uncertain. Since the publication of that review (2005), several new studies of tailored intervention strategies have been published, and as tailoring is frequently regarded as an important step in improvement interventions, we have updated the review.

## **OBJECTIVES**

We addressed the question: are tailored strategies effective in improving professional practice and healthcare outcomes?

To answer this question, we considered the same comparisons as in the earlier review.

1. A comparison of interventions tailored to address identified barriers to change with no intervention or an intervention(s) not tailored to the barriers. We repeated this analysis for two subsets of the studies, one in which the control group received no intervention and the other in which the control was a non-tailored intervention. We also undertook an investigation of heterogeneity on the effectiveness of tailored interventions to identify factors important to consider when designing and implementing a tailored intervention.

2. An intervention targeted at both individual and social or organisational barriers compared with interventions that are targeted at only individual barriers.

## METHODS

### Criteria for considering studies for this review

**Types of studies**—Randomised controlled trials (RCTs).

**Types of participants**—Healthcare professionals responsible for patient care. We excluded studies that included only students.

**Types of interventions**—We defined tailored strategies as strategies to improve professional practice that are planned taking account of prospectively identified barriers to change. Barriers may be identified by various methods, including observation, focus group discussions, interviews or surveys of the involved healthcare professionals, and/or through an analysis of the organisation or system in which care is provided. We excluded studies that used gap analysis only (i.e. audits identifying a gap between actual and desired performance), as well as studies of educational interventions based on an identified lack of knowledge and designed to improve knowledge only. The identification of barriers must have been undertaken before the design and delivery of the intervention. If the timing of the identification of barriers was not clear, we contacted the study authors for clarification.

Studies had to involve a comparison group that did not receive a tailored intervention (including either no intervention or an intervention not tailored to identified barriers), or a comparison between an intervention that was targeted at both individual and social or organisational barriers, compared with an intervention targeted at only individual barriers.

**Types of outcome measures**—Objectively measured professional performance in a healthcare setting. We excluded studies that measured knowledge or performance in a test situation only.

### Search methods for identification of studies

**Electronic searches**—See: Cochrane Effective Practice and Organisation of Care Group (EPOC) Guide for review Authors: Developing a Protocol (EPOC 2007a).

We undertook searches for studies reported by August 2007, and have included relevant studies identified in this review. We undertook further searches to October 2009 to identify any potentially relevant or ongoing studies to be considered in the next update of this review.

The Cochrane Effective Practice and Organisation of Care (EPOC) Group Specialised Register and pending files were searched by the EPOC Trials Search Co-ordinator, using the following strategy initially: ((tailored or tailoring) and (program\* or intervention\* or strategy or strategies or system\* or treatment\* or education\*)). The later strategy (including the pending citations until October 2009) was: tailor/tailors/tailored/tailoring. The Specialised Register aims to contain all RCTs and other relevant trial reports within the

scope of a Cochrane Review Group. Therefore, we did not undertake a search of the Cochrane Central Register of Controlled Trials (CENTRAL) (Cochrane TSC User Guide 2008). We also searched the following databases, without language restrictions: MEDLINE (Ovid) from 1950 to August 2007; EMBASE (Ovid) from 1980 to August 2007; Cumulative Index to Nursing and Allied Health Literature (CINAHL) from 1982 to August 2007; PsycINFO and the Allied and Complementary Medicine Database (AMED) from inception to August 2007; British Nursing Index (BNI) from 1994 to August 2007; Health Management Information Consortium (HMIC) from 1983 to August 2007. We repeated the searches with modified strategies for the period September 2007 to October 2009, with the exception of PsycINFO and the Allied and Complementary Medicine Database (AMED), as there was a very low yield of potentially eligible articles when these databases were initially searched.

We developed two separate but related strategies and applied these in both MEDLINE and EMBASE (the two most productive databases in terms of reports of trials identified for inclusion in the review). We took this approach in an effort to maximise search strategy sensitivity, while maintaining precision (see Appendix 1). Using both strategies together was more sensitive in detecting studies already known to be eligible for inclusion. We then adapted one of these two strategies (MEDLINE strategy I, see Appendix 1) for use in the other databases consulted.

Search terms utilised in the EMBASE methodology filter (used to identify reports of controlled trials) followed current EPOC methodology (EPOC 2007b).

We reviewed the reference lists of related systematic reviews and of all articles obtained in full text so as to identify any additional, potentially relevant reports of trials. We handsearched titles and abstracts in the online electronic version of the *Journal of Evaluation in Clinical Practice*, from February 2003 to October 2009. Most other relevant journals have been included in the EPOC register (EPOC 2009).

**Searching other resources**—We identified one relevant published review article and examined it for any additional, useful (free text or indexing) terms to complement our existing search strategy (Bosch 2007). We also contacted the article authors, in June 2007, for further information regarding their search strategy, which they provided.

We undertook citation searches in November 2007 (on ISI WoK) for articles citing any of the papers newly identified and included in our review.

We contacted the corresponding authors of the included papers in December 2007, for information regarding any potentially relevant studies that they were aware of (both published and unpublished), to add to those we had already identified.

We last searched the National Research Register on 4 September 2007 (using the terms ‘tailor or tailored’ and ‘barrier or barriers’), for details of ongoing trials. We searched all active registers in the *metaRegister* of controlled trials (<http://www.controlled-trials.com/mrct/>), in October 2009, using six different combinations of search terms (Strategies A.-F., Appendix 3), for reports of relevant ongoing and completed trials. We contacted authors of

identified trials listed on the *metaRegister* as completed in October 2009, to ask for details of publications.

We have listed papers identified by the searches conducted in 2009, considered likely to be eligible for inclusion but awaiting further assessment, below, under Studies awaiting classification.

## Data collection and analysis

**Selection of studies**—Two review authors independently assessed studies for inclusion; a third author resolved any discrepancies.

**Data extraction and management**—Two reviewers independently extracted the data from included studies by using the EPOC Data Collection Checklist (EPOC 2002). We contacted study investigators if data were missing from a study or further clarification was needed.

We summarised the methods that were used to identify barriers to change and qualitatively assessed the processes that were used to identify barriers and tailor interventions to address them. Two reviewers independently classified the complexity of the methods used to identify barriers using the following categories: low - a questionnaire survey of health professionals or informal discussion with, for example, a guideline group; moderate - interviews and/or focus groups with samples of health professionals specifically seeking information about barriers, or a survey supplemented by performance data; high - interviews and/or focus groups of health professionals supplemented by additional methods, for example observation.

We classified barriers using the EPOC categories (EPOC 2002): a) information management; b) clinical uncertainty; c) sense of competence; d) perceptions of liability; e) patient expectations; f) standards of practice; g) financial disincentives; h) administrative constraints; i) other.

Two independent reviewers classified the extent to which the tailored intervention was adjusted to local barriers using the following categories: low - the intervention was limited to feedback and education tailored to the general barriers affecting all or most professionals, and not tailored to the particular barriers at individual or team level; moderate - educational outreach or other interventions beyond feedback or education, tailored to general barriers and not to barriers at the individual or team level; high - any intervention or interventions tailored to the particular barriers facing individual health professionals or individual healthcare teams.

**Assessment of risk of bias in included studies**—Two reviewers assessed the risk of bias of included studies using the criteria described by EPOC for RCTs (EPOC 2002). We also used the EPOC Data Collection Checklist to assess risk of bias and extract data. Given the potential heterogeneity of the targeted behaviours, skills and organisational factors relevant to the review, we did not base study inclusion on a minimum cut-off for methodological quality. We have presented the risk of bias of each of the included studies in

the Results section. Since many of the trials were cluster randomised, we assessed whether analyses had taken the unit of analysis into account.

For all of the studies included in the review, we assigned an overall risk of bias rating (high, moderate, low risk of bias) based on the following criteria: concealment of allocation, blinded or objective assessment of primary outcome(s), completeness of follow up of professionals, and no important concerns in relation to baseline measures, reliable primary outcomes, or protection against contamination. We assigned a rating of low risk of bias if the first three criteria were scored as done, and there were no important concerns related to the last three criteria, moderate if one or two criteria were scored as not clear or not done, and high if more than two criteria were scored as not clear or not done (adapted from Jamtvedt 2003).

**Measures of treatment effect**—We assessed all the included studies for inclusion in a meta-regression analysis, with the aim of providing an overall assessment of the effectiveness of tailored interventions. Where possible, we used the primary binary outcome of each study as an estimate of the effectiveness of the tailored intervention, expressed as odds ratios. Where more than one primary outcome was listed, or a secondary outcome had to be utilised because none of the primary outcomes were binary in format, two authors made the decision on which outcome to use through discussion, based on which was the most clinically relevant measure for the study objectives. We excluded five studies from the analyses as they did not report a suitable binary outcome. There was insufficient information to calculate odds ratios for a further nine studies, despite contacting the authors for further information where possible.

**Unit of analysis issues**—We included 12 trials in the meta-regression analysis. As all the trials were cluster randomised, either results reported for each cluster, or an estimate of the intra-class correlation coefficient (ICC) were needed to enable the clustering effect to be accounted for in the overall effect size estimate from each study. Seven of the 12 studies reported either an estimate of the ICC or reported data for each cluster, allowing the ICC to be estimated. We calculated a mean ICC value from the studies where it was reported using Fisher's transformation approach (Ukoumunne 2002). We used this mean ICC value to adjust the effect size for clustering in studies where only the summary results were reported across all clusters. We calculated the design effect, induced by the cluster design of the trials, for each study using the estimated or average ICC value. We then used the design effect to adjust the estimated effect sizes for clustering, whereby the variances of the odds ratios were increased by multiplying them by the design effect (Rao 1992). The method of using an average ICC for studies where results were not reported by cluster is not ideal due to heterogeneity between studies. However, it is a better approach than ignoring the clustering effect altogether, which is often how this problem is dealt with.

**Dealing with missing data**—The trials included in the analysis were randomised at the cluster level, for example, at the level of the clinic or general practice. None of the studies described problems of drop outs at this level during the trial period. As the data collected were on different patients before and after interventions, drop out at the patient level was not an issue. For the five studies that did not report sufficient information to enable calculation



of an ICC value, we used the average ICC value from the seven studies where it could be calculated.

**Assessment of heterogeneity**—We tested for heterogeneity between the odds ratios at follow up using the Cochrane Q test. To investigate possible causes of heterogeneity on the effectiveness of tailored interventions between studies, we assessed attributes that might have an impact on findings of intervention effectiveness: risk of bias, concealment of allocation, level of tailoring, rigour of barriers analysis, complexity of interventions, use of a theory when developing the intervention, and the reported presence or absence of administrative constraints. We have reported classifications for each study by attribute in the table Characteristics of included studies. We investigated heterogeneity by fitting the meta-regression analysis separately for each category of the study attribute of interest and comparing odds ratios and additionally by fitting the study attributes as continuous variables into the meta-regression models.

**Assessment of reporting biases**—We applied no language restrictions in the searches or inclusion of studies. To check for possible publication bias, we undertook a search in 2009 of the *metaRegister of Controlled Trials* (mRCT, available at: <http://www.controlled-trials.com/mrct/>). As mRCT includes randomised trials records held on the National Institutes of Health (NIH) [ClinicalTrials.gov](http://clinicaltrials.gov/) website (available at: <http://clinicaltrials.gov/>), we did not search the latter registry. Furthermore, as the studies included in the review spanned a number of years and were not all recent publications, time-lag bias is unlikely to be a major problem.

**Data synthesis**—We combined the estimated odds ratios for each study using meta-regression techniques, whereby the baseline odds ratios were included as a covariate to adjust for any baseline differences between the intervention and control groups (Sutton 2000). The same model was fitted in both Stata (classical approach, see Appendix 4 for Stata code) and WinBUGS (Bayesian approach), with the Bayesian approach having the added advantage of modelling the ICC with an error term, thus accounting for some of the heterogeneity between studies.

**Sensitivity analysis**—The main analysis assumed the control groups were equivalent in all 12 studies. To test the robustness of this assumption we carried out two separate analyses, one in which the control groups had no intervention, and another in which the control groups were a non-tailored intervention.

## RESULTS

### Description of studies

See: Characteristics of included studies; Characteristics of excluded studies; Characteristics of ongoing studies.

**Results of the search**—Searches of the electronic databases to August 2007 yielded a total of 3250 potentially relevant articles. Following review of titles and abstracts, we obtained 57 for assessment in full text. Searches of the EPOC Register and Pending Files



identified a further 23 and four potentially relevant papers respectively. These were either records that had already been identified by the database searches (25) or reports of studies which were not eligible for inclusion (two).

Online handsearching of titles and abstracts in the *Journal of Evaluation in Clinical Practice* identified eight potentially relevant articles; we found none of these to be eligible for inclusion in the review. Citation searches of the new papers identified did not retrieve any additional papers for consideration in full text.

We received replies to our letters to corresponding authors of newly included papers from five of the contacted authors, and investigated their suggestions for possible additional relevant papers. However, this did not result in the identification of any additional papers meeting our inclusion criteria.

The National Research Register search carried out in September 2007 yielded 27 reports of ongoing or completed studies for consideration, but none of these identified a study for inclusion. Of the 93 studies obtained in full text, 11 met the criteria for inclusion in the review. The searches 2007 to 2009 found seven studies recently identified as eligible for inclusion and awaiting assessment, while seven other records were identified describing study protocols, ongoing, or recently completed studies meeting our inclusion criteria. We have listed these below under Studies awaiting classification and Ongoing studies, respectively.

**Included studies**—We included 26 trials in the review, 15 of which had been included in the original review. Of the 11 additional studies, nine had been published since the previous review and two (Callahan 1994; Karuza 1995) had not been identified in the previous review. There were two four-arm trials, four three-arm trials, and 20 two-arm trials. The unit of allocation was the health professional in five, the practice in eight, and a larger grouping (hospital, geographical cluster) in 13 trials. The characteristics of the included studies are shown in the Characteristics of included studies table.

**Healthcare setting and characteristics of health care professionals:** Eleven studies had been undertaken in healthcare settings in the US, four in the UK, two each in Belgium, Canada, Indonesia, Norway and the Netherlands, and one in Portugal. In 16 trials, the professionals were physicians only, in two nurses, in six multi-professional staff teams, and community pharmacists (Ross-Degnan 1996) and prescribers (Santoso 1996) in one each. Fifteen trials were based in primary or community care, seven in hospital or specialist care, three in both, and one in a nursing home (Avorn 1992).

**Targeted behaviours:** In nine trials, prescribing was the targeted aspect of care, in three preventive care, in one intrapartum monitoring (Davies 2002), in one reporting of adverse drug reactions (Figueiras 2006), and in 12 aspects of clinical management of a variety of conditions, including depression, back pain, incontinence, hypertension, and abortion care.

**Prospective identification of barriers to change:** In 13 studies, more than one method was used to identify barriers. Interviews with health professionals and occasionally patients were

used in 11 studies, focus group interviews in 10 studies, questionnaire surveys in six, review of the literature in four, review of performance data in two, a meeting or workshop in two, and other methods in four (including observation and consultation with an expert group). Some studies employed a complex mix of methods. For example, in one (Flottorp 2002), a literature search, discussion with the guideline development group, brainstorming, focus group interviews with patients and health professionals, discussion groups and informal interviews were all used. The depth of investigation of barriers was categorised as low in six studies, moderate in 13, and high in seven.

**Barriers identified:** The amount of information about the barriers varied among the studies. In three (Avorn 1992; Goodwin 2001; Hux 1999), the details were insufficient to enable the barriers to be classified. Seven studies reported barriers in only one of the EPOC domains: two in the clinical uncertainty domain only (Leviton 1999; Soumerai 1998), two in the patient demand domain only (Avorn 1983; Engers 2005), and three in the other domain only (Karuza 1995; Sehgal 2002; Simon 2005). The other 16 studies reported barriers in between two and four domains.

The numbers of studies reporting barriers in each domain were: administrative constraints 13, clinical uncertainty nine, patient expectations five, information management three, sense of competence two, financial disincentives two, and 'other' 15. Barriers in the 'other' category included negative staff attitudes, anxiety about changing practice, a perception that the clinical issue was not a priority, and advocacy of certain drugs by pharmaceutical companies. Administrative barriers included lack of time, staff or facilities.

**Influence of prospective identification of barriers on intervention design:** Six studies reported drawing on behavioural theory to guide the choice of strategies in response to the identified barriers (Avorn 1983; Avorn 1992; Baker 2001; Cheater 2006; Davies 2002; Evans 1997). The remaining 20 studies made no reference to any theoretical underpinning when developing interventions.

**Characteristics of the intervention:** Details of all interventions can be found in Characteristics of included studies. We identified no new studies that had not been included in the first version of this review that had addressed organisational barriers.

**Excluded studies—**The characteristics of the excluded studies are shown in Characteristics of excluded studies. Reasons for excluding studies included the absence of a prospective identification of barriers to change, and non-randomised study design.

### Risk of bias in included studies

We assessed nine studies as having low risk of bias (see Characteristics of included studies table). We assessed 15 trials as having moderate and two as high risk of bias. We assessed 12 studies as having adequate allocation concealment. The performance of health professionals was the focus of all the studies, and in all but one study follow up of professionals was adequate, the proportion followed up being unclear in one study. Adequate follow up of patients was not achieved in two studies, unclear in one study, and

achieved in 17, but not appropriate in six studies. Blinded assessment of study outcomes was completed in 17 studies, and a power calculation was reported in 15 studies.

**Unit of analysis errors**—We accounted for unit of analysis errors in the analysis by adjusting the odds ratios for clustering prior to their inclusion in the meta-regression models. Of the 14 studies not included in the meta-regression, 11 were cluster trials, of which six had accounted for clustering, and five had not.

## Effects of interventions

See: Summary of findings for the main comparison Tailored interventions for overcoming identified barriers to changing professional practice

The results of the included studies were mixed both across and within studies (Table 1). Some studies showed a statistically significant improvement in all relevant outcomes. Fourteen studies met the criteria for inclusion in the review, but did not report the necessary data for inclusion in the meta-regression. The main results and conclusions of these studies are reported in Table 1. Overall eight of the 14 studies reported benefit of tailored interventions, two reported benefit for some outcomes but not others, and four studies reported that interventions showed no improvement over control arms in terms of the study's primary outcomes. The positive studies included three with unit of analysis errors, and the mixed and negative studies included three with unit of analysis errors. As the excluded studies did not differ from those included in the meta-regression in terms of level of risk of bias, the results of the meta-regression should not be biased in this respect by their unavoidable omission.

In Table 2, for the twelve studies where a suitable binary outcome was available for analysis, we report the effect sizes used for meta-regression analysis. The effect sizes have been adjusted for the clustering effect induced by the study designs. The specific outcomes were chosen because of clinical relevance and suitability for the statistical analysis. The odds ratios at follow up, adjusted for clustering, ranged from 1.07 to 12.25, but not all of the results were statistically significant. When combined using meta-regression techniques and adjusting for baseline odds ratios, the pooled odds ratio for all 12 studies was 1.54 (95% CI, 1.16 to 2.01) from the Bayesian analysis and 1.52 (95% CI, 1.27 to 1.82)  $P < 0.001$  from the classical analysis. The use of Bayesian methods enabled all parameter uncertainty, especially that regarding the between-study variation, to be fully accounted for in the final pooled effect estimate. Both approaches show benefit with tailored interventions. Figure 1 shows a meta-regression plot with the log odds ratio at follow up plotted against the log odds ratio at baseline. Each circle shows the result of one study and circle size relates to the standard error of the log odds ratio. The red line shows the pooled estimated log odds ratio for each value of the baseline log odds ratio. The plot shows that imbalances between the intervention and control groups at baseline influenced the follow-up log odds ratio, therefore the adjustment for baseline values was an important step in the analysis. The results of the classical analysis can be obtained from the plot, as when the baseline log odds ratio is zero, i.e. when there is no estimated difference between the intervention and control groups at baseline, the estimated log odds ratio at follow up is 0.42, which when exponentiated equals

the 1.52 pooled value obtained for the classical analysis. The control group in four of the 12 studies involved no intervention (Avorn 1992; Callahan 1994; Flottorp 2002; Schouten 2007), and in eight studies the control group (Baker 2001; Cheater 2006; Coenen 2004; Davies 2002; Evans 1997; Fretheim 2006; Leviton 1999; Simon 2005) received a non-tailored intervention. There was little difference in the pooled effect size associated with the nature of the control group, although it should be noted that only a small number of studies had a no intervention control (no intervention control OR 1.58 (95% CI, 0.96 to 2.59]; non-tailored control OR 1.56 (95% CI, 1.27 to 1.90)). In the eight trials using a control group receiving a non-tailored intervention, all but one study compared a tailored strategy to dissemination of educational materials or guidelines.

Significant heterogeneity was found between the odds ratios at follow up ( $P < 0.001$ ). Some of this heterogeneity was due to differences between the comparison groups at baseline, which was adjusted for in the main meta-regression analyses. We carried out further analyses out to investigate other possible sources of heterogeneity between trial results. Although we assessed several study attributes including risk of bias, level of tailoring, rigour of barrier analysis, complexity of interventions, concealment of allocation, explicit utilisation of a theory when developing the intervention, and the reported presence or absence of administrative constraints, we found none to be significantly associated with the reported effectiveness of the tailored interventions. When we performed subgroup analyses for level of tailoring, a high level of tailoring of the intervention had a pooled odds ratio of 1.63 (95% CI, 0.64 to 4.18) and moderate tailoring a pooled odds ratio of 1.44 (95% CI, 1.26 to 1.66). Only one study was classified as having an intervention of low tailoring, hence we could not estimate a pooled odds ratio for low level. Although a high level of tailoring showed a greater effect size than moderate, this was not a significant difference.

The original version of this review included a comparison of an intervention targeted at both individual and social or organisational barriers compared with interventions that are targeted at only individual barriers. We did not identify any further studies relevant to this comparison. In the earlier review only three studies had been identified (Evans 1997; Langham 2002; Matchar 2002), and no conclusions had been possible due to the limited number of studies.

## DISCUSSION

### Summary of main results

Interventions tailored to prospectively identified barriers are more likely to improve professional practice than no intervention or to dissemination of guidelines or educational materials. The overall effectiveness as indicated by the meta-regression is modest. There is, however, wide variation in effectiveness between studies and between the targeted behaviours within single studies, from lack of effect to relatively large effect. Part of the variation may be explained by the variety of barriers identified and addressed in the studies, the variety of clinical settings and targeted behaviours, and the lack of consistency in the methods used within the tailored strategy. The methods used to identify barriers, to select interventions likely to overcome the barriers, and to deliver the chosen interventions varied widely between studies. Although some adaptation of the methods can be expected in order

to account for differences between settings or the mix of prevailing barriers, the extent of variation was such as to suggest that the tailored strategies approach has not yet been developed to the point at which there is broad agreement about the design and role of the constituent elements. For example, although tailored interventions appear to be effective, we do not yet know the most effective ways to identify barriers, to pick out from amongst all the barriers those that are most important to address, or how to select interventions likely to overcome them.

### **Overall completeness and applicability of evidence**

Barriers may be classified in different ways (Légaré 2009). We used the EPOC classification, which employs descriptive categories not related to a conceptual model. Revision of the EPOC classification, including the elaboration of an appropriate conceptual model, would be advisable prior to the next update of this review. The studies did not investigate whether identified barriers had been overcome by the chosen interventions other than through assessment of professional behaviour or health outcomes. In future, researchers should consider investigating whether barriers have indeed been overcome, perhaps using some of the methods initially used to identify the barriers, with investigation taking place in both the intervention and control arms of trials. Studies to compare different ways of selecting interventions are also required, for example studies that compare the use of different theories, or the use of theory with no explicit theory.

Furthermore, it is not clear which element of the tailored strategy approach explained effectiveness. The studies employed various interventions to improve professional practice and it is possible that use of such interventions (for example, audit with feedback, educational outreach) would have improved professional practice whether or not tailoring had been undertaken. Eight of the trials in the meta-regression included a control group that received a non-tailored intervention, but in all but one study the control intervention was limited to the relatively ineffective strategy of dissemination of educational materials or guidelines. Therefore, our review shows that tailored strategies can be effective, but is unable to determine whether this approach is more effective than selecting other interventions already shown to have effect but not involving a barriers analysis followed by tailoring to overcome the identified barriers.

It should also be pointed out that the studies included in this review do not enable any assessment of the costs of tailored strategies. Since the identification of barriers and tailoring of strategies involve additional steps beyond the application of a particular strategy such as education alone, the economic costs of tailoring are likely to be higher than several other interventions. Consequently, evidence of the cost-effectiveness of tailoring in comparison with other implementation methods is required from well designed evaluation studies. There are, therefore, several important questions to be addressed in future research of the effectiveness of tailored strategies.

### **Quality of the evidence**

It was possible to include 26 trials in this update, whereas only 15 could be included in the previous version (Shaw 2005). Only six studies could be included in the meta-regression

analysis in the original review, but 12 were included in this update. Therefore, the amount of evidence has improved. There was no convincing trend over time towards improvement in the quality of studies, three of the eleven additional studies being rated as having low risk of bias, seven as moderate, and one high risk of bias. Applying the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) system (GRADE Working Group 2004), we have downgraded the level of evidence to moderate (Summary of findings table 1). The reasons for this are the variable risk of bias of the included studies and the heterogeneity of results.

A number of questions remain about the design of tailored strategies and their impact on identified barriers, as described above. It is possible to have reasonable confidence that tailored implementation strategies are more likely to lead to improved performance than the use of no strategy, or of dissemination of guidelines alone, but further well-planned studies are required to determine how the tailored strategies approach should be designed to maximise effectiveness, and how the approach compares to other implementation strategies.

### **Potential biases in the review process**

The review was limited to RCTs, and whilst the randomised trial design is considered to be less susceptible to bias in comparison with other study designs, it is possible that good quality interrupted time series or controlled before and after studies could provide further insight into the effectiveness of tailored implementation strategies.

Of the 26 trials reviewed, we could include only 12 in the meta-regression. Nevertheless, both classical and Bayesian methods produced the same conclusion. In the meta-regression analysis, the outcomes included were either those reported as the primary outcome or, when this was not possible, we selected the most clinically relevant measure and therefore the introduction of bias is unlikely. We pooled a relatively wide variety of outcomes in the meta-regression, although in all studies the study outcomes related to processes of care and the studies all addressed the same question about the effectiveness of tailored interventions. The small number of studies, however, is likely to have contributed to the finding that no study attributes were associated with reported intervention effectiveness. Another consequence of the relatively small number of studies is that it is not possible to confirm effectiveness of tailored strategies in improving health outcomes, as most studies reported only changes in professional behaviour, not clinical outcomes.

It should also be acknowledged that the classification of reported barriers and assessment of level of tailoring were limited by the limited information reported in the included studies.

A potential limitation of electronic handsearching is that this approach, in contrast to handsearching print journals, risks overlooking otherwise unpublished studies reported in (non-indexed) conference abstracts and journal supplements (Hopewell 2002). However, this is more likely to be a source of bias for reviews in which interrupted time series and controlled before and after studies are included, since in comparison with these types of studies, randomised trials are more likely to be identified through electronic database searches. Using a complex search, including a sensitive RCT filter, in the key electronic databases should have identified the majority of relevant, published trials.

## AUTHORS' CONCLUSIONS

### Implications for practice

The selection of interventions tailored to prospectively identified barriers is more likely to improve professional practice than no intervention or to dissemination of guidelines or educational materials alone.

At present, there is no single, standard method for tailoring strategies to identified barriers. It is not possible to decide the most effective approach based on available evidence, and the cost of the approach in comparison with other approaches is not known. Therefore, use of low cost approaches in practice would be reasonable; complex and more costly tailored strategies projects should not be undertaken outside carefully designed evaluation studies.

### Implications for research

Research is needed to: (a) better develop the intervention, including methods of identifying the salient barriers and of tailoring interventions to address them; (b) develop and apply methods of investigating whether barriers actually have been overcome, showing how the interventions and barriers interact, for example through use of process evaluations; and (c) determine whether tailored interventions are more cost-effective than non-tailored interventions.

## Acknowledgments

We would like to thank Cynthia Fraser, Jessie McGowan, Doug Salzwedel, Michelle Fiander, Rachel Bennett and Alain Mayhew for all their help searching the EPOC Register and Pending Files and for providing guidance on EPOC methods. We would like to thank David Johnson, Marije Bosch, Craig Ramsay, Luciana Ballini, Heather Dickinson, Martin Eccles and Andy Oxman for their helpful comments. We also thank Keith Abrams for guidance in conducting the statistical analysis.

### SOURCES OF SUPPORT

#### Internal sources

- Norwegian Knowledge Centre for the Health Services, Norway.
- Department of Health Sciences, University of Leicester, UK.

#### External sources

- Richard Baker receives a National Institute of Health Research (NIHR) senior investigator award. Janette Camosso-Stefinovic and Noelle Robertson are partly supported by the NIHR Collaboration for leadership in Applied Health Research and Care (CLAHRC) for Leicestershire, Northamptonshire and Rutland (LNR). Professor Baker is Director of the CLAHRC. The opinions expressed in this review do not necessarily reflect those of the NIHR., UK.

## CHARACTERISTICS OF STUDIES

### Characteristics of included studies *[ordered by study ID]*

#### Avorn 1983

|         |   |
|---------|---|
| Methods | RCT (three study groups, randomised block design) |
|---------|---|



|                                   |  |  |
|-----------------------------------|--|--|
| Participants                      | 435 office-based physicians<br>Country: USA<br>Targeted activity: use of 3 selected drugs (cerebral and peripheral vasodilators, oral cephalosporin, propoxyphene)   |  |
| Interventions                     | Barriers analysis: face-to-face interviews with professionals<br>Complexity: moderate<br>Barriers: patient expectations<br>Theory: communications theory and behaviour change research<br>Interventions:<br><ol style="list-style-type: none"> <li>1 printed materials only</li> <li>2 printed materials plus academic detailing</li> <li>3 no intervention</li> </ol> Tailoring: moderate |  |
| Outcomes                          | Professional practice: number of units of drugs prescribed<br>Health outcome: none   |  |
| Notes                             |  |  |
| <b>Risk of bias</b>               |  |  |
| <b>Item</b>                       | <b>Authors' judgement</b>  | <b>Description</b>   |
| Allocation concealment?           | Unclear  | Quote: "Control and experimental interventions were then allocated randomly within each block..."  |
| Blinding?<br>All outcomes         | Unclear  | Insufficient information reported to permit judgement  |
| Follow-up of professionals?       | Yes  | Quote: "Of the original 435 members of the sample, 9 had moved out of the state, 6 had died, and 5 had retired by the start of 1981."                                  |
| Protection against contamination? | Yes  | Quote: "If a small town contained more than one physician from our sample, all physicians in that town were randomized as a cluster to prevent cross-contamination..." |
| Follow-up of patients?            | Unclear  | No patients or patient level data included   |
| Power calculation?                | No   | A power calculation is not reported  |
| Reliable outcomes?                | Yes  | Quote: "We used Medicaid prescribing records to document changes in the prescribing of target drugs."  |
| Baseline data?                    | Yes  | Quote: "The physicians in each of the study groups were comparable before the intervention in terms of the amount of the target drugs they prescribed..."              |

### Avorn 1992

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | Staff in nursing homes<br>Country: USA<br>Targeted activity: use of psychoactive drugs   |
| Interventions | Barriers analysis: interviews of nurses, nursing assistants and physicians in nursing homes not included in the study, and reviews of the literature<br>Complexity: moderate<br>Barriers: unclear<br>Theory: principles of academic detailing<br>Interventions:<br><ol style="list-style-type: none"> <li>1 educational outreach to high prescribing physicians, and training sessions for nurses</li> <li>2 no intervention.</li> </ol> |

Tailoring: moderate

|                                   |   |   |
|-----------------------------------|---|---|
| Outcomes                          | Professional practice: psychoactive drug use<br>Health outcome: mental status |   |
| Notes                             |   |   |
| <b>Risk of bias</b>               |   |   |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>  |
| Allocation concealment?           | Unclear   | One institution in each pair was then randomly assigned to receive the experimental program   |
| Blinding? All outcomes            | Unclear   | Quote: "After measuring base-line drug use and performing clinical assessments, we initiated a comprehensive educational-outreach program..."   |
| Follow-up of professionals?       | Unclear   | No data about professionals were reported.  |
| Protection against contamination? | Yes   | Quote: "We sought to ensure that the facilities in each pair were similar in terms of baseline drug use but were geographically distant enough to minimize the spread of information by staff members affiliated with both an experimental and a control nursing home." |
| Follow-up of patients?            | Yes   | Quote: "The proportions of residents remaining in the two groups of homes after the intervention were also quite similar: 349 of 431 (81%) in the experimental nursing homes and 329 of 392 (84%) in the control facilities."   |
| Power calculation?                | No  | A power calculation is not reported.  |
| Reliable outcomes?                | Unclear   | Quote: "Software was written for a laptop computer and used to record all medications received ..."   |
| Baseline data?                    | Yes   | Quote: "At base line, the use of psychoactive medication was comparable in the experimental and control nursing homes."   |

**Baker 2001**

|                     |   |                    |
|---------------------|---|--------------------|
| Methods             | RCT   |                    |
| Participants        | 60 general practices<br>Country: UK<br>Targeted activity: management of patients with depression  |                    |
| Interventions       | Barriers analysis: interviews of general practitioners, plus performance data<br>Complexity: high<br>Barriers: varied according to the individual practitioner, including sense of competence, administrative constraints and other<br>Theory: psychological theories of behaviour change<br>Interventions:<br><ol style="list-style-type: none"> <li>1 guideline plus strategies selected from outreach, feedback, scripts, group session</li> <li>2 guideline only</li> </ol> Tailoring: high |                    |
| Outcomes            | Professional practice: adherence to guideline recommendations<br>Health outcome: depression score   |                    |
| Notes               |   |                    |
| <b>Risk of bias</b> |   |                    |
| <b>Item</b>         | <b>Authors' judgement</b>   | <b>Description</b> |

|                                   |         |  |
|-----------------------------------|---------|--|
| Allocation concealment?           | Yes     | Quote: "The practices of those GPs who agreed to take part were randomised using a table of random numbers to control and intervention groups."  |
| Blinding?<br>All outcomes         | Yes     | Quote: "Data collection was undertaken by two trained data collectors blind to practitioners' study groups."   |
| Follow-up of professionals?       | Yes     | Quote: "64 randomised (three of the original volunteers did not enrol any patients and were excluded, one moved away, one withdrew)."  |
| Protection against contamination? | Yes     | Quote: "No practice included a doctor in both study groups."   |
| Follow-up of patients?            | Unclear | Quote: "Data collected from patient records; details of missing records not given. Beck depression inventory completed by more than 80% of patients at baseline."  |
| Power calculation?                | Yes     | Power calculation reported.  |
| Reliable outcomes?                | Yes     | Quote: "Inter-rater reliability of the data collection for the variables to check adherence to the guidelines were all satisfactory ( $k = 0.68-0.95$ )."  |
| Baseline data?                    | Yes     | Quote: "There were no significant differences in the age of patients in each study group, but there were fewer males in the intervention group in the first data collection ( $P < 0.05$ ). There were no significant differences between groups in adherence to the guideline recommendations at baseline." |

### Callahan 1994

|                             |   |  |
|-----------------------------|---|--|
| Methods                     | RCT   |  |
| Participants                | 103 primary care physicians<br>Country: USA<br>Targeted activity: diagnosis and management of depression in late life   |  |
| Interventions               | Barriers analysis: survey of 153 primary care physicians, plus performance data<br>Complexity: moderate<br>Barriers: clinical uncertainty, administrative constraints, other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 guidelines, additional appointments for patients, feedback on depression score, letter to the physician about each patient</li> <li>2 no intervention</li> </ol> Tailoring: moderate |  |
| Outcomes                    | Professional practice: adherence to guidance on depression management<br>Health outcome: depression score   |  |
| Notes                       |   |  |
| <b>Risk of bias</b>         |   |  |
| <b>Item</b>                 | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?     | Unclear   | Quote: "29 practice sessions were randomized to control or intervention status."   |
| Blinding?<br>All outcomes   | Unclear   | No information is given about blinding.  |
| Follow-up of professionals? | Yes   | Quote: "Among the 103 (43%) physicians with a patient enrolled in the clinical trial, 3 (61%) had 1 patient enrolled, 18 (17%) had 2, and 22 (21%) had 3 or more patients enrolled." |

|                                   |         |  |
|-----------------------------------|---------|--|
| Protection against contamination? | Unclear | The study took place in a single ambulatory care clinic, giving rise to a risk of contamination, although 'No physician had both control and intervention patients.' |
| Follow-up of patients?            | Yes     | Process data are reported on all 175 patients enrolled in the trial  |
| Power calculation?                | Yes     | Power calculation reported.  |
| Reliable outcomes?                | Unclear | Hamilton depression rating scale used, but source of data on recording diagnoses of depression and prescribing not described   |
| Baseline data?                    | Yes     | 'There were no significant differences between these 2 groups in any baseline characteristics.'  |

### Cheater 2006

|                                   |   |  |
|-----------------------------------|---|--|
| Methods                           | RCT   |  |
| Participants                      | 194 community nurses<br>Country: UK<br>Targeted activity: nurse urinary incontinence care   |  |
| Interventions                     | Barriers analysis: questionnaire survey of nurses in the intervention group<br>Complexity: low<br>Barriers: information management, administrative constraints, other<br>Theory: communication and behaviour change theory<br>Interventions:<br><ol style="list-style-type: none"> <li>1 educational outreach tailored to barriers</li> <li>2 audit with feedback</li> <li>3 audit with feedback, plus educational outreach</li> <li>4 educational materials alone</li> </ol> Tailoring: high |  |
| Outcomes                          | Professional practice: adherence to guideline recommendations<br>Health outcomes: symptoms, and well-being  |  |
| Notes                             |   |  |
| <b>Risk of bias</b>               |   |  |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?           | Yes   | Concealed randomisation was conducted by the project administrator and SR, other researchers and data collectors being blind to allocation.'                 |
| Blinding?<br>All outcomes         | Yes   | Quote: "Researchers and data collectors were blind to allocation."   |
| Follow-up of professionals?       | Yes   | Quote: "176 nurses recruit 1078 patients." Comment: Follow up indicated in flow chart  |
| Protection against contamination? | Yes   | Quote: "Family practices to which nurses were attached were randomized to reduce the risk of intrapractice contamination."                                   |
| Follow-up of patients?            | Yes   | Quote: "Data on compliance with review criteria at baseline were available for 1017 (94.7%) patients and follow-up data for 877 (81.3%)."                    |
| Power calculation?                | Yes   | Power calculation reported.  |
| Reliable outcomes?                | Yes   | Quote: "Four trained data collectors, blind to allocations, extracted information from records (mean inter-rater percentage agreement for all items 86.7%)." |

|                |     |  |
|----------------|-----|--|
| Baseline data? | Yes | Compliance with recommendations lower in one study group at baseline. 'Baseline differences were adjusted for in analysis of aggregate compliance scores by fitting the baseline score as a covariate in the model.' |
|----------------|-----|--|

### Coenen 2004

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | 85 general practitioners<br>Country: Belgium<br>Targeted activity: antibiotic prescribing for acute cough  |
| Interventions | Barriers analysis: interviews of 24 general practitioners, and survey of 316 general practitioners<br>Complexity: high<br>Barriers: sense of competence, patient expectations, other<br>Theory: none<br>Interventions: <ol style="list-style-type: none"> <li>1 guideline, educational outreach visit.</li> <li>2 educational materials</li> </ol> Tailoring: high |
| Outcomes      | Professional practice: antibiotic prescribing rate<br>Health outcome: time to symptom resolution   |

#### Notes

#### *Risk of bias*

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Yes                | Quote: "Afterwards, P.V.R., who was blinded for the composition of the groups, determined whether group 1 became the intervention or the control by tossing a coin."  |
| Blinding?<br>All outcomes         | Unclear            | Quote: "They (the GPs) collected the data themselves on pre-printed forms."   |
| Follow-up of professionals?       | Yes                | Quote: "This left 27 of 42 GPs in the intervention arm and 32 of 43 GPs in the control arm for the post-test."  |
| Protection against contamination? | Yes                | Quote: "We randomized GPs rather than practices since more than half of the GPs worked single-handed and not all GPs from group practices participated. SC made sure that GPs from the same practice ended up in the same group." |
| Follow-up of patients?            | Yes                | Quote: "They included 1800 patients in the study of which 1503 patients were eligible for analysis of the primary outcome."   |
| Power calculation?                | Yes                | A power calculation is reported.  |
| Reliable outcomes?                | Unclear            | The reliability of the GP collected data and of patient diaries is not reported   |
| Baseline data?                    | Yes                | Quote: "No significant differences were found between the intervention and control GPs."  |

### Davies 2002

|         |     |
|---------|-----|
| Methods | RCT |
|---------|-----|

|               |   |
|---------------|---|
| Participants  | 135 nurses in two obstetric hospitals<br>Country: USA<br>Targeted activity: intrapartum foetal monitoring   |
| Interventions | Barriers analysis: interactive workshops of nurses.<br>Complexity: low<br>Barriers: self-efficacy, other<br>Theory: self-efficacy<br>Interventions:<br><ol style="list-style-type: none"> <li>1 8-hour interactive workshops; use of existing channels (rounds, departmental meetings, posters)</li> <li>2 newsletter publications and presentation</li> </ol> Tailoring: low |
| Outcomes      | Professional practice: use of electronic foetal monitoring, time spent providing labour support<br>Health outcome: none   |

## Notes

**Risk of bias**

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Unclear            | Quote: "Central random allocation was done so that 1 hospital of either type was designated to receive the tailored intervention."                |
| Blinding?<br>All outcomes         | Yes                | Quote: "All research assistants (observers and chart reviewers) were blind to the study design and had not worked at any of the study hospitals." |
| Follow-up of professionals?       | Unclear            | Information about professionals not reported.   |
| Protection against contamination? | Yes                | Randomisation was at the level of the hospital.   |
| Follow-up of patients?            | Yes                | Quote: "We reviewed 2864 randomly selected charts of women who had given birth in the fall of 1995 or the fall of 1996."                          |
| Power calculation?                | Yes                | Power calculation reported.   |
| Reliable outcomes?                | Yes                | Quote: "To determine the proportion of women who received EFM, we randomly selected charts for all women who gave birth in an 8-week period."     |
| Baseline data?                    | Yes                | Quote: "The EFM rates from the regional database at the 4 hospitals before the intervention (1993-95) ranged from 84.4% to 99.3%."                |

**Engers 2005**

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | 67 general practitioners<br>Country: The Netherlands<br>Targeted activity: management of low back pain   |
| Interventions | Barriers analysis: interviews of 20 patients and their general practitioners<br>Complexity: moderate<br>Barriers: patient expectations<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 workshop, patient education card, scientific articles, tool to facilitate collaboration with patients, and guideline</li> <li>2 guideline only</li> </ol> Tailoring: moderate |

|                                   |   |  |
|-----------------------------------|---|--|
| Outcomes                          | Professional practice: prescribing, referral, advice<br>Health outcomes: none |  |
| Notes                             |   |  |
| <b>Risk of bias</b>               |   |  |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?           | Yes   | Quote: "Blind treatment allocation was conducted by an independent researcher with no information on the GPs, using a computer-generated random list of numbers."                  |
| Blinding?<br>All outcomes         | No  | Comment: GPs participating in the study collected the data. Quote: "The GPs were asked to prospectively complete self-registration forms shortly after the first consultations..." |
| Follow-up of professionals?       | Yes   | Quote: "Of the 67 GPs included in the study, a total of 42 returned one or more postconsultation forms (response rate 61%)."   |
| Protection against contamination? | Unclear   | Randomisation at the level of the GP; it is not reported whether some GPs were in the same practice  |
| Follow-up of patients?            | Yes   | Quote: "A total of 616 consultations for 531 patients with nonspecific low back pain were reported on."  |
| Power calculation?                | Yes   | Power calculation reported.  |
| Reliable outcomes?                | Unclear   | Outcomes recorded by GP participants.  |
| Baseline data?                    | Yes   | Quote: "There were no differences in baseline characteristics among GPs in the intervention and control groups."   |

**Evans 1997**

|                           |   |  |
|---------------------------|---|--|
| Methods                   | RCT   |  |
| Participants              | 134 staff in child health clinics<br>Country: USA<br>Target activity: diagnosis and management of childhood asthma  |  |
| Interventions             | Barriers analysis: focus groups<br>Complexity: moderate<br>Barriers: clinical uncertainty, administrative constraints<br>Theory: planned organisational change, learner centred teaching<br>Interventions:<br><br>1 teaching sessions, discussions of patients, tutorial for physicians, monthly educator visits<br><br>2 guideline Tailoring: moderate |  |
| Outcomes                  | Professional practice: identification of patients with asthma, continuity of care, use of medication, patient education<br>Health outcomes: none  |  |
| Notes                     |   |  |
| <b>Risk of bias</b>       |   |  |
| <b>Item</b>               | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?   | Yes   | Quote: We randomly allocated one panel to intervention status by asking a volunteer to toss a coin during a meeting of BH supervisors and administrators." |
| Blinding?<br>All outcomes | No  | No blinding reported.  |



|                                   |     |  |
|-----------------------------------|-----|--|
| Follow-up of professionals?       | Yes | Quote: "Nevertheless, each clinic had at least one paediatrician, public health nurse, public health assistant, laboratory technician, and clerical worker."               |
| Protection against contamination? | Yes | Quote: "Randomisation took place at the level of the clinic."  |
| Follow-up of patients?            | Yes | Quote: "We conducted telephone interviews with the caregivers of 460 patients identified through the BCH database who had receive treatment for asthma in the 22 clinics." |
| Power calculation?                | No  | No power calculation reported.   |
| Reliable outcomes?                | Yes | Quote: "We examined data from the BCH computer database of patient visits."  |
| Baseline data?                    | Yes | Quote: "There were no significant differences between the intervention and control clinics."   |

### Figueiras 2006

|                                   |   |  |
|-----------------------------------|---|--|
| Methods                           | RCT   |  |
| Participants                      | 6451 physicians<br>Country: Portugal<br>Targeted activity: reporting of adverse drug reaction   |  |
| Interventions                     | Barriers analysis: survey of staff who had and had not reported an adverse drug reaction<br>Complexity: low<br>Barriers: administrative constraints, other.<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 educational outreach, reminder card and report form</li> <li>2 no intervention control</li> </ol> Tailoring: moderate |  |
| Outcomes                          | Professional practice: reporting of adverse drug reactions<br>Health outcomes: none   |  |
| Notes                             |   |  |
| <b>Risk of bias</b>               |   |  |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?           | Yes   | Quote: "Using a computer-generated procedure, 4 clusters were assigned to the intervention and 11 to the control group."                           |
| Blinding?<br>All outcomes         | Yes   | Quote: "The Pharmacovigilance Unit expert responsible for codifying adverse reactions (J.P.) was blinded to the physician study group assignment." |
| Follow-up of professionals?       | Yes   | All included physicians followed up through reporting of adverse drug reactions  |
| Protection against contamination? | Yes   | Quote: "To prevent cross-contamination between the intervention and control groups, 15 spatial clusters were used as units of assignment."         |
| Follow-up of patients?            | Unclear   | No patient level data collected  |
| Power calculation?                | Yes   | Power calculation reported.  |

|                    |     |   |
|--------------------|-----|---|
| Reliable outcomes? | Yes | Quote: "All data came from the Northern Pharmacovigilance Unit (under the Portuguese Health Authority) and were certified in accordance with World Health Organization guidelines." |
| Baseline data?     | Yes | Quote: "Models were adjusted for age, speciality and work setting" (there were baseline differences for these variables)."  |

### Flottorp 2002

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | 142 general practices<br>Country: Norway<br>Targeted activity: management of urinary tract infection in women and sore throat  |
| Interventions | Barriers analysis: literature search, discussion with the guideline development group, brainstorming, focus group interviews with patients and GP assistants, a pilot study, discussion groups at a course, and informal interviews<br>Complexity: high<br>Barriers: patient expectations, financial disincentives, administrative constraints, other<br>Theory: none<br>Interventions: <ol style="list-style-type: none"> <li>1 summary of guideline recommendations, patient educational material, computer based support and reminders, increased fees for telephone consultations, printed material to facilitate discussions, interactive courses for GPs and practice assistants, CME point for participants</li> <li>2 no intervention</li> </ol> Tailoring: moderate |
| Outcomes      | Professional practice: rates of use of antibiotics, laboratory tests and telephone consultations<br>Health outcomes: none  |

#### Notes

#### *Risk of bias*

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Yes                | Quote: "142 practices were randomised by computer."   |
| Blinding?<br>All outcomes         | Unclear            | Quote: "Because of the nature of the interventions, participating practices knew the group to which they were assigned."                  |
| Follow-up of professionals?       | Yes                | Quote: "Thirteen practices in the urinary tract infection arm and nine practices in the sore throat arm dropped out after randomisation." |
| Protection against contamination? | Yes                | Randomisation at practice level.  |
| Follow-up of patients?            | Yes                | Data were collected from electronic records using bespoke software for all relevant consultations   |
| Power calculation?                | Yes                | Power calculation reported.   |
| Reliable outcomes?                | Yes                | Data on antibiotic prescribing, laboratory tests and telephone consultations collected with standard software                             |
| Baseline data?                    | Yes                | Quote: "The arms were similar for patient characteristics and baseline measurements."   |

### Foy 2004

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | Medical and nursing staff of 26 hospital gynaecology units<br>Country: UK<br>Targeted activity: adherence to induced abortion guideline  |
| Interventions | Barriers analysis: interviews of lead gynaecologists in each unit plus a survey of medical, nursing and midwifery staff<br>Complexity: high<br>Barriers: administrative constraints, other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 feedback, a presentation and discussion of barriers, patient booklet, local action plans, structured case records</li> <li>2 guidelines only</li> </ol> Tailoring: high |
| Outcomes      | Professional practice: adherence to 15 guideline recommendations<br>Health outcomes: patient satisfaction  |

## Notes

**Risk of bias**

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Yes                | Quote: "The units in each matched pair were randomised to either intervention or control by an independent statistician."  |
| Blinding?<br>All outcomes         | No                 | Blinding not reported.   |
| Follow-up of professionals?       | Yes                | Comment: Details of professionals in participating units not reported<br>Quote: "Post-intervention, 1474 case notes from 25 gynaecology units were reviewed. No relevant cases were identified in one small rural gynaecology unit."                 |
| Protection against contamination? | Yes                | Quote: "Measures were taken to avoid contamination (e.g. avoidance of any joint educational meetings between units)."  |
| Follow-up of patients?            | Yes                | Quote: "Post-intervention data were abstracted from up to 75 cases per unit."  |
| Power calculation?                | Yes                | Power calculation reported.  |
| Reliable outcomes?                | Yes                | Quote: "Prior to the intervention, women undergoing induced abortion over a three month period were identified from ward admission books. Fifty case records per unit were randomly selected and compliance with guideline recommendations audited." |
| Baseline data?                    | Yes                | Quote: "Overall, intervention and control units were balanced with respect to patient and unit characteristics, except for a higher proportion of medical abortions in the intervention arm."  |

**Fretheim 2006**

|              |   |
|--------------|---|
| Methods      | RCT   |
| Participants | 501 physicians in 139 general practices<br>Country: Norway<br>Targeted activity: management of cardiovascular risk factor |

|               |  |
|---------------|--|
| Interventions | Barriers analysis: literature search, structured reflection, physician questionnaire, focus group<br>Complexity: high<br>Barriers: clinical uncertainty, administrative constraints, other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 guidelines plus educational outreach, software package with reminders, audit and feedback</li> <li>2 guidelines only</li> </ol> Tailoring: moderate |
|---------------|--|

|          |  |
|----------|--|
| Outcomes | Professional practice: adherence to guideline recommendations<br>Health outcomes: BP and cholesterol control |
|----------|--|

|       |  |
|-------|--|
| Notes |  |
|-------|--|

**Risk of bias**

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Yes                | Quote: "A colleague not directly involved in our research project generated the allocation list using software..."                |
| Blinding?<br>All outcomes         | Yes                | Data extracted from electronic health records.  |
| Follow-up of professionals?       | Yes                | Quote: "For seven of the 146 participating practices, we were unable to collect medical record data for various reasons."         |
| Protection against contamination? | Yes                | Randomisation was at the level of the practice.   |
| Follow-up of patients?            | Yes                | Details given in patient flow chart.  |
| Power calculation?                | Yes                | Power calculation reported.   |
| Reliable outcomes?                | Yes                | Data collected from electronic records using software for this purpose  |
| Baseline data?                    | Yes                | Quote: "The practices and patients in the intervention and control groups were similar with regards to baseline characteristics." |

**Goodwin 2001**

|                     |   |
|---------------------|---|
| Methods             | RCT   |
| Participants        | 154 family physicians<br>Country: USA<br>Targeted activity: preventive care   |
| Interventions       | Barriers analysis: observation of practice, staff interviews<br>Complexity: high<br>Barriers: not clear<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 facilitation, practice meetings, feedback, menu of tools and approaches</li> <li>2 no intervention</li> </ol> Tailoring: high |
| Outcomes            | Professional practice: delivery of preventive care<br>Health outcomes: none   |
| Notes               |   |
| <b>Risk of bias</b> |   |

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Yes                | Quote: "Practices were randomized in blocks of four as they enrolled..."   |
| Blinding?<br>All outcomes         | Unclear            | Information on blinding not reported.  |
| Follow-up of professionals?       | Yes                | Quote: "During the course of the clinical trial, one practice in the intervention group declined continued participation and two practices in the control group moved."                                  |
| Protection against contamination? | Unclear            | Randomisation at practice level, but risk of interaction between practices not discussed   |
| Follow-up of patients?            | Yes                | Data collection at baseline and at 6 and 12 months involved a total of 10,172 patient visits   |
| Power calculation?                | Yes                | Power calculation reported.  |
| Reliable outcomes?                | Yes                | Data from unannounced medial record review.  |
| Baseline data?                    | Yes                | Quote: "The lack of statistically significant differences between intervention and control practices indicates that randomization of practices at baseline successfully produced balanced study groups." |

### Hux 1999

|               |   |
|---------------|---|
| Methods       | RCT   |
| Participants  | 251 primary care physicians<br>Country: Canada<br>Targeted activity: antibiotic prescribing   |
| Interventions | Barriers analysis: focus groups of physicians<br>Complexity: moderate<br>Barriers: unclear<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 feedback with educational bulletins</li> <li>2 no intervention</li> </ol> Tailoring: low |
| Outcomes      | Professional practice: cost of antibiotic prescribing and choice of antibiotics<br>Health outcomes: none  |
| Notes         |   |

#### *Risk of bias*

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Unclear            | Quote: "400 were randomly assigned to the intervention arm and 400 to the control arm."  |
| Blinding?<br>All outcomes         | No                 | Prescribing profiles obtained from claims data.  |
| Follow-up of professionals?       | Yes                | Quote: "All included physicians followed up except for 1 intervention physician had fewer than 10 prescriptions in the study period, and the data for this doctor were not included."                              |
| Protection against contamination? | Yes                | Quote: "To reduce the chance of contamination between study arms or reinforcement of the intervention through participant interaction, physicians with the same address as another participant were not selected." |

|                        |         |   |
|------------------------|---------|---|
| Follow-up of patients? | Unclear | Physician level prescribing data only.  |
| Power calculation?     | Unclear | Power calculation not given.  |
| Reliable outcomes?     | Yes     | Data from a claims database.  |
| Baseline data?         | Yes     | Quote: "Physicians in the intervention and control arms of the study were similar with regard to age, sex, number of years since graduation from medical school and certification by the College of Family Physicians." |

### Karuza 1995

|               |   |
|---------------|---|
| Methods       | RCT   |
| Participants  | 51 primary care physicians<br>Country: USA<br>Targeted activity: influenza vaccination  |
| Interventions | Barriers analysis: literature and facilitated discussion groups<br>Complexity: moderate<br>Barriers: other<br>Theory: none<br>Interventions:<br><br>1 lecture, development of an action plan<br>2 discussion on an unrelated preventive healthcare topic<br><br>Tailoring: high |
| Outcomes      | Professional practice: vaccination rates<br>Health outcomes: none   |

Notes

#### *Risk of bias*

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Unclear            | Randomisation process not described.  |
| Blinding?<br>All outcomes         | Unclear            | It is not stated whether data extraction was blind to study group   |
| Follow-up of professionals?       | Yes                | Quote: "...51 met the inclusionary criteria for analysis. Eight physicians dropped out..."  |
| Protection against contamination? | Yes                | Quote: "Because the physicians practiced in group settings, the practice groups were assigned to the two study arms randomly..."  |
| Follow-up of patients?            | Yes                | Quote: "Physician compliance with the influenza vaccination guideline was defined by the percentage of patients older than 65 years in his or her practice who received influenza vaccine..." |
| Power calculation?                | Unclear            | No power calculation reported.  |
| Reliable outcomes?                | Yes                | Quote: "For the key measures, the inter-judge reliability of the chart review was better than 98% agreement."   |
| Baseline data?                    | No                 | Quote: "No systematic differences in the patients' demographic profile or health status were noted between study arms."   |

### Langham 2002

|                                   |   |  |
|-----------------------------------|---|--|
| Methods                           | RCT   |  |
| Participants                      | 17 general practices<br>Country: UK<br>Targeted activity: prescribing for, and recording and control of cardiovascular risk factors   |  |
| Interventions                     | Barriers analysis: meetings with each practice, and with all practices together<br>Complexity: moderate<br>Barriers: information management, clinical uncertainty<br>Theory: none<br>Interventions: <ol style="list-style-type: none"> <li>1 training in organisation of patient information</li> <li>2 training in assessing evidence of effectiveness</li> <li>3 training in both information and evidence</li> <li>4 training on an unrelated topic</li> </ol> Tailoring: high |  |
| Outcomes                          | Professional practice: recording of risk factors and relevant prescribing<br>Health outcomes: control of blood pressure and cholesterol   |  |
| Notes                             |   |  |
| <b>Risk of bias</b>               |   |  |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?           | Unclear   | Quote: "Practices were randomly allocated to one of the four intervention groups..."                     |
| Blinding?<br>All outcomes         | Unclear   | It is not reported whether case note abstraction was blind to study group                                |
| Follow-up of professionals?       | Yes   | All practices randomised were followed up.   |
| Protection against contamination? | Yes   | Practice teams were the unit of randomisation.   |
| Follow-up of patients?            | Yes   | Quote: "Baseline and follow-up data were collected on 974 patients (85.2% of those alive at follow-up)." |
| Power calculation?                | Yes   | Power calculation reported.  |
| Reliable outcomes?                | Unclear   | The reliability of chart review not reported.  |
| Baseline data?                    | Yes   | Quote: "Baseline patient characteristics were broadly comparable across intervention groups..."          |

### Leviton 1999

|               |  |  |
|---------------|--|--|
| Methods       | RCT  |  |
| Participants  | Obstetricians and fetal-maternal specialists in 27 hospitals<br>Country: USA<br>Targeted activity: use of antenatal corticosteroids  |  |
| Interventions | Barriers analysis: interviews and focus groups<br>Depth: moderate Barriers: clinical uncertainty<br>Theory: none<br>Interventions: <ol style="list-style-type: none"> <li>1 educational outreach, opinion leader grand rounds, chart reminders, group discussion, feedback</li> <li>2 written educational materials</li> </ol> Tailoring: moderate |  |



|                                   |  |  |
|-----------------------------------|--|--|
| Outcomes                          | Professional practice: use of corticosteroids<br>Health outcomes: none |  |
| Notes                             |  |  |
| <b>Risk of bias</b>               |  |  |
| <b>Item</b>                       | <b>Authors' judgement</b>  | <b>Description</b>   |
| Allocation concealment?           | Yes  | Quote: "The NPIC and AECOM conducted randomization separately for their member hospitals."   |
| Blinding?<br>All outcomes         | No   | Quote: "The study was not blinded because physicians in the active dissemination condition were aware of the study, and the leadership of all hospitals ... were aware of the condition assignment." |
| Follow-up of professionals?       | Yes  | All included institutions followed up.   |
| Protection against contamination? | Yes  | Quote: "...cross-hospital diffusion of the intervention was unlikely because almost no practitioners overlapped across institutions..."  |
| Follow-up of patients?            | Yes  | Quote: "The charts of 6798 eligible women were abstracted from the 27 institutions..."   |
| Power calculation?                | Unclear  | Quote: "For statistical power, our goal was to abstract an average of 162 charts per hospital per study year."   |
| Reliable outcomes?                | Yes  | Quote: "We trained medical data collectors to identify cases in a 2-stage process."  |
| Baseline data?                    | Yes  | Quote: "There were no baseline differences between intervention and control hospitals for..."  |

### Matchar 2002

|                           |   |   |
|---------------------------|---|---|
| Methods                   | RCT   |   |
| Participants              | Physicians in 6 managed care organisations<br>Country: USA<br>Targeted activity: anticoagulation in atrial fibrillation   |   |
| Interventions             | Barriers analysis: literature review, survey of physicians, interviews<br>Complexity: high<br>Barriers: clinical uncertainty, financial disincentives, administrative constraints, other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 introduction of an anticoagulation service</li> <li>2 no intervention</li> </ol> Tailoring: moderate |   |
| Outcomes                  | Professional practice: time in target anticoagulation range, time to follow up<br>Health outcomes: thrombo-embolic events   |   |
| Notes                     |   |   |
| <b>Risk of bias</b>       |   |   |
| <b>Item</b>               | <b>Authors' judgement</b>   | <b>Description</b>  |
| Allocation concealment?   | Yes   | Quote: "Using a computer random number function ... we assigned one practice cluster to the intervention ... and the other to the control..." |
| Blinding?<br>All outcomes | Unclear   | Blinding is not described.  |

|                                   |     |   |
|-----------------------------------|-----|---|
| Follow-up of professionals?       | Yes | Comment: One site was dropped. Quote: "The remaining five sites enrolled eligible patients throughout the trial..."                           |
| Protection against contamination? | Yes | Randomisation at the level of the organisation.   |
| Follow-up of patients?            | Yes | Study flow chart set out progress of 1165 patients observed.  |
| Power calculation?                | Yes | Power calculation reported.   |
| Reliable outcomes?                | Yes | Data abstracted from records.   |
| Baseline data?                    | Yes | Quote: "There were no statistically significant differences in the characteristics of the patients in the intervention and control clusters." |

### Ross-Degnan 1996

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | Staff in 87 community pharmacies<br>Country: Indonesia<br>Targeted activity: treatment for diarrhoea   |
| Interventions | Barriers analysis: interviews and focus group discussions<br>Complexity: moderate<br>Barriers: patient expectations, financial disincentives, other<br>Theory: none<br>Interventions:<br><b>1</b> educational outreach, patient education materials<br><b>2</b> no intervention<br>Tailoring: moderate |
| Outcomes      | Professional practice: use of rehydration salts and antidiarrhoeals<br>Health outcomes: none   |

#### Notes

#### *Risk of bias*

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Yes                | Quote: "Pharmacies were randomly assigned to intervention (n = 43) and control groups (n = 44) ..."<br>Comment: Details of method not given. |
| Blinding?<br>All outcomes         | Yes                | Quote: "These surrogate patients were blind to the purpose of the study."  |
| Follow-up of professionals?       | Yes                | Quote: "All pharmacies visited with one visit per pharmacy per period."  |
| Protection against contamination? | Yes                | Randomisation at level of the pharmacy unit.   |
| Power calculation?                | Unclear            | No power calculation reported.   |
| Reliable outcomes?                | Yes                | Data collected by surrogate patients.  |
| Baseline data?                    | Unclear            | Baseline characteristics not described.  |

### Santoso 1996

|              |                          |
|--------------|--------------------------|
| Methods      | RCT                      |
| Participants | Primary care prescribers |

|                                   |   |   |
|-----------------------------------|---|---|
|                                   | Country: Indonesia<br>Targeted activity: use of drugs for diarrhoea   |   |
| Interventions                     | Barriers analysis: focus groups with prescribers and patients<br>Complexity: moderate<br>Barriers: clinical uncertainty, patient expectations<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 small group discussions, group work, written information</li> <li>2 formal seminars and written material</li> <li>3 no intervention</li> </ol> Tailoring: low |   |
| Outcomes                          | Professional practice: prescribing<br>Health outcomes: none   |   |
| Notes                             |   |   |
| <b>Risk of bias</b>               |   |   |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>  |
| Allocation concealment?           | Unclear   | The method of randomisation was not described.  |
| Blinding?<br>All outcomes         | Unclear   | No information is given on blinding.  |
| Follow-up of professionals?       | Unclear   | Details of numbers of professionals and their follow up not given   |
| Protection against contamination? | Yes   | Quote: "The districts were randomly divided into three groups."   |
| Follow-up of patients?            | Yes   | Quote: "Ten cases were randomly selected from all acute diarrhoea cases seen in each month from a health center." |
| Power calculation?                | No  | No power calculation reported.  |
| Reliable outcomes?                | Unclear   | Details of data collection limited.   |
| Baseline data?                    | Unclear   | Information about baseline characteristics not given.   |

**Schouten 2007**

|                     |   |  |
|---------------------|---|--|
| Methods             | RCT   |  |
| Participants        | Hospital staff caring for patients with community acquired pneumonia<br>Country: The Netherlands<br>Targeted activity: antibiotic use in pneumonia  |  |
| Interventions       | Barriers analysis: individual and group interviews<br>Complexity: moderate<br>Barriers: clinical uncertainty, administrative constraints, other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 lecture, feedback, critical care pathway, plus facilitated modules specific to each intervention site</li> <li>2 no intervention</li> </ol> Tailoring: high |  |
| Outcomes            | Professional practice: adherence to 15 guideline recommendations<br>Health outcomes: length of stay, mortality, intensive care unit admission   |  |
| Notes               |   |  |
| <b>Risk of bias</b> |   |  |

| Item                              | Authors' judgement | Description   |
|-----------------------------------|--------------------|---|
| Allocation concealment?           | Yes                | Quote: "R.P.A., who was blinded to the composition of the groups, flipped a coin to determine which hospitals would be in the intervention and control groups." |
| Blinding?<br>All outcomes         | Unclear            | Blinding is not described.  |
| Follow-up of professionals?       | Yes                | All included hospitals completed the study.   |
| Protection against contamination? | Yes                | Randomisation took place at the level of the hospital.  |
| Follow-up of patients?            | Yes                | Quote: "Exclusion rates varied from 10.4% to 17.8%, and exclusions were mainly attributable to the recent discharge (within 30 days) of patients with LRTI."    |
| Power calculation?                | No                 | No power calculation reported.  |
| Reliable outcomes?                | Yes                | Quote: "2 independent researchers performed double-chart reviews to 10% of the patients."<br>Comment: Kappa 0.7-1.  |
| Baseline data?                    | Yes                | Quote: "No clinically relevant differences were detected for characteristics of hospitals and professionals..."   |

### Sehgal 2002

|                     |  |
|---------------------|--|
| Methods             | RCT  |
| Participants        | 53 nephrologists<br>Country: USA<br>Targeted activity: haemodialysis treatment   |
| Interventions       | Barriers analysis: review of care of 749 patients<br>Complexity: low<br>Barriers: other<br>Theory: none<br>Interventions:<br><ol style="list-style-type: none"> <li>1 recommendations, feedback, patient education</li> <li>2 no intervention</li> </ol> Tailoring: high |
| Outcomes            | Professional practice: changes in dialysis dose, catheter use and treatment time<br>Health outcomes: quality of life   |
| Notes               |  |
| <b>Risk of bias</b> |  |

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Yes                | Quote: "We used a random number generator to assign these nephrologists to an intervention or control group."  |
| Blinding?<br>All outcomes         | Unclear            | Blinding not described   |
| Follow-up of professionals?       | Yes                | 1 nephrologist declined participation. 44 of 53 nephrologists included in the analysis   |
| Protection against contamination? | Yes                | Quote: "...assigning nephrologists rather than patients to prevent the possibility that a given nephrologist may care for both intervention and control patients." |
| Follow-up of patients?            | Yes                | Quote: "A total of 169 patients completed the trial."  |
| Power calculation?                | Yes                | Power calculation reported.  |
| Reliable outcomes?                | Yes                | Data collected from patient records.   |

|                |     |   |
|----------------|-----|---|
| Baseline data? | Yes | Quote: "Intervention and control patients had similar demographic and medical characteristics..." |
|----------------|-----|---|

### Simon 2005

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | 781 prescribers at practice sites in a large health maintenance organisation<br>Country: USA<br>Targeted activity: use of antihypertensives  |
| Interventions | Barriers analysis: focus group discussion<br>Complexity: moderate<br>Barriers: clinical uncertainty, patient expectations<br>Theory: none<br>Interventions: <ol style="list-style-type: none"> <li>1 individual academic detailing</li> <li>2 group academic detailing</li> <li>3 printed educational materials</li> </ol> Tailoring: moderate |
| Outcomes      | Professional practice: antihypertension medication prescribing<br>Health outcomes: last blood pressure reading   |

#### Notes

#### *Risk of bias*

| Item                              | Authors' judgement | Description  |
|-----------------------------------|--------------------|--|
| Allocation concealment?           | Unclear            | The randomisation process was not described.   |
| Blinding?<br>All outcomes         | No                 | Quote: "Blinding with respect to the experimental condition was not feasible."   |
| Follow-up of professionals?       | Yes                | The three practices completed the study.   |
| Protection against contamination? | Yes                | Quote: "We recruited 3 geographically separated practices of similar size and demographic composition from each division." |
| Follow-up of patients?            | Yes                | Data collected on all 3692 included patients.  |
| Power calculation?                | No                 | No power calculation reported.   |
| Reliable outcomes?                | Yes                | Data from electronic medical records and prescribing data were used  |
| Baseline data?                    | Yes                | Quote: "The rates of use of diuretics or $\beta$ -blockers across the 3 arms were almost identical..."                     |

### Soumerai 1998

|               |  |
|---------------|--|
| Methods       | RCT  |
| Participants  | Doctors and nurses in 36 hospitals<br>Country: USA<br>Targeted activity: use of medication in acute myocardial infarction                                      |
| Interventions | Barriers analysis: 1-day meeting of opinion leaders and guideline panel<br>Complexity: low<br>Barriers: clinical uncertainty<br>Theory: none<br>Interventions: |

|                                   |   |   |
|-----------------------------------|---|---|
|                                   | 1   | opinion leader led programmes in each hospital, including educational sessions and materials, administrative support and system changes, feedback |
|                                   | 2   | feedback  |
|                                   | Tailoring: high   |   |
| Outcomes                          | Professional practice: use of specific drugs<br>Health outcomes: none |   |
| Notes                             |   |   |
| <b>Risk of bias</b>               |   |   |
| <b>Item</b>                       | <b>Authors' judgement</b>   | <b>Description</b>  |
| Allocation concealment?           | Unclear   | The randomisation process not described in detail.  |
| Blinding?<br>All outcomes         | Unclear   | Information on blinding not given.  |
| Follow-up of professionals?       | Yes   | The recruited hospitals completed the study.  |
| Protection against contamination? | Yes   | Quote: "To minimize contamination of control hospitals, large cities ... were randomized as clusters..."  |
| Follow-up of patients?            | Yes   | Data were collected on all eligible patients.   |
| Power calculation?                | Unclear   | Details of power calculation not given.   |
| Reliable outcomes?                | Yes   | Quote: "Abstractors were required to demonstrate ongoing interrater agreement with the criterion reviewer of 95% of higher."                      |
| Baseline data?                    | Yes   | Quote: "Both groups were comparable overall with respect to several characteristics..."   |

### Verhoeven 2005

|                           |   |  |
|---------------------------|---|--|
| Methods                   | RCT   |  |
| Participants              | 36 general practitioners<br>Country: Belgium<br>Targeted activity: screening for Chlamydia infection  |  |
| Interventions             | Barriers analysis: survey of primary care clinicians<br>Complexity: low<br>Barriers: patient expectations, administrative constraints, other<br>Theory: none<br>Interventions:<br>1 training in interview techniques, plus practice visit to discuss procedures<br>2 practice visit to discuss procedures<br>Tailoring: low |  |
| Outcomes                  | Professional practice: numbers of patients assessed and tested<br>Health outcomes: none   |  |
| Notes                     |   |  |
| <b>Risk of bias</b>       |   |  |
| <b>Item</b>               | <b>Authors' judgement</b>   | <b>Description</b>   |
| Allocation concealment?   | Unclear   | Details of randomisation process not described.                                    |
| Blinding?<br>All outcomes | No  | Quote: "The GPs knew they were participating in a pilot implementation program..." |

|                                   |         |   |
|-----------------------------------|---------|---|
| Follow-up of professionals?       | Yes     | Quote: "Fourteen GPs dropped out after they received full information..."   |
| Protection against contamination? | Yes     | Quote: "GPs working together in a practice were grouped for randomisation."   |
| Follow-up of patients?            | Yes     | Data were collected on all 317 patients who underwent rapid risk assessment   |
| Power calculation?                | No      | No power calculation reported.  |
| Reliable outcomes?                | Unclear | The data were collected by the participating GPs.   |
| Baseline data?                    | Yes     | Quote: "Non-participants did not differ significantly from participants with respect to age, sex, or type of practice." |

### Characteristics of excluded studies [ordered by study ID]

| Study           | Reason for exclusion  |
|-----------------|---|
| Allison 2005    | Intervention not explicitly tailored to barriers  |
| Altiner 2007    | No systematic, prospective identification of barriers                                   |
| Azocar 2003     | No systematic, prospective identification of barriers                                   |
| Baer 2001       | No systematic, prospective identification of barriers; no clinical outcome measures     |
| Benrimoj 2003   | No systematic, prospective identification of barriers                                   |
| Bosworth 2007   | Targeted patient behaviour, not professionals' behaviour                                |
| Bravo 2005      | Not an RCT - pre/post-test design   |
| Brinkman 2009   | No systematic, prospective identification of barriers or tailoring                      |
| Buckmaster 2006 | Not an RCT  |
| Byrne 2006      | Not an RCT  |
| Cabrera 2001    | Not an RCT  |
| Casebeer 2003   | No systematic, prospective identification of barriers; only outcome measured: knowledge |
| Cranney 1999    | No objective performance outcomes   |
| Cranney 2001    | Not an RCT  |
| de Velasco 2004 | Not an RCT  |
| Downs 2006      | No systematic, prospective identification of barriers                                   |
| Edwards 2002    | Not an RCT  |
| Edwards 2007    | Not an RCT  |
| Figueiras 2001  | No systematic, prospective identification of barriers                                   |
| Fretheim 2004   | Not an RCT  |
| Garcia 2004     | No systematic, prospective identification of barriers; not an RCT                       |
| Gask 2005       | Not an RCT  |
| Gonano 2003     | No systematic, prospective identification of barriers or tailoring                      |
| Green 2002      | Not an RCT  |
| Gregory 1999    | Lack of objectively measured outcomes; no statistical tests reported                    |
| Griffiths 2007  | No systematic, prospective identification of barriers or tailoring                      |
| Gülmezoglu 2007 | No systematic, prospective identification of barriers                                   |
| Hanbury 2009    | Not an RCT  |

| <b>Study</b>       | <b>Reason for exclusion</b>   |
|--------------------|---|
| Hardeman 2005      | Not an RCT  |
| Hendryx 1998       | Intervention targeted at patients, not health professionals   |
| Hennessy 2006      | No systematic, prospective identification of barriers   |
| Herdeiro 2005      | Not an RCT  |
| Holzemer 2007      | Intervention targeted at patients, not health professionals   |
| Inouye 2000        | Not an RCT  |
| Jones 2004         | Not an RCT  |
| Kinmonth 1996      | Not an RCT  |
| LaPointe 2006      | No systematic, prospective identification of barriers   |
| Laprise 2009       | No systematic, prospective identification of barriers or tailoring  |
| Leong 2006         | Not an RCT  |
| Leveille 1998      | Intervention targeted at patients, not health professionals   |
| Levine 2005        | RCT with pre- and post-intervention survey. Outcome measured: physician satisfaction  |
| Lundborg 1999      | No systematic, prospective identification of barriers   |
| Markey 2001        | Only outcomes measured: knowledge and attitudes   |
| Murphy 2005        | Not an RCT  |
| Nansel 2007        | RCT. Some tailoring, but outcomes not measured objectively (parent self-report)   |
| Naughton 2007      | No systematic, prospective identification of barriers or tailoring  |
| New 2003           | No systematic, prospective identification of barriers   |
| Otero-Sabogal 2006 | Intervention targeted at patients, not health professionals   |
| Peters-Klimm 2008  | No systematic, prospective identification of barriers or tailoring  |
| Ploeg 2007         | Not an RCT  |
| Romero 2005        | Focused on content of guidelines, rather than barriers to implementation  |
| Saini 2006         | Not an RCT  |
| Sehgal 1998        | Not an RCT  |
| Seltzer 1997       | Not an RCT  |
| Shirazi 2008       | Educational intervention tailored, but lack of objectively measured outcomes  |
| Silverman 2004     | Not an RCT  |
| Socolar 1998       | Feedback tailored to identified deficiencies, not to barriers   |
| Solomon 2001       | No systematic, prospective identification of barriers   |
| Solomon 2007       | No systematic, prospective identification of barriers. Some tailoring of education for patients, but not reported at professional level |
| Spunt 1996         | Not an RCT  |
| Straand 2006       | No systematic, prospective identification of barriers   |
| Stéphan 2006       | No systematic, prospective identification of barriers   |
| Taylor 1996        | Interventions carefully planned, but not tailored to barriers   |
| Taylor 2000        | Not an RCT  |
| Turnbull 2006      | No systematic, prospective identification of barriers   |
| Unrod 2007         | Targeted at patients rather than professional performance   |
| Vallerand 2004     | Only outcomes measured: knowledge and attitudes   |



| Study          | Reason for exclusion  |
|----------------|---|
| van Driel 2007 | No systematic, prospective identification of barriers       |
| van Eijk 2001  | No systematic, prospective identification of barriers       |
| Ward 2009      | Intervention targeted at patients, not health professionals |
| Welschen 2004  | No systematic, prospective identification of barriers       |
| Witt 2004      | No systematic, prospective identification of barriers       |
| Wright 2003    | Not an RCT  |
| Wright 2006    | Not an RCT - before and after design                        |
| Zimmerman 2003 | Not an RCT  |
| Zimmerman 2006 | Not an RCT  |

## Characteristics of ongoing studies *[ordered by study ID]*

### Barkun 2009

|                     |   |
|---------------------|---|
| Trial name or title | The dissemination of consensus recommendations on upper gastrointestinal bleeding (REASON-II)             |
| Methods             |   |
| Participants        | Hospital healthcare teams and patients with non-variceal upper gastrointestinal bleeding                  |
| Interventions       | Multi-faceted educational intervention  |
| Outcomes            | Application of guidelines on upper gastrointestinal bleeding  |
| Starting date       | September 2008  |
| Contact information | A. Barkun, McGill University alan.barkun@muhc.mcgill.ca   |
| Notes               | Estimated Primary Completion Date: December 2009 (Final data collection date for primary outcome measure) |

### Dykes 2009

|                     |
|---------------------|
| Trial name or title |
| Methods             |
| Participants        |
| Interventions       |
| Outcomes            |
| Starting date       |
| Contact information |
| Notes               |

### Engelman 2007

|                     |
|---------------------|
| Trial name or title |
| Methods             |
| Participants        |
| Interventions       |
| Outcomes            |
| Starting date       |
| Contact information |
| Notes               |

### Gjelstad 2006

|                     |   |
|---------------------|---|
| Trial name or title | Can antibiotic prescriptions in respiratory tract infections be improved? A cluster-randomized educational intervention in general practice - the Prescription Peer Academic Detailing (Rx-PAD) Study |
| Methods             |   |
| Participants        |   |
| Interventions       | A tailored, multifaceted intervention.<br>Study design: multifaceted intervention, educational outreach   |
| Outcomes            | Identifying determinants and patterns of antibiotic prescribing and improving antibiotic prescribing  |
| Starting date       | Janary 2006   |
| Contact information | S. Gjelstad (svein.gjelstad@medisin.uio.no)   |
| Notes               | study protocol.<br><a href="#">ClinicalTrials.gov</a> Identifier: [NCT00272155].  |

### Jansen 2007

|                     |   |
|---------------------|---|
| Trial name or title | Tailoring intervention procedures to routine primary health care practice; an ethnographic process evaluation |
| Methods             | Ethnographic process evaluation   |
| Participants        | General practices   |
| Interventions       | Multi-faceted tailored intervention strategy  |
| Outcomes            | Adherence to recommendations for cardiovascular disease prevention  |
| Starting date       | April 2003  |
| Contact information | YJFM Jansen; y.jansen@bmg.eur.nl  |
| Notes               |   |

### Laurant 2007

|                     |
|---------------------|
| Trial name or title |
| Methods             |
| Participants        |
| Interventions       |
| Outcomes            |
| Starting date       |
| Contact information |
| Notes               |

**van Gaal 2009**

|                     |  |
|---------------------|--|
| Trial name or title | The design of the SAFE or SORRY? study: a cluster randomised trial on the development and testing of an evidence based inpatient safety program for the prevention of adverse events |
| Methods             | Cluster randomised trial   |
| Participants        | Nurses and patients admitted to hospitals and nursing homes  |
| Interventions       | Multifaceted tailored implementation strategy  |
| Outcomes            | Incidence of adverse events in hospitals and nursing homes   |
| Starting date       | September 2006   |
| Contact information | Van Gaal B.vangaal@iq.umcn.nl  |
| Notes               | Study protocol   |

**DATA AND ANALYSES**

This review has no analyses.

**Appendix 1. Ovid Search Strategies****MEDLINE (Strategy I)**

1. tailor\$.ti,ab.
2. (tailor\$ adj3 intervention?).ti,ab.
3. (tailor\$ adj2 care).ti,ab.
4. (tailor\$ adj2 strateg\$).ti,ab.
5. \*Education, Medical, Continuing/
6. \*Education, Continuing/
7. (education\$ adj2 (program\$ or intervention\$ or outreach\$ or strateg\$) adj4 (target\$ or enhanc\$ or improv\$ or reduc\$ or facilitat\$)).ti,ab.

8. ((targeted or personal\$ or tailor\$ or outreach) adj2 (professional or physician\$ or doctor\$ or practitioner\$ or nurse\$)).ti,ab.
9. (intervention strateg\$ adj3 (professional or physician\$ or doctor\$ or practitioner\$ or nurse\$)).ti,ab.
10. ((target\$ or provider-focus\$) adj (intervention\$ or program\$ or education\$)).ti,ab.
11. (personali?ed adj3 (information or education\$ or program\$ or intervention\$)).ti,ab.
12. motivational intervention\$.ti.
13. motivational interview\$.ti,ab.
14. (dissemination adj2 (strateg\$ or effort\$ or method\$)).ti,ab.
15. (focused adj (strateg\$ or effort\$ or method\$)).ti,ab.
16. or/1-15
17. randomized controlled trial.pt.
18. controlled clinical trial.pt.
19. randomized controlled trials.sh.
20. random allocation.sh.
21. double blind method.sh.
22. single-blind method.sh.
23. or/17-22
24. clinical trial.pt.
25. exp clinical trial/
26. (clin\$ adj2 trial\$).ti,ab.
27. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj2 (blind\$ or mask\$)).ti,ab.
28. placebos.sh.
29. placebo\$.ti,ab.
30. random\$.ti,ab.
31. research design.sh.
32. or/24-31
33. 23 or 32
34. animal/
35. human/
36. 34 not (34 and 35)
37. 33 not 36

- 38. 16 and 37
- 39. comment.pt.
- 40. editorial.pt.
- 41. 39 or 40
- 42. 38 not 41
- 43. review.pt.
- 44. 42 not 43
- 45. meta-analysis.pt.
- 46. 44 not 45

### MEDLINE (Strategy II)

- 1. ((tailor\$ or personali?e? or personali?ing or customi\$) adj2 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?)).ti,ab.
- 2. (target\$ adj2 intervention? adj3 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?)).ti,ab.
- 3. (motivational adj (intervention? or interview\$) adj3 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practitioner?)).ti,ab.
- 4. (focus?ed adj2 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practitioner?)).ti,ab.
- 5. or/1-4
- 6. (barrier? or gap? or practice-gap?).ti,ab.
- 7. exp Physicians/
- 8. exp Nurses/
- 9. Organizational.hw.
- 10. ((doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?) adj (behavio?r? or change? or changing or improv\$ or performance or pattern?)).ti,ab.
- 11. ((clinic? or hospital? or organi?ation\$) adj (change? or changing or improv\$)).ti,ab.
- 12. Physician’s Practice Patterns/
- 13. or/6-12 [barrier or change]
- 14. Randomized controlled trial/ or Clinical trial/ or Controlled clinical trial/ or Multicenter study/

15. (Randomized controlled trial or Controlled Clinical Trial or Multicenter Study).pt.
16. random\$.ti,ab.
17. controlled.ti.
18. control groups/
19. (control\$ adj2 (clinical or group\$ or trial\$ or study or studies or design\$ or method \$)).ti,ab.
20. ((multicent\$ or multi-cent\$ or multisite? or multi-site?) adj (study or studies or trial \$)).ti,ab.
21. single-blind method/ or double-blind method/
22. ((single or double or triple or treble) adj blind\$).ti,ab.
23. or/14-22
24. (intervention? or multiintervention? or multi-intervention? or postintervention? or post-intervention? or preintervention? or pre-intervention?).ti,ab.
25. (pre-post or “pre test\$” or pretest\$ or posttest\$ or “post test\$”).ti,ab,hw.
26. (“pre and post” or “pre- and post-”).ti,ab.
27. before-after.ti,ab.
28. (“quasi-experiment\$” or quasiexperiment\$ or “quasi random\$” or quasirandom\$ or “quasi control\$” or quasicontrol\$ or ((quasi\$ or experimental) adj3 (method\$ or study or studies or trial or design\$))).ti,ab,hw.
29. (“time series” adj2 interrupt\$).ti,ab,hw.
30. or/24-29
31. intervention?.ti. or (multiintervention? or multi-intervention? or postintervention? or post-intervention? or preintervention? or pre-intervention?).ti,ab.
32. (knowledge adj (application or broke\$ or creation or diffus\$ or disseminat\$ or exchange\$ or implement\$ or management or mobili\$ or translat\$ or transfer\$ or uptake or utili\$)).ti,ab. or “knowledge translation”/
33. (research\$ adj (DIFFUSION\$ or DISSEMINAT\$ or EXCHANG\$)).ti,ab.
34. TRANSLATIONAL RESEARCH.ti,ab.
35. (“research findings into action” or “research to action” or “research into action” or “evidence to action” or “evidence to practice”).ti,ab.
36. (diffusion adj2 innovation).ti,ab. or DIFFUSION OF INNOVATION/
37. research utili?ation.ti,ab.
38. ((knowledge or evidence) adj2 synthesis).ti,ab.
39. ((EVIDENCE or “EVIDENCE-BASE?”) adj2 (TRANSLATED or TRANSLATING or TRANSLATION or EXCHANG\$)).ti,ab.

40. ((EVIDENCE or KNOWLEDGE) adj2 SYNTHESIS).ti,ab.
41. (EVIDENCE-BASE? adj2 (GUIDELINE? or PROTOCOL? or DECISION? or PATHWAY? or POLICY or POLICIES or TREATMENT? or PREVENTION or PROCESS\$ or RECOMMENDATION? or ALGORITHM? or PRACTICE or PHARMA\$ or PRESCRIB\$)).ti,ab.
42. academic detailing.ti,ab.
43. (“AUDIT AND FEEDBACK” or “SELF-AUDIT\$”).ti,ab.
44. (AUDIT adj2 (QUALITY or IMPROVEMENT? or HEALTHCARE or “HEALTH CARE” or “PATIENT CARE” or POLICY or POLICIES)).ti,ab.
45. (barrier? and facilitator?).ti,ab.
46. (BARRIER? adj2 (CHANGE? or IMPLEMENTATION)).ti,ab.
47. (booklet\$ or brochure? or pamphlet? or paper-based or “printed material?”).ti,ab.
48. (EVIDENCE-BASE? adj2 (POLICY\$ or POLICIES)).ti,ab.
49. ((CHANGE? or CHANGING or IMPROV\$ or EFFECT\$ or ENHANC\$ or INFLUENC\$) adj2 ((ADMINISTRAT\$ or CARE or MANAGEMENT or OUTCOME or ORGANIZATION\$ or POLICY or POLICIES or PROVIDER? or PHYSICIAN? or NURSE? or NURSING or PATHWAY? or PROTOCOL?) adj5 (DIAGNOS\$ or HEALTHCARE or “HEALTH CARE” or HOSPITAL? or PATIENT? or PRACTICE? or PROVIDER? or TREATMENT?))).ti,ab.
50. ((CHANG\$ or IMPROV\$ or OPTIMI\$ or OPTIMAL) adj3 PRESCRIB\$).ti,ab.
51. (PROGRAM\$ adj2 (EFFECT\$ or EVALUAT\$ or INTRODUC\$ or IMPACT)).ti,ab.
52. ((clinical or knowledge or evidence or quality or research or practice) adj2 gap?).ti,ab.
53. EDUCATION, DENTAL, CONTINUING/ or EDUCATION, MEDICAL, CONTINUING/ or EDUCATION, NURSING, CONTINUING/ or EDUCATION, PHARMACY, CONTINUING/ or EDUCATION, PROFESSIONAL, RETRAINING/
54. (CONTINUING adj2 EDUCATION).ti,ab.
55. (RETRAIN\$ adj2 (DOCTOR? or “HEALTH CARE” or NURSE? or NURSING or PHYSICIAN? or PRACTITIONER? )).ti,ab.
56. WORKSHOP?.ti,ab.
57. INSERVICE TRAINING/ or STAFF DEVELOPMENT/
58. (PROFESSIONAL DEVELOPMENT adj3 (DOCTOR? or (“HEALTH CARE” or HEALTHCARE or HOSPITAL) adj (STAFF or WORKER? or EMPLOYEE?)) or NURSE? or NURSING or PHARMACIST\$ or PHYSICIAN? or PRACTITIONER? )).ti,ab.

59. Guideline Adherence/
60. ((PROTOCOL? or guideline?) adj3 (adhere\$ or CONCORDANCE or EFFECT\$ or enforc\$ or influenc\$ or implement\$ or impact\$ or introduc\$ or uptake)).ti,ab.
61. (incentiv\$ adj2 (economic or employee? or financ\$ or insurer? or insurance or market\$ or monetar\$ or pay\$ or physician? or plan? or practitioner? or program\$ or provider? or reimburs\$ or salary or salarie? or staff or team\$ or value-based)).ti,ab.
62. (“nurse-led” or “nurse-driven” or (nurse? adj2 (led or DRIVEN or managed or coordinat\$ or co-ordinat\$))).ti,ab.
63. (PHYSICIAN INITIATED or PROVIDER INITIATED or PRACTITIONER INITIATED).ti,ab.
64. ((knowledge or evidence or practice) adj2 (gap? or barrier?)).ti,ab.
65. “opinion leader?”.ti,ab.
66. (outreach adj2 (communit\$ or plan? or program? or visit?)).ti,ab.
67. (“PHYSICIAN\$ BEHAVIO?R?” or “BEHAVIO?R? OF PHYSICIAN?” or “NURSE? BEHAVIO?R?” or “NURSING BEHAVIO?R?” or “BEHAVIO?R? OF NURSE?” or “PHARMACIST? BEHAVIO?R?” or “BEHAVIO?R? OF PHARMACIST? ”).ti,ab.
68. (PRACTICE PATTERN? adj3 (CHANGES\$ or CHANGING or EFFECT? or IMPACT? or IMPROVE\$ or IMPROVING or MODIFY\$ or MODIFIE? or MODERATE? or MODERATING)).ti,ab.
69. ((policy\$ or policies) adj2 (chang\$ or effect? or impact? or influenc\$)).ti,ab.
70. (quality adj2 (assurance or improvement? or initiativ\$ or plan\$ or program\$ or review)).ti,ab.
71. (QI adj (inititative? or intervention? or program\$ or plan\$)).ti,ab.
72. ((IMPROVEMENT or QUALITY) adj2 (INITIATIVE? or PROGRAM)).ab.
73. ((IMPROV\$ or EFFECT?) adj2 PERFORMANCE).ti,ab.
74. (“user computer” or “computer user”).ti,ab.
75. computers, handheld/ or handheld?.ti,ab. or (PDA or “personal data assistant?” or blackberr\$).ti,ab.
76. TELEPHON\$.ti,hw. or (tele-health\$ or tele-medicine or TELEMEDICINE or TELEHEALTH).ti,ab.
77. (e-health\$ or e-medicine or e-practice).ti,ab.
78. (video\$ adj5 (diagnos\$ or healthcare or “health care” or learning or “patient care” or teaching)).ti,ab.
79. AUDIOVISUAL AIDS/ or MULTIMEDIA/



80. Social marketing/ or (marketing or “virtual communit\$” or facebook or twitter or “social networking”).ti,ab.
81. ((change? or changing or improv\$ or effect\$ or influenc\$) adj2 (“healthcare delivery” or “health care delivery” or “delivery of health\$” or (organi? adj2 healthcare) or (organi? adj2 “health care”) or “patient outcome?” or “practic\$ MANAGEMENT” or provider? or “treatment outcome?” or “disease management”)).ti,ab.
82. (effective adj2 (practice or healthcare or “health care”)).ti,ab.
83. ((standard or usual) adj care adj3 (COMPAR\$ or CHANGE? or CHANGING or IMPROV\$ or EFFECT\$ or ENHANC\$ or INFLUENC\$)).ti,ab.
84. ((doctor? or “healthcare provider?” or “health care provider?” or nurse? or nursing or physician? or practitioner?) adj2 (bonus\$ or incentive? or reward?)).ti,ab.
85. ((performance\$ adj2 pay\$) or P4P or “pay for quality improvement?” or P4QI or “fee-for service?”).ti,ab.
86. ((“performance based” or value-based) adj4 (SALARY or SALARIES or REIMBURSEMENT? or PAY\$ or INCENTIV\$ or PHYSICIAN? or HEALTHCARE or “HEALTH CARE” or “PATIENT CARE” or HOSPITAL?)).ti,ab.
87. (“HOSPITAL? PERFORMANCE” or “NURSS\$ PERFORMANCE” or “PHYSICIAN? PERFORMANCE”).ti,ab.
88. (payment? adj2 (blend\$ or “blue cross” or bonus\$ or capitat\$ or capped or “episode of care” or fixed or government\$ or insur\$ or level? or linear or medicaid or medicare or non-linear or per-patient or per-episode or per-visit or performance or prospectiv\$ or retroactiv\$ retrospectiv\$ or reward\$ or schedule? or system? or target\$ or third-part\$ or threshold? or uncap\$ or shared or variable or per-visit?)).ti,ab.
89. (NON-COMPLIANCE or NONCOMPLIANCE or NONADHERENCE or NON-ADHERENCE or NONPERSISTENCE or NON-PERSISTANCE or “INADEQUATE ADHERENCE”).ti,ab.
90. (change? or changing or improv\$ or effect\$ or influenc\$).ti. and (health or care).hw. and “organization & administration”.fs.
91. (change? or changing or improv\$ or effect\$ or influenc\$).ti. and (hospital? or practice).hw. and “organization & administration”.fs.
92. ((PROCESS or PROCESSES or SYSTEM or SYSTEMS) adj2 (IMPROV\$ or REENGINEER\$ or RE-ENGINEER\$ or REDESIGN\$)).ti,ab.
93. ((SUB-OPTIMAL or SUBOPTIMAL) adj2 (CARE or MANAGEMENT or PRESCRIB\$)).ti,ab.
94. (INTEGRAT\$ adj2 (CARE or DELIVERY or HEALTHCARE or “HEALTH CARE” or SERVICE?)).ti,ab.

95. (“PATIENT? SATISFACTION” adj3 (IMPROV\$ or INCREAS\$)).ti,ab.
96. ((CLINIC\$ or DOCTOR? or PATIENT? or PHYSICIAN?) adj2 referral?).ti,ab.
97. (((decreas\$ or reduc\$ or minimi\$ or shorten or optimi\$) adj3 “LENGTH OF STAY”) or (wait adj2 time?)).ti,ab.
98. ((decreas\$ or improv\$ or reduc\$ or minimi\$ or shorten or optimi\$) adj3 (readmission? or ((patient? or hospital?) adj4 (admission? or admitting or discharg\$ or transfer?))))).ti,ab.
99. ((POLICY\$ or POLICIES) adj2 (CHANG\$ or IMPROV\$ or IMPLEMENT\$ or OPTIMI\$)).ti,ab.
- 100.(chang\$ or EFFECT\$ or improv\$ or IMPLEMENT\$).ti. and (“health care” adj2 delivery) or (patient adj2 care) or (disease adj Management) or (health\$ adj2 service?) or (inpatient adj2 care) or (primary adj care) or POLICY or POLICIES or “QUALITY OF HEALTH CARE”).hw.
- 101.(chang\$ or improv\$ or effect\$ or influenc\$).ti. and (“health CARE” or care).hw. and “organization & administration”.fs.
- 102.(PERFORMANCE adj IMPROV\$).ti,ab.
- 103.(blog\$ or wiki\$ or “web 2.0”).ti,ab.
- 104.(e-detailing or “electronic detailing”).ti,ab.
- 105.(web-based or internet-based or “digital technolog\$”).ti,ab.
- 106.(videoconferenc\$ or video-conferenc\$ or “video conferenc\$” or web-cam\$).ti,ab.
- 107.(voip or “voice over internet” or skype or “audiovisual dialog\$” or “audio-visual dialog\$”).ti,ab.
- 108.(wifi or “web conferenc\$” or “instant messaging” or “instant messenger” or “online chat\$” or (internet adj2 chat\$) or ROIP or “radio over internet” or wideband).ti,ab.
- 109.(broadband adj2 (technology or technologies or network?)).ti,ab.
- 110.(remote adj2 (access or clinic\$ or diagnos\$ or doctor? or learning or medicine or monitor\$ or nurse? or nursing or patient or physician? or teaching)).ti,ab.
- 111.community-base?.ti.
- 112.collaborat\$.ti.
- 113.team?.ti.
- 114.(virtual adj2 (class\$ or communit\$ or consult\$ or diagnos\$ or learning or medicine or reality or teaching)).ti,ab.
- 115.interdisciplinary communication/ or interdisciplinary.ti,ab.
- 116.(“cross-profession\$” or intraprofession\$ or intra-profession\$ or (skill adj2 mix\$) or teambase? or team-based).ti,ab.
- 117.Interprofessional Relations/ or interprofessional\$.ti.

- 118.or/31-117
- 119.cross-sectional studies/
- 120.(cross-sectional adj2 (design or study or studies or trial?)).ti.
- 121.case-control studies/
- 122.((“case control ” or multicase or multi-case) adj2 (design? or study or studies or trial?)).ti.
- 123.follow-up studies/
- 124.((“follow up” or follow-up) adj2 (design or study or studies)).ti.
- 125.cross-over studies/
- 126.((crossover or cross-over) adj2 (design or study or studies or trial)).ti.
- 127.pilot projects/
- 128.(pilot\$ adj2 (project? or study or studies)).ti.
- 129.Comparative study.pt.
- 130.(comparative adj2 (study or studies)).ti.
- 131.intervention studies/
- 132.evaluation studies.pt.
- 133.(evaluation or evaluative).ti.
- 134.or/119-133
- 135.5 and 23
- 136.5 and 30
- 137.5 and 118
- 138.137 or 136 or 1

### EMBASE (Strategy I)

1. tailor\$.ti,ab.
2. (tailor\$ adj3 intervention?).ti,ab.
3. (tailor\$ adj2 care).ti,ab.
4. (tailor\$ adj2 strateg\$).ti,ab.
5. \*Education, Medical, Continuing/
6. \*Education, Continuing/
7. (education\$ adj2 (program\$ or intervention\$ or outreach\$ or strateg\$) adj4 (target\$ or enhanc\$ or improv\$ or reduc\$ or facilitat\$)).ti,ab.

8. ((targeted or personal\$ or tailor\$ or outreach) adj2 (professional or physician\$ or doctor\$ or practitioner\$ or nurse\$)).ti,ab.
9. (intervention strateg\$ adj3 (professional or physician\$ or doctor\$ or practitioner\$ or nurse\$)).ti,ab.
10. ((target\$ or provider-focus\$) adj (intervention\$ or program\$ or education\$)).ti,ab.
11. (personali?ed adj3 (information or education\$ or program\$ or intervention\$)).ti,ab.
12. motivational intervention\$.ti.
13. motivational interview\$.ti,ab.
14. (dissemination adj2 (strateg\$ or effort\$ or method\$)).ti,ab.
15. (focused adj (strateg\$ or effort\$ or method\$)).ti,ab.
16. or/1-15
17. Clinical trial/
18. Randomized controlled trial/
19. Randomization/
20. Single blind procedure/
21. Double blind procedure/
22. Crossover procedure/
23. Placebo/
24. Randomi?ed controlled trial\$.tw.
25. Rct.tw.
26. Random allocation.tw.
27. Randomly allocated.tw.
28. Allocated randomly.tw.
29. (allocated adj2 random).tw.
30. Prospective study/
31. (clin\$ adj2 trial\$).ti,ab.
32. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj2 (blind\$ or mask\$)).ti,ab.
33. random\$.ti,ab.
34. or/17-33
35. 16 and 34
36. animal/
37. human/

- 38. 36 not (36 and 37)
- 39. 35 not 38
- 40. case study/
- 41. case report.tw.
- 42. letter/
- 43. or/40-42
- 44. 39 not 43
- 45. review.pt.
- 46. 44 not 45
- 47. randomized controlled trial/
- 48. controlled clinical trial/
- 49. clinical trial/
- 50. multicenter study/
- 51. single blind procedure/
- 52. double blind procedure/
- 53. experimental design/
- 54. randomi?ed controlled trial\$.tw.
- 55. rct.tw.
- 56. controlled.ti.
- 57. (clin\$ adj2 trial\$.ti,ab.
- 58. (control\$ adj2 (clinical or group\$ or trial\$ or study or studies or design\$ or method \$)).ti,ab.
- 59. ((multicent\$ or multi-cent\$ or multisite? or multi-site?) adj (study or studies or trial \$)).ti,ab.
- 60. ((singl\$ or doubl\$ or trebl\$ or tripl\$) adj blind\$.ti,ab.
- 61. or/47-60
- 62. 16 and 61
- 63. 62 not (38 or 43 or 45)
- 64. 63 not 46

## EMBASE (Strategy II)

1. ((tailor\$ or personali?e? or personali?ing or customi\$) adj2 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?)).ti,ab.
2. (target\$ adj2 intervention? adj3 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?)).ti,ab.
3. (motivational adj (intervention? or interview\$) adj3 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practitioner?)).ti,ab.
4. (focus?ed adj2 (doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practitioner?)).ti,ab.
5. or/1-4
6. (barrier? or gap? or practice-gap?).ti,ab.
7. exp Physicians/
8. exp Nurses/
9. Organizational.hw.
10. ((doctor? or “health care professional?” or “health\$ professional?” or nurse? or nursing or physician? or practice? or practitioner?) adj (behavio?r? or change? or changing or improv\$ or performance or pattern?)).ti,ab.
11. ((clinic? or hospital? or organi?ation\$) adj (change? or changing or improv\$)).ti,ab.
12. Physician’s Practice Patterns/
13. or/6-12 [barrier or change]
14. Randomized controlled trial/ or Clinical trial/
15. Controlled clinical trial/ or Multicenter study/
16. random\$.ti,ab.
17. controlled.ti.
18. control groups/
19. (control\$ adj2 (clinical or group\$ or trial\$ or study or studies or design\$ or method \$)).ti,ab.
20. ((multicent\$ or multi-cent\$ or multisite? or multi-site?) adj (study or studies or trial \$)).ti,ab.
21. single-blind method/ or double-blind method/
22. ((single or double or triple or treble) adj blind\$).ti,ab.
23. or/14-22

24. (intervention? or multiintervention? or multi-intervention? or postintervention? or post-intervention? or preintervention? or pre-intervention?).ti,ab.
25. (pre-post or “pre test\$” or pretest\$ or posttest\$ or “post test\$”).ti,ab,hw.
26. (“pre and post” or “pre- and post-”).ti,ab.
27. before-after.ti,ab.
28. (“quasi-experiment\$” or quasiexperiment\$ or “quasi random\$” or quasirandom\$ or “quasi control\$” or quasicontrol\$ or ((quasi\$ or experimental) adj3 (method\$ or study or studies or trial or design\$))).ti,ab,hw.
29. (“time series” adj2 interrupt\$).ti,ab,hw.
30. or/24-29
31. intervention?.ti. or (multiintervention? or multi-intervention? or postintervention? or post-intervention? or preintervention? or pre-intervention?).ti,ab.
32. (knowledge adj (application or broke\$ or creation or diffus\$ or disseminat\$ or exchang\$ or implement\$ or management or mobili\$ or translat\$ or transfer\$ or uptake or utili\$)).ti,ab. or “knowledge translation”/
33. (research\$ adj (DIFFUSION\$ or DISSEMINAT\$ or EXCHANG\$)).ti,ab.
34. TRANSLATIONAL RESEARCH.ti,ab.
35. (“research findings into action” or “research to action” or “research into action” or “evidence to action” or “evidence to practice”).ti,ab.
36. (diffusion adj2 innovation).ti,ab. or DIFFUSION OF INNOVATION/
37. research utili?ation.ti,ab.
38. ((knowledge or evidence) adj2 synthesis).ti,ab.
39. ((EVIDENCE or “EVIDENCE-BASE?”) adj2 (TRANSLATED or TRANSLATING or TRANSLATION or EXCHANG\$)).ti,ab.
40. ((EVIDENCE or KNOWLEDGE) adj2 SYNTHESIS).ti,ab.
41. (EVIDENCE-BASE? adj2 (GUIDELINE? or PROTOCOL? or DECISION? or PATHWAY? or POLICY or POLICIES or TREATMENT? or PREVENTION or PROCESS\$ or RECOMMEDATION? or ALGORITHM? or PRACTICE or PHARMA\$ or PRESCRIB\$)).ti,ab.
42. academic detailing.ti,ab.
43. (“AUDIT AND FEEDBACK” or “SELF-AUDIT\$”).ti,ab.
44. (AUDIT adj2 (QUALITY or IMPROVEMENT? or HEALTHCARE or “HEALTH CARE” or “PATIENT CARE” or POLICY or POLICIES)).ti,ab.
45. (barrier? and facilitator?).ti,ab.
46. (BARRIER? adj2 (CHANGE? or IMPLEMENTATION)).ti,ab.

47. (booklet\$ or brochure? or pamphlet? or paper-based or “printed material?”).ti,ab.
48. (EVIDENCE-BASE? adj2 (POLICY\$ or POLICIES)).ti,ab.
49. ((CHANGE? or CHANGING or IMPROV\$ or EFFECT\$ or ENHANC\$ or INFLUENC\$) adj2 ((ADMINISTRAT\$ or CARE or MANAGEMENT or OUTCOME or ORGANI?ATION\$ or POLICY or POLICIES or PROVIDER? or PHYSICIAN? or NURSE? or NURSING or PATHWAY? or PROTOCOL?) adj5 (DIAGNOS\$ or HEALTHCARE or “HEALTH CARE” or HOSPITAL? or PATIENT? or PRACTICE? or PROVIDER? or TREATMENT?))).ti,ab.
50. ((CHANG\$ or IMPROV\$ or OPTIMI\$ or OPTIMAL) adj3 PRESCRIB\$).ti,ab.
51. (PROGRAM\$ adj2 (EFFECT\$ or EVALUAT\$ or INTRODUC\$ or IMPACT)).ti,ab.
52. ((clinical or knowledge or evidence or quality or research or practice) adj2 gap?).ti,ab.
53. EDUCATION, DENTAL, CONTINUING/ or EDUCATION, MEDICAL, CONTINUING/ or EDUCATION, NURSING, CONTINUING/ or EDUCATION, PHARMACY, CONTINUING/ or EDUCATION, PROFESSIONAL, RETRAINING/
54. (CONTINUING adj2 EDUCATION).ti,ab.
55. (RETRAIN\$ adj2 (DOCTOR? or “HEALTH CARE” or NURSE? or NURSING or PHYSICIAN? or PRACTITIONER? )).ti,ab.
56. WORKSHOP?.ti,ab.
57. INSERVICE TRAINING/ or STAFF DEVELOPMENT/
58. (PROFESSIONAL DEVELOPMENT adj3 (DOCTOR? or (“HEALTH CARE” or HEALTHCARE or HOSPITAL) adj (STAFF or WORKER? or EMPLOYEE?)) or NURSE? or NURSING or PHARMACIST\$ or PHYSICIAN? or PRACTITIONER? )).ti,ab.
59. Guideline Adherence/
60. ((PROTOCOL? or guideline?) adj3 (adhere\$ or CONCORDANCE or EFFECT\$ or enforc\$ or influenc\$ or implement\$ or impact\$ or introduc\$ or uptake)).ti,ab.
61. (incentiv\$ adj2 (economic or employee? or financ\$ or insurer? or insurance or market\$ or monetar\$ or pay\$ or physician? or plan? or practitioner? or program\$ or provider? or reimburs\$ or salary or salarie? or staff or team\$ or value-based)).ti,ab.
62. (“nurse-led” or “nurse-driven” or (nurse? adj2 (led or DRIVEN or managed or coordinat\$ or co-ordinat\$))).ti,ab.
63. (PHYSICIAN INITIATED or PROVIDER INITIATED or PRACTITIONER INITIATED).ti,ab.
64. ((knowledge or evidence or practice) adj2 (gap? or barrier?)).ti,ab.



65. “opinion leader?”.ti,ab.
66. (outreach adj2 (communit\$ or plan? or program? or visit?)).ti,ab.
67. (“PHYSICIAN\$ BEHAVIO?R?” or “BEHAVIO?R? OF PHYSICIAN?” or “NURSE? BEHAVIO?R?” or “NURSING BEHAVIO?R?” or “BEHAVIO?R? OF NURSE?” or “PHARMACIST? BEHAVIO?R?” or “BEHAVIO?R? OF PHARMACIST? ”).ti,ab.
68. (PRACTICE PATTERN? adj3 (CHANGES\$ or CHANGING or EFFECT? or IMPACT? or IMPROVE\$ or IMPROVING or MODIFY\$ or MODIFIE? or MODERATE? or MODERATING)).ti,ab.
69. ((policy\$ or policies) adj2 (chang\$ or effect? or impact? or influenc\$)).ti,ab.
70. (quality adj2 (assurance or improvement? or initiativ\$ or plan\$ or program\$ or review)).ti,ab.
71. (QI adj (inititative? or intervention? or program\$ or plan\$)).ti,ab.
72. ((IMPROVEMENT or QUALITY) adj2 (INITIATIVE? or PROGRAM)).ab.
73. ((IMPROV\$ or EFFECT?) adj2 PERFORMANCE).ti,ab.
74. (“user computer” or “computer user”).ti,ab.
75. computers, handheld/ or handheld?.ti,ab. or (PDA or “personal data assistant?” or blackberr\$).ti,ab.
76. TELEPHON\$.ti,hw. or (tele-health\$ or tele-medicine or TELEMEDICINE or TELEHEALTH).ti,ab.
77. (e-health\$ or e-medicine or e-practice).ti,ab.
78. (video\$ adj5 (diagnos\$ or healthcare or “health care” or learning or “patient care” or teaching)).ti,ab.
79. AUDIOVISUAL AIDS/ or MULTIMEDIA/
80. Social marketing/ or (marketing or “virtual communit\$” or facebook or twitter or “social networking”).ti,ab.
81. ((change? or changing or improv\$ or effect\$ or influenc\$) adj2 (“healthcare delivery” or “health care delivery” or “delivery of health\$” or (organi? adj2 healthcare) or (organi? adj2 “health care”) or “patient outcome?” or “practic\$ MANAGEMENT” or provider? or “treatment outcome?” or “disease management”).ti,ab.
82. (effective adj2 (practice or healthcare or “health care")).ti,ab.
83. ((standard or usual) adj care adj3 (COMPAR\$ or CHANGE? or CHANGING or IMPROV\$ or EFFECT\$ or ENHANC\$ or INFLUENC\$)).ti,ab.
84. ((doctor? or “healthcare provider?” or “health care provider?” or nurse? or nursing or physician? or practitioner?) adj2 (bonus\$ or incentive? or reward?)).ti,ab.

85. ((performance\$ adj2 pay\$) or P4P or “pay for quality improvement?” or P4QI or “fee-for service?”).ti,ab.
86. ((“performance based” or value-based) adj4 (SALARY or SALARIES or REIMBURSEMENT? or PAY\$ or INCENTIV\$ or PHYSICIAN? or HEALTHCARE or “HEALTH CARE” or “PATIENT CARE” or HOSPITAL?)).ti,ab.
87. (“HOSPITAL? PERFORMANCE” or “NURS\$ PERFORMANCE” or “PHYSICIAN? PERFORMANCE”).ti,ab.
88. (payment? adj2 (blend\$ or “blue cross” or bonus\$ or capitat\$ or capped or “episode of care” or fixed or government\$ or insur\$ or level? or linear or medicaid or medicare or non-linear or per-patient or per-episode or per-visit or performance or prospectiv\$ or retroactiv\$ retrospectiv\$ or reward\$ or schedule? or system? or target\$ or third-part\$ or threshold? or uncap\$ or shared or variable or per-visit?)).ti,ab.
89. (NON-COMPLIANCE or NONCOMPLIANCE).ti,ab.
90. (NONPERSISTENCE or NON-PERSISTENCE or “INADEQUATE ADHERENCE”).ti,ab.
91. (NONADHERENCE or NON-ADHERENCE).ti,ab.
92. ((PROCESS or PROCESSES or SYSTEM or SYSTEMS) adj2 (IMPROV\$ or REENGINEER\$ or RE-ENGINEER\$ or REDESIGN\$)).ti,ab.
93. ((SUB-OPTIMAL or SUBOPTIMAL) adj2 (CARE or MANAGEMENT or PRESCRIB\$)).ti,ab.
94. (INTEGRAT\$ adj2 (CARE or DELIVERY or HEALTHCARE or “HEALTH CARE” or SERVICE?)).ti,ab.
95. (“PATIENT? SATISFACTION” adj3 (IMPROV\$ or INCREAS\$)).ti,ab.
96. ((CLINIC\$ or DOCTOR? or PATIENT? or PHYSICIAN?) adj2 referral?).ti,ab.
97. (((decreas\$ or reduc\$ or minimi\$ or shorten or optimi\$) adj3 “LENGTH OF STAY”) or (wait adj2 time?)).ti,ab.
98. ((decreas\$ or improv\$ or reduc\$ or minimi\$ or shorten or optimi\$) adj3 (readmission? or ((patient? or hospital?) adj4 (admission? or admitting or discharg\$ or transfer?))))).ti,ab.
99. ((POLICY\$ or POLICIES) adj2 (CHANG\$ or IMPROV\$ or IMPLEMENT\$ or OPTIMI\$)).ti,ab.
100. (chang\$ or EFFECT\$ or improv\$ or IMPLEMENT\$).ti. and ((“health care” adj2 delivery) or (patient adj2 care) or (disease adj Management) or (health\$ adj2 service?)).hw.

- 101.**(chang\$ or EFFECT\$ or improv\$ or IMPLEMENT\$).ti. and ((inpatient adj2 care) or (primary adj care) or POLICY or POLICIES or “QUALITY OF HEALTH CARE”).hw.
- 102.**(PERFORMANCE adj IMPROV\$).ti,ab.
- 103.**(blog\$ or wiki\$ or “web 2.0”).ti,ab.
- 104.**(e-detailing or “electronic detailing”).ti,ab.
- 105.**(web-based or internet-based or “digital technolog\$”).ti,ab.
- 106.**(videoconferenc\$ or video-conferenc\$ or “video conferenc\$” or web-cam\$).ti,ab.
- 107.**(voip or “voice over internet” or skype or “audiovisual dialog\$” or “audio-visual dialog\$”).ti,ab.
- 108.**(wifi or “web conferenc\$” or “instant messaging” or “instant messenger” or “online chat\$” or (internet adj2 chat\$) or ROIP or “radio over internet” or wideband).ti,ab.
- 109.**(broadband adj2 (technology or technologies or network?)).ti,ab.
- 110.**(remote adj2 (access or clinic\$ or diagnos\$ or doctor? or learning or medicine or monitor\$ or nurse? or nursing or patient or physician? or teaching)).ti,ab.
- 111.**community-base?.ti.
- 112.**collaborat\$.ti.
- 113.**team?.ti.
- 114.**(virtual adj2 (class\$ or communit\$ or consult\$ or diagnos\$ or learning or medicine or reality or teaching)).ti,ab.
- 115.**interdisciplinary communication/ or interdisciplinary.ti,ab.
- 116.**(“cross-profession\$” or intraprofession\$ or intra-profession\$ or (skill adj2 mix\$) or teambase? or team-based).ti,ab.
- 117.**Interprofessional Relations/ or interprofessional\$.ti.
- 118.**or/31-117
- 119.**5 and 23
- 120.**5 and 30
- 121.**5 and 118
- 122.**121 or 120 or 119
- 123.**23 or 30
- 124.**randomized controlled trial/
- 125.**controlled clinical trial/
- 126.**clinical trial/
- 127.**controlled study/

- 128.multicenter study/
- 129.major clinical study/
- 130.single blind procedure/
- 131.double blind procedure/
- 132.experimental design/
- 133.placebo/
- 134.randomi?ed controlled trial\$.tw.
- 135.rct.tw.
- 136.controlled.ti.
- 137.(clin\$ adj2 trial\$).ti,ab.
- 138.(control\$ adj2 (clinical or group\$ or trial\$ or study or studies or design\$ or method \$)).ti,ab.
- 139.((multicent\$ or multi-cent\$ or multisite? or multi-site?) adj (study or studies or trial \$)).ti,ab.
- 140.((singl\$ or doubl\$ or trebl\$ or tripl\$) adj blind\$).ti,ab.
- 141.or/124-140
- 142.5 and 118 and 141
- 143.5 and 118 and 123
- 144.142 not 143

### **Cumulative Index to Nursing and Allied Health Literature (CINAHL) Strategy**

- 1. CINAHL tailor\$.ti,ab
- 2. CINAHL (tailor\* adj2 intervention\*).ti
- 3. CINAHL (tailor\$ adj2 care).ti
- 4. CINAHL \*EDUCATION, MEDICAL, CONTINUING/
- 5. CINAHL \*EDUCATION, CONTINUING/
- 6. CINAHL (education\$ adj2 program\$).ti
- 7. CINAHL (education\$ adj2 intervention\$).ti
- 8. CINAHL (education\$ adj2 outreach\$).ti
- 9. CINAHL (education\$ adj2 strateg\$).ti
- 10. CINAHL 6 or 7 or 8 or 9
- 11. CINAHL ((target\$ OR enhanc\$ OR improv\$ OR reduc\$ OR facilitat\$)).ti,ab
- 12. CINAHL 10 AND 11

13. CINAHL (target\$ adj2 professional\$).ti
14. CINAHL (target\$ adj2 physician\$).ti
15. CINAHL (target\$ adj2 doctor\$).ti
16. CINAHL (target\$ adj2 practitioner\$).ti
17. CINAHL (target\$ adj2 nurse\$).ti
18. CINAHL (personal\$ adj2 professional\$).ti
19. CINAHL (personal\$ adj2 physician\$).ti
20. CINAHL (personal\$ adj2 doctor\$).ti
21. CINAHL (personal\$ adj2 practitioner\$).ti
22. CINAHL (personal\$ adj2 nurse\$).ti
23. CINAHL (tailor\$ adj2 professional\$).ti
24. CINAHL (tailor\$ adj2 doctor\$).ti
25. CINAHL (tailor\$ adj2 practitioner\$).ti
26. CINAHL (tailor\$ adj2 nurse\$).ti
27. CINAHL (outreach adj2 professional\$).ti
28. CINAHL (outreach adj2 physician\$).ti
29. CINAHL (outreach adj2 doctor\$).ti
30. CINAHL (outreach adj2 nurse\$).ti
31. CINAHL (intervention adj3 professional).ti
32. CINAHL (intervention adj3 physician\$).ti
33. CINAHL (intervention adj3 doctor\$).ti
34. CINAHL (intervention adj3 practitioner\$).ti
35. CINAHL (intervention adj3 nurse\$).ti
36. CINAHL (target\$ adj2 intervention\$).ti
37. CINAHL (target\$ adj2 program\$).ti
38. CINAHL (target\$ adj2 education\$).ti
39. CINAHL ((provider-focus\$ adj2 intervention\$)).ti,ab
40. CINAHL ((provider-focus\$ adj2 education\$)).ti,ab
41. CINAHL ((provider-focus\$ adj2 program\$)).ti,ab
42. CINAHL (personali?ed adj3 information).ti
43. CINAHL ((personali?ed adj3 education\$)).ti
44. CINAHL ((personali?ed adj3 program\$)).ti

45. CINAHL (personalized adj3 intervention\$).ti
46. CINAHL (motivational AND intervention\$).ti,ab
47. CINAHL (motivational AND interview\$).ti,ab
48. CINAHL (dissemination adj2 strateg\$).ti
49. CINAHL (dissemination adj2 effort\$).ti
50. CINAHL (dissemination adj2 method\$).ti
51. CINAHL (focused ADJ strateg\$).ti
52. CINAHL (focused ADJ effort\$).ti
53. CINAHL (focused ADJ method\$).ti
54. CINAHL 1 OR 2 OR 3 OR 4 OR 5 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53
55. CINAHL exp CLINICAL TRIALS/
56. CINAHL RANDOM ASSIGNMENT/
57. CINAHL (random AND allocation).ti,ab
58. CINAHL DOUBLE-BLIND STUDIES/
59. CINAHL SINGLE-BLIND STUDIES/
60. CINAHL ((clin\$ adj2 trial\$)).ti
61. CINAHL (singl\$ ADJ blind\$ OR double ADJ blind\$ OR tripl\$ ADJ blind\$ OR trebl\$ ADJ blind\$).ti,ab
62. CINAHL PLACEBOS/
63. CINAHL random\$.ti
64. CINAHL 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63
65. CINAHL 54 AND 64

### **British Nursing Index (BNI) Strategy**

1. BNI tailor\$.ti,ab
2. BNI (tailor\* adj2 intervention\*).ti
3. BNI (tailor\$ adj2 care).ti
4. BNI (education\$ adj2 program\$).ti
5. BNI (education\$ adj2 intervention\$).ti
6. BNI (education\$ adj2 outreach\$).ti

7. BNI (education\$ adj2 strateg\$).ti
8. BNI 4 or 5 or 6 or 7
9. BNI ((target\$ OR enhanc\$ OR improv\$ OR reduc\$ OR facilitat\$)).ti,ab
10. BNI 8 AND 9
11. BNI (target\$ adj2 professional\$).ti
12. BNI (target\$ adj2 physician\$).ti
13. BNI (target\$ adj2 doctor\$).ti
14. BNI (target\$ adj2 practitioner\$).ti
15. BNI (target\$ adj2 nurse\$).ti
16. BNI (personal\$ adj2 professional\$).ti
17. BNI (personal\$ adj2 physician\$).ti
18. BNI (personal\$ adj2 doctor\$).ti
19. BNI (personal\$ adj2 practitioner\$).ti
20. BNI (personal\$ adj2 nurse\$).ti
21. BNI (tailor\$ adj2 professional\$).ti
22. BNI (tailor\$ adj2 doctor\$).ti
23. BNI (tailor\$ adj2 practitioner\$).ti
24. BNI (tailor\$ adj2 nurse\$).ti
25. BNI (outreach adj2 professional\$).ti
26. BNI (outreach adj2 physician\$).ti
27. BNI (outreach adj2 doctor\$).ti
28. BNI (outreach adj2 nurse\$).ti
29. BNI (intervention adj3 professional).ti
30. BNI (intervention adj3 physician\$).ti
31. BNI (intervention adj3 doctor\$).ti
32. BNI (intervention adj3 practitioner\$).ti
33. BNI (intervention adj3 nurse\$).ti
34. BNI (target\$ adj2 intervention\$).ti
35. BNI (target\$ adj2 program\$).ti
36. BNI (target\$ adj2 education\$).ti
37. BNI ((provider-focus\$ adj2 intervention\$)).ti,ab
38. BNI ((provider-focus\$ adj2 education\$)).ti,ab

39. BNI ((provider-focus\$ adj2 program\$)).ti,ab
40. BNI (personali?ed adj3 information).ti
41. BNI ((personali?ed adj3 education\$)).ti
42. BNI ((personali?ed adj3 program\$)).ti
43. BNI (personali?ed adj3 intervention\$).ti
44. BNI (motivational AND intervention\$).ti,ab
45. BNI (motivational AND interview\$).ti,ab
46. BNI (dissemination adj2 strateg\$).ti
47. BNI (dissemination adj2 effort\$).ti
48. BNI (dissemination adj2 method\$).ti
49. BNI (focused ADJ strateg\$).ti
50. BNI (focused ADJ effort\$).ti
51. BNI (focused ADJ method\$).ti
52. BNI 1 OR 2 OR 3 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51
53. BNI exp CLINICAL TRIALS/
54. BNI (random AND allocation).ti,ab
55. BNI ((clin\$ adj2 trial\$)).ti
56. BNI (singl\$ ADJ blind\$ OR double ADJ blind\$ OR tripl\$ ADJ blind\$ OR trebl\$ ADJ blind\$).ti,ab
57. BNI random\$.ti
58. BNI 53 OR 54 OR 55 OR 56 OR 57
59. BNI 52 AND 58

### Health Management Information Consortium (HMIC) Strategy

1. HMIC tailor\$.ti,ab
2. HMIC (tailor\* adj2 intervention\*).ti
3. HMIC (tailor\$ adj2 care).ti
4. HMIC (education\$ adj2 program\$).ti
5. HMIC (education\$ adj2 intervention\$).ti
6. HMIC (education\$ adj2 outreach\$).ti



7. HMIC (education\$ adj2 strateg\$).ti
8. HMIC 4 or 5 or 6 or 7
9. HMIC ((target\$ OR enhanc\$ OR improv\$ OR reduc\$ OR facilitat\$)).ti,ab
10. HMIC 8 AND 9
11. HMIC (target\$ adj2 professional\$).ti
12. HMIC (target\$ adj2 physician\$).ti
13. HMIC (target\$ adj2 doctor\$).ti
14. HMIC (target\$ adj2 practitioner\$).ti
15. HMIC (target\$ adj2 nurse\$).ti
16. HMIC (personal\$ adj2 professional\$).ti
17. HMIC (personal\$ adj2 physician\$).ti
18. HMIC (personal\$ adj2 doctor\$).ti
19. HMIC (personal\$ adj2 practitioner\$).ti
20. HMIC (personal\$ adj2 nurse\$).ti
21. HMIC (tailor\$ adj2 professional\$).ti
22. HMIC (tailor\$ adj2 doctor\$).ti
23. HMIC (tailor\$ adj2 practitioner\$).ti
24. HMIC (tailor\$ adj2 nurse\$).ti
25. HMIC (outreach adj2 professional\$).ti
26. HMIC (outreach adj2 physician\$).ti
27. HMIC (outreach adj2 doctor\$).ti
28. HMIC (outreach adj2 nurse\$).ti
29. HMIC (intervention adj3 professional).ti
30. HMIC (intervention adj3 physician\$).ti
31. HMIC (intervention adj3 doctor\$).ti
32. HMIC (intervention adj3 practitioner\$).ti
33. HMIC (intervention adj3 nurse\$).ti
34. HMIC (target\$ adj2 intervention\$).ti
35. HMIC (target\$ adj2 program\$).ti
36. HMIC (target\$ adj2 education\$).ti
37. HMIC ((provider-focus\$ adj2 intervention\$)).ti,ab
38. HMIC ((provider-focus\$ adj2 education\$)).ti,ab

39. HMIC ((provider-focus\$ adj2 program\$)).ti,ab
40. HMIC (personali?ed adj3 information).ti
41. HMIC ((personali?ed adj3 education\$)).ti
42. HMIC ((personali?ed adj3 program\$)).ti
43. HMIC (personali?ed adj3 intervention\$).ti
44. HMIC (motivational AND intervention\$).ti,ab
45. HMIC (motivational AND interview\$).ti,ab
46. HMIC (dissemination adj2 strateg\$).ti
47. HMIC (dissemination adj2 effort\$).ti
48. HMIC (dissemination adj2 method\$).ti
49. HMIC (focused ADJ strateg\$).ti
50. HMIC (focused ADJ effort\$).ti
51. HMIC (focused ADJ method\$).ti
52. HMIC 1 OR 2 OR 3 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39 OR 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51
53. HMIC exp CLINICAL TRIALS/
54. HMIC (random AND allocation).ti,ab
55. HMIC ((clin\$ adj2 trial\$)).ti
56. HMIC (singl\$ ADJ blind\$ OR double ADJ blind\$ OR tripl\$ ADJ blind\$ OR trebl\$ ADJ blind\$).ti,ab
57. HMIC PLACEBOS/
58. HMIC random\$.ti
59. HMIC 53 OR 54 OR 55 OR 56 OR 57 OR 58
60. HMIC 52 AND 59

## Appendix 2. EPOC Register & Pending Files Strategy

Tailor / tailors / tailored / tailoring

(Register search restricted to publication dates 2007 to 2009; Pending citations searched from April 2009 to October 2009)

## Appendix 3. Search Strategies (A. to F.) for the metaRegister of Controlled Trials

### **meta Register Strategy A**

("tailor intervention" OR "tailored interventions" OR "tailoring interventions" OR "tailored care" OR "tailoring care" OR "customised intervention") AND (physician OR physicians OR doctor OR doctors OR nurse OR nurses OR provider OR providers)

### **meta Register Strategy B**

("tailored strategies" OR "outreach strategies" OR "targeted intervention" OR "personalized intervention" OR "focused strategy" OR "focused strategies") AND (physician OR physicians OR doctor OR doctors OR nurse OR nurses OR provider OR providers)

### **meta Register Strategy C**

("personalized strategy" OR "focused effort" OR "focused method" OR "focused strategies" OR "focused intervention" OR "focused interventions") AND (physician OR PHYSICIANS OR doctor OR doctors OR nurse OR nurses OR provider OR providers)

### **meta Register Strategy D**

("physician tailored" OR "focused intervention" OR "barrier to change" or "barriers to change")

### **meta Register Strategy E**

"tailored message" OR "tailored messaging" OR "tailored messages" OR "tailored intervention" OR "tailored interventions" OR "tailored multifaceted" OR "tailored reminder" OR "tailored reminders"

### **meta Register Strategy F**

"physician tailored" OR "nurse tailored" OR "provider tailored" OR tailor AND physician OR Tailored and Physicians OR tailored AND nurse OR tailored AND nurses OR tailored AND provider OR tailored AND providers

*\* N.B. Search terms were divided into 6 sets of terms or phrases (strategies A. to F.), as the metaRegister search interface tended to freeze up when long search strings were used. Results of the six strategies were collated for review.*

## Appendix 4. Stata code for meta-regression analysis

\*calculate the ICC for the 5 studies where it is missing using the mean gx value from ICC meta-analysis, 0.609 for base and 0.797 for foll

```
gen ICCf.est=((Clusters-1)*(exp(2*0.797)-1))/(exp(2*0.797)*(Clusters-1)+ N)
```

```

gen ICCb.est=((Clusters-1)*(exp(2*0.609)-1))/(exp(2*0.609)*(Clusters-1)+ N)

*calculate the design effect

gen DEb=1+((K-1)*ICCb)

gen DEf=1+((K-1)*ICcf)

*calculate adjusted cell n's for 2x2 table (baseline)

gen eventba=nintb/DEb

gen noeintba=(NintB-nintb)/DEb

gen eveconba=nconb/DEb

gen noeveconba=(NcontB-nconb)/DEb

gen orbased= (eventba*(noeveconba))/(eveconba*(noeventba))

gen logorbased= log(orbased)

gen Vlogorbased=(1/eventba)+(1/eveconba)+(1/noeveconba) + (1/noeventba)

gen SElogorbased=sqrt(Vlogorbased)

*calculate adjusted cell n's for 2x2 table (follow-up)

gen eventfo=nintf/DEf

gen noeintfo=(NintF-nintf)/DEf

gen eveconfo=nconf/DEf

gen noeveconfo=(NcontF-nconf)/DEf

gen orfollad= (eventfo*(noeveconfo))/(eveconfo*(noeventfo))

gen logorfollad= log(orfollad)

gen Vlogorfollad=(1/eventfo)+(1/eveconfo)+(1/noeveconfo) + (1/noeventfo)

gen SElogorfollad=sqrt(Vlogorfollad)

*meta-analysis at baseline + follow-up

meta logorbased SElogorbased, print graph(r) eform xlab id(Author) xline(1) cline
b2title('odds ratio')

meta logorfollad SElogorfollad, print graph(r) eform xlab id(Author) xline(1) cline
b2title('odds ratio')

```

\*meta-regression adjusting for baseline and cluster- with SE taken from IPD cluster analyses for Baker, Davies and Evans as reported in analysis.doc

```
metareg logorfolld logorbasead, wsse(SElogorfolld)
```

\*meta-regression plot

```
twoway (scatter logorfolld logorbasead [weight=SElogorfolld], msymbol(circle.hollow))  
(line graphy graphx), ytitle(Log odds ratio at follow-up) xtitle(Log odds ratio at baseline)
```

\*exploring heterogeneity

\*quality

```
metareg logorfolld logorbasead quality, wsse(SElogorfolld)
```

```
xi: metareg logorfolld logorbasead i.quality, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if quality==3, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if quality>1, wsse(SElogorfolld)
```

\*allocation concealment

```
metareg logorfolld logorbasead concealment, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if concealment==1, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if concealment==2, wsse(SElogorfolld)
```

\*administrative constraints a barrier- yes/no

```
metareg logorfolld logorbasead admin, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if admin==1, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if admin==2, wsse(SElogorfolld)
```

\*theory for barriers- yes/no

```
metareg logorfolld logorbasead theory, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if theory==1, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if theory==2, wsse(SElogorfolld)
```

\*level of tailoring

```
metareg logorfolld logorbasead tailoring, wsse(SElogorfolld)
```

```
metareg logorfolld logorbasead if tailoring==1, wsse(SElogorfolld)
```

metareg logorfolldad logorbasead if tailoring==2, wsse(SElogorfolldad)

metareg logorfolldad logorbasead if tailoring==3, wsse(SElogorfolldad)

## HISTORY

Protocol first published: Issue 2, 1999

Review first published: Issue 3, 2005

| Date        | Event  | Description                     |
|-------------|--|---------------------------------|
| 27 May 2008 | Amended  | Converted to new review format. |
| 25 May 2005 | New citation required and conclusions have changed | Substantive amendment           |

## WHAT'S NEW

Last assessed as up-to-date: 14 October 2009.

| Date             | Event  | Description  |
|------------------|--|--|
| 15 February 2010 | New citation required and conclusions have changed | Eleven new studies identified, providing more evidence regarding the effectiveness of the intervention                                 |
| 15 February 2010 | New search has been performed                      | Search conducted up to October 2009. Eleven new studies added. Risk of bias tables and summary of findings tables also added to review |

## SUMMARY OF FINDINGS FOR THE MAIN COMPARISON

Should tailored interventions be used for overcoming identified barriers to changing professional practice?

**Patient or population:** Health care professionals responsible for patient care

**Settings:** Mostly primary care in the U.S. and Europe

**Intervention:** Tailored interventions

| Outcomes   | Illustrative comparative risks* (95% CI) |                              | Relative effect (95% CI)            | No of Participants (studies)   | Quality of the evidence (GRADE) | Comments |
|--|--|------------------------------|-------------------------------------|--------------------------------|---------------------------------|----------|
|  | Assumed risk                             | Corresponding risk           |                                     |                                |                                 |          |
| <b>Desired professional practice</b><br>The outcome measures used were measures of professional performance, such as prescribing, and adherence to guideline recommendations | Control                                  | Experimental                 | OR 1.52 (1.27 to 1.82) <sup>2</sup> | 2189 (12 studies) <sup>3</sup> | +++0 moderate <sup>4</sup>      |          |
|  | Medium risk population<br>60 per 100     | 69.5 per 100 (65.6 to 73.2)  |                                     |                                |                                 |          |
|  | High risk population<br>20 per 100       | 27.5 per 1000 (24.1 to 31.3) |                                     |                                |                                 |          |

\* The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; OR: Odds Ratio

GRADE Working Group grades of evidence

**High quality:** Further research is very unlikely to change our confidence in the estimate of effect.

**Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

**Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

**Very low quality:** We are very uncertain about the estimate.

<sup>1</sup> The assumed risks without a tailored intervention were selected to help interpret the overall odds ratios in situations in which there are a high risk of undesirable professional practice or bad healthcare outcomes without intervening (20% desired practice or outcomes) and a medium risk (60% desired practice or outcomes).

<sup>2</sup> The OR and confidence intervals are from the meta-regression using a classical analysis. The results using a Bayesian analysis are also reported in the results section of the review.

<sup>3</sup> The number of participants shown here is the approximate number of health professionals in the 12 studies. The results of 14 studies not included in the meta regression also suggest that on average tailored interventions improve professional practice, but the effects are heterogeneous.

<sup>4</sup> We have downgraded the quality of evidence to moderate because study limitations (risk of bias) in some of the included studies and heterogeneity of results.

## References to studies included in this review

- Avorn 1983 {published data only} . \*Avorn J, Soumerai SB. Improving drug-therapy decisions through educational outreach. *New England Journal of Medicine*. 1983; 308(24):1457–63. [MEDLINE: 83219085]. [PubMed: 6406886]
- Avorn 1992 {published data only} . \*Avorn J, Soumerai SB, Everitt DE, Ross-Degnan D, Beers MH, Sherman D, et al. A randomized trial of a program to reduce the use of psychotropic drugs in nursing homes. *New England Journal of Medicine*. 1992; 327:168–73. [MEDLINE: 92301485; : 30 RCTC]. [PubMed: 1608408] Beers M, Avorn J, Soumerai SB, Everitt DE, Sherman DS, Salem S. Psychoactive medication use in intermediate-care facility residents. *JAMA*. 1988; 260(20):3016–20. [PubMed: 2903260]
- Baker 2001 {published data only} . \*Baker R, Reddish S, Robertson N, Hershaw H, Jones B. Randomised controlled trial of tailored strategies to implement guidelines for the management of patients with depression in general practice. *British Journal of General Practice*. 2001; 51:737–41. [PubMed: 11593835]
- Callahan 1994 {published data only} . \*Callahan CM, Hendrie HC, Dittus RS, Brater DC, Hui SL, Tierney WM. Improving treatment of late life depression in primary care: a randomized clinical trial. *Journal of the American Geriatric Society*. 1994; 42:839–46. Callahan CM, Niennaber NA, Hendrie HC, Tierney WM. Depression in elderly outpatients: primary care physicians' attitudes and practice patterns. *Journal of General Internal Medicine*. 1992; 7:27–31.
- Cheater 2006 {published data only} . \*Cheater FM, Baker R, Reddish S, Spiers N, Wailoo A, Gillies C, et al. Cluster randomized controlled trial of the effectiveness of audit and feedback and educational outreach on improving nursing practice and patient outcomes. *Medical Care*. 2006; 44:542–51. [PubMed: 16708003]
- Coenen 2004 {published data only} . \*Coenen S, van Royen P, Michiels B, Denekens J. Optimizing antibiotic prescribing for acute cough in general practice: a cluster-randomized controlled trial. *Journal of Antimicrobial Chemotherapy*. 2004; 54:661–72. [PubMed: 15282232]
- Davies 2002 {published data only} . Davies, B. Unpublished doctoral dissertation. University of Toronto; Toronto: 1999. Evaluation of two strategies for the transfer of research results about labour support and electronic fetal monitoring into practice. \*Davies B, Hodnett E, Hannah M, O'Brien-Pallas L, Pringle D, Wells G, et al. Fetal health surveillance: a community-wide approach versus a tailored intervention for the implementation of clinical practice guidelines. *Canadian Medical Association Journal*. 2002; 167(5):469–74. [PubMed: 12240812] Davies BL, Hodnett E. Labour support: nurses' self-efficacy and views about factors influencing implementation. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*. 2002; 31(1):48–56.
- Engers 2005 {published data only} . \*Engers AJ, Wensing M, van Tulder MW, Timmermans A, Oostendorp AB, Koes BW, et al. Implementation of the Dutch low back pain guideline for general practitioners: A cluster randomized controlled trial. *Spine*. 2005; 30(6):595–600. Schers H, Braspenning J, Drijver R, Wensing M, Grol R. Low back pain in general practice: reported management and reasons for not adhering to the guidelines in the Netherlands. *British Journal of General Practice*. 2000; 50:640–4. [PubMed: 11042916] Schers H, Wensing M, Huijsmans Z, van Tulder M, Grol R. Implementation barriers for general practice guidelines on low back pain: A qualitative study. *Spine*. 2001; 26:E348–53. [PubMed: 11474367]
- Evans 1997 {published data only} . \*Evans D, Mellins R, Lobach K, Ramos-Bonoan C, Pinkett-Heller M, Wiesemann S, et al. Improving care for minority children with asthma: professional education in public health clinics. *Pediatrics*. 1997; 99:157–64. [: 600 RCTC]. [PubMed: 9024439]
- Figueiras 2006 {published data only} . \*Figueiras A, Herdeiro MT, Polónia J, Gestal-Otero JJ. An educational intervention to improve physician reporting of adverse drug reactions: a cluster-randomized controlled trial. *JAMA*. 2006; 296(9):1086–93. [PubMed: 16954488]
- Flottorp 2002 {published data only} . Flottorp S, Havelrud K, Oxman AD. Process evaluation of a cluster randomised controlled trial of tailored interventions to implement guidelines in primary care - why is it so hard to change practice? *Family Practice*. 2003; 20(3):333–9. [PubMed: 12738704] \*Flottorp S, Oxman AD. Identifying barriers and tailoring interventions to improve the management of urinary tract infections and sore throat; a pragmatic study using qualitative



- methods. *BMC Health Services Research*. 2003; 3(1):3. [PubMed: 12622873] Flottorp S, Oxman AD, Havelsrud K, Treweek S, Herrin J. Cluster randomised controlled trial of tailored interventions to improve the management of urinary tract infections in women and sore throat. *BMJ*. 2002; 325:367–72. [PubMed: 12183309]
- Foy 2004 {published data only} . \*Foy R, Penney GC, Grimshaw JM, Ramsay CR, Walker AE, MacLennan G, et al. A randomised controlled trial of a tailored multifaceted strategy to promote implementation of a clinical guideline on induced abortion care. *BJOG*. 2004; 111(7):726–33. [PubMed: 15198764]
- Fretheim 2006 {published data only} . Fretheim A, Oxman AD, Flottorp S. Improving prescribing of antihypertensive and cholesterol-lowering drugs: a method for identifying and addressing barriers to change. *BMC Health Services Research*. 2004; 4:23.\*Fretheim A, Oxman AD, Havelsrud K, Treweek S, Kristoffersen DT, Bjorndal A. Rational prescribing in primary care (RaPP): a cluster randomized trial of a tailored intervention. *PLoS Medicine*. 2006; 3(6):e134. [PubMed: 16737346] Fretheim A, Oxman AD, Treweek S, Bjorndal A. Rational prescribing in primary care (RaPP-trial). A randomised trial of a tailored intervention to improve prescribing of antihypertensive and cholesterol-lowering drugs in general practice. *BMC Health Services Research*. 2003; 3:5. [ISRCTN48751230]. [PubMed: 12657163]
- Goodwin 2001 {published data only} . \*Goodwin MA, Zyzanski SJ, Zronek S, Ruhe M, Weyer SM, Konrad M, et al. A clinical trial of tailored office systems for preventive service delivery. The study to enhance prevention by understanding practice (STEP-UP). *American Journal of Preventive Medicine*. 2001; 21(1):20–8. [PubMed: 11418253] Stange KC, Goodwin MA, Zyzanski SJ, Dietrich AJ. Sustainability of a practice-individualised preventive service delivery intervention. *American Journal of Preventive Medicine*. 2003; 25(4):296–300. [PubMed: 14580630]
- Hux 1999 {published data only} . \*Hux JE, Melady M, Deboer D. Confidential prescriber feedback and education to improve antibiotic use in primary care: a controlled trial. *Canadian Medical Association Journal*. 1999; 161:388–92. [PubMed: 10478162]
- Karuza 1995 {published data only} . \*Karuza J, Calkins E, Feather J, Hershey CO, Katz L, Majeroni B. Enhancing physician adoption of practice guidelines. Dissemination of influenza vaccination guideline using a small-group consensus process. *Archives of Internal Medicine*. 1995; 155:625–32. [PubMed: 7887759]
- Langham 2002 {published data only} . \*Langham J, Tucker H, Sloan D, Pettifer J, Thom S, Hemingway H. Secondary prevention of cardiovascular disease: a randomised trial of training in information management, evidence-based medicine, both or neither: the PIER trial. *British Journal of General Practice*. 2002; 52:818–24. [PubMed: 12392122]
- Leviton 1999 {published data only} . Leviton L, Baker S, Hassol A, Goldenberg RL. An exploration of opinion and practice patterns affecting low use of antenatal corticosteroids. *American Journal of Obstetrics and Gynaecology*. 1995; 173(1):312–15.\*Leviton L, Goldenberg RL, Baker SC, Schwartz RM, Freda MC, Larry LJ, et al. Methods to encourage the use of antenatal corticosteroid therapy for fetal maturation: a randomized controlled trial. *JAMA*. 1999; 281:46–52. [PubMed: 9892450]
- Matchar 2002 {published data only} . \*Matchar DB, Samsa GP, Cohen SJ, Oddone EZ. Community impact of anticoagulation services: rationale and design of the managing anticoagulation services trial (MAST). *Journal of Thrombosis and Thrombolysis*. 2000; 9:S7–11. [PubMed: 10859579] Matchar DB, Samsa GP, Cohen SJ, Oddone EZ, Jurgelski AE. Improving the quality of anticoagulation of patients with atrial fibrillation in managed care organisations: results of the Managing Anticoagulation Services Trial. *American Journal of Medicine*. 2002; 113:42–51. [PubMed: 12106622] Samsa GP, Matchar DB, Cohen SJ, Lipscomb J, Abrahamse P, McCormack M. A seven step model for practice improvement research: description and application to the managing anticoagulation services trial. *New Medicine*. 1998; 2:139–46.
- Ross-Degnan 1996 {published data only} . \*Ross-Degnan D, Soumerai SB, Goel PK, Bates J, Makhulo J, Dondi N, et al. The impact of face-to-face educational outreach in diarrhoea treatment in pharmacies. *Health Policy and Planning*. 1996; 11(3):308–18. [PubMed: 10160376]
- Santoso 1996 {published data only} . \*Santoso B, Suryawati S, Prawitasari JE. Small group intervention vs formal seminar for improving appropriate drug use. *Social Science & Medicine*. 1996; 42:1163–8. [PubMed: 8737434]

- Schouten 2007 {published data only} . \*Schouten JA, Hulscher ME, Natsch S, Kullberg BJ, van der Meer JW, Grol RP. Barriers to optimal antibiotic use for community-acquired pneumonia at hospitals: a qualitative study. *Quality & Safety in Health Care*. 2007; 16(2):143–9. [PubMed: 17403764]
- Sehgal 2002 {published data only} . \*Sehgal AR, Leon JB, Siminoff LA, Singer ME, Bunosky LM, Cebul RD. Improving the quality of hemodialysis treatment: community-based randomized controlled trial to overcome patient-specific barriers. *JAMA*. 2002; 287(15):1961–7. [PubMed: 11960538] Sehgal AR, Snow RJ, Singer ME, Amini SB, DeOreo PB, Silver MR, et al. Barriers to adequate delivery of hemodialysis. *American Journal of Kidney Diseases*. 1998; 31(4):593–601. [PubMed: 9531174]
- Simon 2005 {published data only} . \*Simon SR, Majumbar SR, Prosser LA, Salem-Schatz S, Warner C, Kleinman K, et al. Group versus individual academic detailing to improve the use of antihypertensive medications in primary care: a cluster-randomized controlled trial. *American Journal of Medicine*. 2005; 118:521–8. [PubMed: 15866255]
- Soumerai 1998 {published data only} . McLaughlin TJ, Soumerai SB, Willison DJ, Gurwitz JH, Borbas C, Guadagnoli E, et al. Adherence to national guidelines for drug treatment of suspected acute myocardial infarction: evidence for undertreatment in women and the elderly. *Archives of Internal Medicine*. 1996; 156(7):799–805. [PubMed: 8615714] \*Soumerai SB, McLaughlin TJ, Gurwitz JH, Guadagnoli E, Hauptman PJ, Borbas C, et al. Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. *JAMA*. 1998; 279:1358–63. [PubMed: 9582043]
- Verhoeven 2005 {published data only} . \*Verhoeven V, Avonts D, Vermeire E, Debaene L, van Royen P. A short educational intervention on communication skills improves the quality of screening for Chlamydia in GPs in Belgium: a cluster randomized controlled trial. *Patient Education and Counselling*. 2005; 57:101–5. Verhoeven V, Bovijn K, Helder A, Peremans L, Hermann I, Van Royen P, et al. Discussing STIs: doctors are from Mars, patients from Venus. *Family Practice*. 2003; 20:11–15. [PubMed: 12509364]

## References to studies excluded from this review

- Allison 2005 {published data only} . Allison JJ, Kiefe CI, Wall T, Casebeer L, Ray MN, Spettell CM, et al. Multicomponent Internet continuing medical education to promote chlamydia screening. *American Journal of Preventive Medicine*. Apr; 2005 28(3):285–90. [PubMed: 15766617]
- Altiner 2007 {published data only} . \*Altiner A, Brockmann S, Sielk M, Wilm S, Wegscheider K, Abholz HH, et al. Reducing antibiotic prescriptions for acute cough by motivating GPs to change their attitudes to communication and empowering patients: a cluster-randomized intervention study. *Journal of Antimicrobial Chemotherapy*. 2007; 60(3):638–44. [PubMed: 17626023]
- Azocar 2003 {published data only} . Azocar F, Cuffel B, Goldman W, McCarter L. The impact of evidence-based guideline dissemination for the assessment and treatment of major depression in a managed behavioral health care organization. *Journal of Behavioral Health Services & Research*. Jan-Feb;2003 30(1):109–18. [PubMed: 12633007]
- Baer 2001 {published data only} . Baer JS, Wells EA, Rosengren DB, Hartzler B, Beadnell B, Dunn C. Agency context and tailored training in technology transfer: A pilot evaluation of motivational interviewing training for community counsellors. *Journal of Substance Abuse Treatment*. Sep; 2009 37(2):191–202. [PubMed: 19339139]
- Benrimoj 2003 {published data only} . Benrimoj SI, Langford JH, Berry G, Collins D, Lauchlan R, Stewart K, et al. Clinical intervention rates in community pharmacy: a randomised trial of the effect of education and a professional allowance. *International Journal of Pharmacy Practice*. Jun; 2003 11(2):71–80.
- Bosworth 2007 {published data only} . \*Bosworth HB, Olsen MK, McCant F, Harrelson M, Gentry P, Rose C, et al. Hypertension Intervention Nurse Telemedicine Study (HINTS): testing a multifactorial tailored behavioral/educational and a medication management intervention for blood pressure control. *American Heart Journal*. 2007; 153(6):918–24. [PubMed: 17540191]

- Bravo 2005 {published data only} . Bravo G, Dubois MF, Roy PM. Improving the quality of residential care using goal attainment scaling. *Journal of the American Medical Directors Association*. May-Jun;2005 6(3):173–80. [PubMed: 15894246]
- Brinkman 2009 {published data only} . Brinkman WB, Geraghty SR, Lanphear BP, Khoury JC, Gonzalez del Rey JA, Dewitt TG, et al. Effect of multi-source feedback on resident communication skills and professionalism: a randomized controlled trial. *Archives of Pediatric Adolescent Medicine*. Jan; 2007 161(1):103–4.
- Buckmaster 2006 {published data only} . \*Buckmaster ND, Heazlewood V, Scott IA, Jones M, Haerer W, Hillier K, et al. Using a clinical pathway and education to reduce inappropriate prescribing of enoxaparin in patients with acute coronary syndromes: a controlled study. *Internal Medicine Journal*. 2006; 36(1):12–8. [PubMed: 16409308]
- Byrne 2006 {published data only} . Byrne M, Cupples ME, Smith SM, Leathem C, Corrigan M, Byrne MC, et al. Development of a complex intervention for secondary prevention of coronary heart disease in primary care using the UK Medical Research Council framework. *American Journal of Managed Care*. May; 2006 12(5):261–6. [PubMed: 16686583]
- Cabrera 2001 {published data only} . \*Cabrera Bueno F, Gomez Doblaz JJ, Ruiz MR, Jimenez Navarro MF, Rodriguez Bailón I, Espinosa Caliani JS, et al. Quality control and improvement of the care provided to the patient with acute myocardial infarction. Implementation of a quality assurance program [Garantía y mejora de calidad de la atención al paciente con infarto agudo de miocardio. Implantación de un programa de calidad]. *Revista Espanola de Cardiologia*. 2001; 54(1):43–8. [PubMed: 11141454]
- Casebeer 2003 {published data only} . Casebeer LL, Strasser SM, Spettell CM, Wall TC, Weissman N, Ray MN, et al. Designing tailored Web-based instruction to improve practicing physicians' preventive practices. *Journal of Medical Internet Research*. Jul-Sep;2003 5(3):e20. [PubMed: 14517111]
- Cranney 1999 {published data only} . \*Cranney M, Barton S, Walley T. Addressing barriers to change: an RCT of practice-based education to improve the management of hypertension in the elderly. *British Journal of General Practice*. 1999; 49:527–30. [PubMed: 10621985]
- Cranney 2001 {published data only} . Cranney M, Warren E, Barton S, Gardner K, Walley T. Why do GPs not implement evidence-based guidelines? A descriptive study. *Family Practice*. Aug; 2001 18(4):359–63. [PubMed: 11477041]
- de Velasco 2004 {published data only} . \*de Velasco JA, Cosín J, de Oya M, de Teresa E, Grupo de investigadores del estudio PRESENTE. Intervention program to improve secondary prevention of myocardial infarction. Results of the PRESENTE (early secondary prevention) study [Programa de intervención para mejorar la prevención secundaria del infarto de miocardio. Resultados del estudio PRESENTE (PREvención SEcuNdaria TEMprana)]. *Revista Espanola de Cardiologia*. 2004; 57(2):146–54.
- Downs 2006 {published data only} . \*Downs M, Turner S, Bryans M, Wilcock J, Keady J, Levin E, et al. Effectiveness of educational interventions in improving detection and management of dementia in primary care: cluster randomised controlled study. *BMJ*. 2006; 332(7543):692–6. [PubMed: 16565124]
- Edwards 2002 {published data only} . Edwards K. "Short stops": peer support of scholarly activity. *Academic Medicine*. Sep.2002 77(9):939. [PubMed: 12228113]
- Edwards 2007 {published data only} . \*Edwards H, Walsh A, Courtney M, Monaghan S, Wilson J, Young J, et al. Improving paediatric nurses' knowledge and attitudes in childhood fever management. *Journal of Advanced Nursing*. 2007; 57(3):257–69. [PubMed: 17233646]
- Figueiras 2001 {published data only} . \*Figueiras A, Sastre I, Tato F, Rodriguez C, Lado E, Caamano F, et al. One-to-one versus group sessions to improve prescription in primary care: a pragmatic randomized controlled trial. *Medical Care*. 2001; 39(2):158–67. [PubMed: 11176553]
- Fretheim 2004 {published data only} . Fretheim A, Oxman AD, Flottorp S. Improving prescribing of antihypertensive and cholesterol-lowering drugs: a method for identifying and addressing barriers to change. *BMC Health Services Research*. Sep 3.2004 4(1):23. [PubMed: 15347426]
- Garcia 2004 {published data only} . \*Garcia JM, Gomez Doblaz JJ, Santiago Perez MI, de Teresa GE, Cruz Fernandez JM, Castro BA, et al. Effect of a simple educational program for physicians on adherence to secondary prevention measures after discharge following acute coronary

syndrome. The CAM Project [Efecto de un programa sencillo de educación de los profesionales en el cumplimiento de medidas de prevención secundaria en el momento del alta hospitalaria tras un síndrome coronario agudo. Proyecto CAM]. *Revista Espanola de Cardiologia*. 2004; 57(11): 1017–28.

- Gask 2005 {published data only} . Gask L, Dixon C, May C, Dowrick C. Qualitative study of an educational intervention for GPs in the assessment and management of depression. *British Journal of General Practice*. Nov; 2005 55(520):854–9. [PubMed: 16282001]
- Gonano 2003 {published data only} . Gonano C, Sitzwohl C, Pusch F, Kettner SC, Weinstabl C, Zimpfer M. Educational or Organizational Approach: Which Is More Effective in Changing Blood-Sampling Habits? *Anesthesia & Analgesia*. 2003; 97:1479–1482. [PubMed: 14570669]
- Green 2002 {published data only} . \*Green LA, Gorenflo DW, Wyszewianski L, Michigan Consortium for Family Practice Research. Validating an instrument for selecting interventions to change physician practice patterns: a Michigan Consortium for Family Practice Research study. *Journal of Family Practice*. 2002; 51(11):938–42. [PubMed: 12485547]
- Gregory 1999 {published data only} . Gregory C, Cifaldi M, Tanner LA. Targeted intervention programs: creating a customized practice model to improve the treatment of allergic rhinitis in a managed care population. *American Journal of Managed Care*. Apr; 1999 5(4):485–96. [PubMed: 10387387]
- Griffiths 2007 {published data only} . Griffiths C, Sturdy P, Brewin P, Bothamley G, Eldridge S, Martineau A, et al. Educational outreach to promote screening for tuberculosis in primary care: a cluster randomised controlled trial. *Lancet*. May 5; 2007 369(9572):1528–34. [PubMed: 17482983]
- Gülmezoglu 2007 {published data only} . \*Gülmezoglu AM, Langer A, Piaggio G, Lumbiganon P, Villar J, Grimshaw J. Cluster randomised trial of an active, multifaceted educational intervention based on the WHO Reproductive Health Library to improve obstetric practices. *BJOG*. 2007; 114(1):16–23. Epub 2006 Sep 27. [PubMed: 17010115]
- Hanbury 2009 {published data only} . Hanbury A, Wallace L, Clark M. Use of a time series design to test effectiveness of a theory-based intervention targeting adherence of health professionals to a clinical guideline. *British Journal of Health Psychology*. 2009; 14(3):505–18. [PubMed: 18851769]
- Hardeman 2005 {published data only} . Hardeman W, Sutton S, Griffin S, Johnston M, White A, Wareham NJ, et al. A causal modelling approach to the development of theory-based behaviour change programmes for trial evaluation. *Health Education Research*. Dec; 2005 20(6):676–87. [PubMed: 15781446]
- Hendryx 1998 {published data only} . Hendryx MS, Fieselmann JF, Bock MJ, Wakefield DS, Helms CM, Bentler SE. Outreach education to improve quality of rural ICU care. Results of a randomized trial. *American Journal of Respiratory and Critical Care Medicine*. Aug; 1998 158(2):418–23. [PubMed: 9700115]
- Hennessy 2006 {published data only} . \*Hennessy S, Leonard CE, Yang W, Kimmel SE, Townsend RR, Wasserstein AG, et al. Effectiveness of a two-part educational intervention to improve hypertension control: a cluster-randomized trial. *Pharmacotherapy*. 2006; 26(9):1342–7. [PubMed: 16945057]
- Herdeiro 2005 {published data only} . \*Herdeiro MT, Figueiras A, Polónia J, Gestal-Otero JJ. Physicians' attitudes and adverse drug reaction reporting: a case-control study in Portugal. *Drug Safety*. 2005; 28(9):825–33. [PubMed: 16119975]
- Holzemer 2007 {published data only} . Holzemer WL, Bakken S, Portillo CJ, Grimes R, Welch J, Wantland D, et al. Testing a nurse-tailored HIV medication adherence intervention. *Nursing Research*. May-Jun; 2006 55(3):189–97. [PubMed: 16708043]
- Inouye 2000 {published data only} . Inouye SK. Prevention of delirium in hospitalized older patients: risk factors and targeted intervention strategies. *Annals of Medicine*. 2000; 32(4):257–63. [PubMed: 10852142]
- Jones 2004 {published data only} . Jones KR, Fink R, Pepper G, Hutt E, Vojir CP, Scott J, et al. Improving nursing home staff knowledge and attitudes about pain. *Gerontologist*. Aug; 2004 44(4):469–78. [PubMed: 15331804]

- Kinmonth 1996 {published data only} . Kinmonth AL, Spiegel N, Woodcock A. Developing a training programme in patient-centred consulting for evaluation in a randomised controlled trial; diabetes care from diagnosis in British primary care. *Patient Education and Counseling*. Oct; 1996 29(1):75–86. [PubMed: 9006224]
- LaPointe 2006 {published data only} . LaPointe NM, DeLong ER, Chen A, Hammill BG, Muhlbauer LH, Califf RM, et al. Multifaceted intervention to promote beta-blocker use in heart failure. *American Heart Journal*. Oct.2006 152(4):e43. [PubMed: 16996820]
- Laprise 2009 {published data only} . Laprise R, Thivierge R, Gosselin G, Bujas-Bobanovic M, Vandal S, Paquette D, et al. Improved cardiovascular prevention using best CME practices: a randomized trial. *The Journal of Continuing Education in the Health Professions*. Dec 21; 2009 29(1):16–31. [PubMed: 19288563]
- Leong 2006 {published data only} . \*Leong CN, Shakespeare TP, Mukherjee RK, Back MF, Lee KM, Lu JJ, et al. Efficacy of an integrated continuing medical education (CME) and quality improvement (QI) program on radiation oncologist (RO) clinical practice. *International Journal of Radiation Oncology, Biology, Physics*. 2006; 66(5):1457–60.
- Leveille 1998 {published data only} . Leveille SG, Wagner EH, Davis C, Grothaus L, Wallace J, LoGerfo M, et al. Preventing disability and managing chronic illness in frail older adults: a randomized trial of a community-based partnership with primary care. *Journal of the American Geriatrics Society*. Oct; 1998 46(10):1191–8. [PubMed: 9777899]
- Levine 2005 {published data only} . Levine S, Unützer J, Yip JY, Hoffing M, Leung M, Fan MY, et al. Physicians' satisfaction with a collaborative disease management program for late-life depression in primary care. *General Hospital Psychiatry*. Nov-Dec;2005 27(6):383–91. [PubMed: 16271652]
- Lundborg 1999 {published data only} . \*Lundborg CS, Wahlstrom R, Diwan VK, Oke T, Martenson D, Tomson G, et al. Combining feedback from simulated cases and prescribing. Design and implementation of an educational intervention in primary care in Sweden. *International Journal of Technology Assessment in Health Care*. 1999; 15(3):458–72. [PubMed: 10874374]
- Markey 2001 {published data only} . Markey P, Schattner P. Promoting evidence-based medicine in general practice-the impact of academic detailing. *Family Practice*. Aug; 2001 18(4):353–5. [PubMed: 11477039]
- Murphy 2005 {published data only} . Murphy AW, Cupples ME, Smith SM, Byrne M, Leatham C, Byrne MC, The SPHERE study. Secondary prevention of heart disease in general practice: protocol of a randomised controlled trial of tailored practice and patient care plans with parallel qualitative, economic and policy analyses. *Current Controlled Trials in Cardiovascular Medicine*. 2005; 6:11. [PubMed: 16053525]
- Nansel 2007 {published data only} . Nansel TR, Weaver NL, Jacobsen HA, Glasheen C, Kreuter MW. Preventing unintentional pediatric injuries: a tailored intervention for parents and providers. *Health Education Research*. 2008; 23(4):656–69. [PubMed: 17906313]
- Naughton 2007 {published data only} . Naughton C, Feely J, Bennett K. A clustered randomized trial of the effects of feedback using academic detailing compared to postal bulletin on prescribing of preventative cardiovascular therapy. *Family Practice*. Oct; 2007 24(5):475–80. [PubMed: 17670803]
- New 2003 {published data only} . New JP, Mason JM, Freemantle N, Teasdale S, Wong L, Bruce NJ, et al. Educational outreach in diabetes to encourage practice nurses to use primary care hypertension and hyperlipidaemia guidelines (EDEN): a randomized controlled trial. *Diabetic Medicine*. Jun; 2004 21(6):599–603. [PubMed: 15154946]
- Otero-Sabogal 2006 {published data only} . \*Otero-Sabogal R, Owens D, Canchola J, Tabnak F. Improving rescreening in community clinics: does a system approach work? *Journal of Community Health*. 2006; 31(6):497–519. [PubMed: 17186643]
- Peters-Klimm 2008 {published data only} . Peters-Klimm F, Müller-Tasch T, Remppis A, Szecsenyi J, Schellberg D. Improved guideline adherence to pharmacotherapy of chronic systolic heart failure in general practice--results from a cluster-randomized controlled trial of implementation of a clinical practice guideline. *Journal of Evaluation in Clinical Practice*. Oct; 2008 14(5):823–9. [PubMed: 19018915]



- Ploeg 2007 {published data only} . Ploeg J, Davies B, Edwards N, Gifford W, Miller PE. Factors influencing best-practice guideline implementation: lessons learned from administrators, nursing staff, and project leaders. *Worldviews on Evidence-Based Nursing*. 2007; 4(4):210–9. [PubMed: 18076464]
- Romero 2005 {published data only} . \*Romero A, Alonso C, Marin I, Grimshaw J, Villar E, Rincon M, et al. Effectiveness of a multifactorial strategy for implementing clinical guidelines on unstable angina: cluster randomized trial [Efectividad de la implantación de una guía clínica sobre la angina inestable mediante una estrategia multifactorial. Ensayo clínico aleatorizado en grupos]. *Revista Espanola de Cardiologia*. 2005; 58(6):640–8.
- Saini 2006 {published data only} . \*Saini B, Smith L, Armour C, Krass I. An educational intervention to train community pharmacists in providing specialized asthma care. *American Journal of Pharmaceutical Education*. 2006; 70(5):118. [PubMed: 17149447]
- Sehgal 1998 {published data only} . \*Sehgal AR, Snow RJ, Singer ME, Amini SB, DeOreo PB, Silver MR, et al. Barriers to adequate delivery of hemodialysis. *Journal of Kidney Diseases*. 1998; 31(4):593–601.
- Seltzer 1997 {published data only} . Seltzer SE, Kelly P, Adams DF, Chiango BF, Viera MA, Fener E, et al. Expediting the turnaround of radiology reports in a teaching hospital setting. *American Journal of Roentgenology*. Apr; 1997 168(4):889–93. [PubMed: 9124134]
- Shirazi 2008 {published data only} . Shirazi M, Zeinaloo AA, Parikh SV, Sadeghi M, Taghva A, Arbabi M, et al. Effects on readiness to change of an educational intervention on depressive disorders for general physicians in primary care based on a modified Prochaska model--a randomized controlled study. *Family Practice*. Apr; 2008 25(2):98–104. [PubMed: 18304971]
- Silverman 2004 {published data only} . \*Silverman M, Terry MA, Zimmerman RK, Nutini JF, Ricci EM. Tailoring interventions: understanding medical practice culture. *Journal of Cross-Cultural Gerontology*. 2004; 19(2):47–76. [PubMed: 15146138]
- Socolar 1998 {published data only} . Socolar RR, Raines B, Chen-Mok M, Runyan DK, Green C, Paterno S. Intervention to improve physician documentation and knowledge of child sexual abuse: a randomized, controlled trial. *Pediatrics*. May; 1998 101(5):817–24. [PubMed: 9565408]
- Solomon 2001 {published data only} . \*Solomon DH, Van Houten L, Glynn RJ, Baden L, Curtis K, Schragger H, et al. Academic detailing to improve use of broad-spectrum antibiotics at an academic medical centre. *Archives of Internal Medicine*. 2001; 161:1897–902. [PubMed: 11493132]
- Solomon 2007 {published data only} . Solomon DH, Polinski JM, Stedman M, Truppo C, Breiner L, Egan C, et al. Improving care of patients at-risk for osteoporosis: a randomized controlled trial. *Journal of General Internal Medicine*. Mar; 2007 22(3):362–7. [PubMed: 17356969]
- Spunt 1996 {published data only} . Spunt BS, Deyo RA, Taylor VM, Leek KM, Goldberg HI, Mulley AG. An interactive videodisc program for low back pain patients. *Health Education Research*. Dec; 1996 11(4):535–41. [PubMed: 10163960]
- Straand 2006 {published data only} . \*Straand J, Fetveit A, Rognstad S, Gjelstad S, Brekke M, Dalen I, et al. A cluster-randomized educational intervention to reduce inappropriate prescription patterns for elderly patients in general practice--The Prescription Peer Academic Detailing (Rx-PAD) study. *BMC Health Services Research*. 2006; 6:72. [NCT00281450]. [PubMed: 16764734]
- Stéphan 2006 {published data only} . Stéphan F, Sax H, Wachsmuth M, Hoffmeyer P, Clergue F, Pittet D. Reduction of urinary tract infection and antibiotic use after surgery: a controlled, prospective, before-after intervention study. *Clinical Infectious Diseases*. Jun 1; 2006 42(11): 1544–51. [PubMed: 16652311]
- Taylor 1996 {published data only} . Taylor VM, Goldberg HI, Deyo RA, Cooper S, Leek M, Nordgulen LL, et al. Modifying community practice styles: The back pain outcome assessment team information dissemination effort. *Journal of Continuing Education in the Health Professions*. 1996; 16(4):203–14.
- Taylor 2000 {published data only} . Taylor VM, Deyo RA, Ciol M, Farrar EL, Lawrence MS, Shonnard NH, et al. Patient-oriented outcomes from low back surgery: a community-based study. *Spine*. Oct 1; 2000 25(19):2445–52. [PubMed: 11013495]

- Turnbull 2006 {published data only} . Turnbull DA, Beilby JJ, Ziaian T, Qureshi F, Nelson M, Tonkin AL, et al. Disease management for hypertension -A pilot cluster randomized trial of 67 Australian general practices. *Disease Management & Health Outcomes*. 2006; 14(1):27–35.
- Unrod 2007 {published data only} . \*Unrod M, Smith M, Spring B, DePue J, Redd W, Winkel G, et al. Randomized controlled trial of a computer-based, tailored intervention to increase smoking cessation counseling by primary care physicians. *Journal of General Internal Medicine*. 2007; 22(4):478–84. [PubMed: 17372796]
- Vallerand 2004 {published data only} . Vallerand AH, Riley-Doucet C, Hasenau SM, Templin T. Improving cancer pain management by homecare nurses. *Oncology Nursing Forum*. Jul 13; 2004 31(4):809–16. [PubMed: 15252435]
- van Driel 2007 {published data only} . \*van Driel ML, Coenen S, Dirven K, Lobbestael J, Janssens I, Van Royen P, et al. What is the role of quality circles in strategies to optimise antibiotic prescribing? A pragmatic cluster-randomised controlled trial in primary care. *Quality & Safety in Health Care*. 2007; 16(3):197–202. [PubMed: 17545346]
- van Eijk 2001 {published data only} . \*van Eijk ME, Avorn J, Porsius AJ, de Boer A. Reducing prescribing of highly anticholinergic antidepressants for elderly people: randomised trial of group versus individual academic detailing. *BMJ*. 2001; 322(7287):654–7. [PubMed: 11250852]
- Ward 2009 {published data only} . Ward SE, Wang KK, Serlin RC, Peterson SL, Murray ME. A randomized trial of a tailored barriers intervention for Cancer Information Service (CIS) callers in pain. *Pain*. Jul; 2009 144(1-2):49–56. [PubMed: 19406576]
- Welschen 2004 {published data only} . \*Welschen I, Kuyvenhoven MM, Hoes AW, Verheij TJ. Effectiveness of a multiple intervention to reduce antibiotic prescribing for respiratory tract symptoms in primary care: randomised controlled trial. *BMJ*. 2004; 329(7463):431. [PubMed: 15297305]
- Witt 2004 {published data only} . Witt K, Knudsen E, Ditlevsen S, Hollnagel H. Academic detailing has no effect on prescribing of asthma medication in Danish general practice: a 3-year randomized controlled trial with 12-monthly follow-ups. *Family Practice*. Jun; 2004 21(3):248–53. [PubMed: 15128684]
- Wright 2003 {published data only} . Wright J, Warren E, Reeves J, Bibby J, Harrison S, Dowswell G, et al. Effectiveness of multifaceted implementation of guidelines in primary care. *Journal of Health Services Research Policy*. Jul; 2003 8(3):142–8. [PubMed: 12869339]
- Wright 2006 {published data only} . Wright J, Harrison S, McGeorge M, Patterson C, Russell I, Russell D, et al. Improving the management and referral of patients with transient ischaemic attacks: a change strategy for a health community. *Quality and Safety in Health Care*. Feb; 2006 15(1):9–12. [PubMed: 16456203]
- Zimmerman 2003 {published data only} . \*Zimmerman RK, Nowalk MP, Raymund M, Tabbarah M, Hall DG, Wahrenberger JT, et al. Tailored interventions to increase influenza vaccination in neighborhood health centers serving the disadvantaged. *American Journal of Public Health*. Oct; 2003 93(10):1699–705. [PubMed: 14534225]
- Zimmerman 2006 {published data only} . Zimmerman RK, Hoberman A, Nowalk MP, Lin CJ, Greenberg DP, Weinberg ST, et al. Improving influenza vaccination rates of high-risk inner-city children over 2 intervention years. *Annals of Family Medicine*. 2006; 4(6):534–40. [PubMed: 17148632]

## References to studies awaiting assessment

- Althabe 2008 {published data only} . Althabe F, Buekens P, Bergel E, Belizán JM, Campbell MK, Moss N, et al. Guidelines Trial Group. A behavioral intervention to improve obstetrical care. *New England Journal of Medicine*. May 1; 2008 358(18):1929–40. [PubMed: 18450604]
- Benner 2007 {published data only} . Benner JS, Cherry SB, Erhardt L, Fernandes M, Flammer M, Gaciong Z, et al. Rationale, design, and methods for the risk evaluation and communication health outcomes and utilization trial (REACH OUT). *Contemporary Clinical Trials*. 2007; 28(5): 662–673. [PubMed: 17490918]

- Cupples 2008 {published data only} . Cupples ME, Byrne MC, Smith SM, Leathem CS, Murphy AW. Secondary prevention of cardiovascular disease in different primary healthcare systems with and without payfor-performance. *Heart*. 2008; 94:1594–600. [PubMed: 18701532]
- Herdeiro 2008 {published data only} . Herdeiro MT, Polónia J, Gestal-Otero JJ, Figueiras A. Improving the reporting of adverse drug reactions: a cluster-randomized trial among pharmacists in Portugal. *Drug Safety*. 2008; 31(4):335–44. [PubMed: 18366244]
- Lafata 2007 {published data only} . Lafata JE, Gunter MJ, Hsu J, Kaatz S, Krajenta R, Platt R, et al. Academic detailing to improve laboratory testing among outpatient medication users. *Medical Care*. Oct; 2007 45(10):966–72. [PubMed: 17890994]
- Lobo 2004 {published data only} . Lobo CM, Frijling BD, Hulscher MEJL, Bernsen RMD, Grol RPTM, Prins A, et al. Effect of a comprehensive intervention program targeting general practice staff on quality of life in patients at high cardiovascular risk: A randomized controlled trial. *Quality of Life Research*. 2004; 13:73–80. [PubMed: 15058789]

## References to ongoing studies

- Barkun 2009 {published data only} . Barkun, A. The Dissemination of Consensus Recommendations on Upper Gastrointestinal Bleeding (REASON-II). <http://clinicaltrials.gov/ct2/show/NCT00840008>
- Dykes 2009 {published data only} . Dykes, PC. Falls - Tailoring Interventions for Patient Safety (Falls TIPS). <http://clinicaltrials.gov/ct2/show/NCT00675935>
- Engelman 2007 {published data only} . Engelman, K. Use of Novel Tailored Reminders in Rural Primary Care. <http://clinicaltrials.gov/ct2/show/NCT00593073>
- Gjelstad 2006 {published data only} . Gjelstad S, Fetveit A, Straand J, Dalen I, Rognstad S, Lindbaek M. Can antibiotic prescriptions in respiratory tract infections be improved? A cluster-randomized educational intervention in general practice--the Prescription Peer Academic Detailing (Rx-PAD) Study [NCT00272155]. *BMC Health Services Research*. Jun 15.2006 6:75. [PubMed: 16776824]
- Jansen 2007 {published data only} . Jansen YJFM, de Bont A, Foets M, Bruijnzeels M, Bal R. Tailoring intervention procedures to routine primary health care practice; an ethnographic process evaluation. *BMC Health Services Research*. 2007; 7:125. [PubMed: 17683627]
- Laurant 2007 {published data only} . Laurant, K. Engaging General Practice in the Prevention of Patients With Alcohol Problems. <http://clinicaltrials.gov/ct2/show/results/NCT00298220>
- van Gaal 2009 {published data only} . van Gaal BGI, Schoonhoven L, Hulscher MEJL, Mintjes JAJ, Borm GF, Koopmans RTCM, et al. The design of the SAFE or SORRY? study: a cluster randomised trial on the development and testing of an evidence based inpatient safety program for the prevention of adverse events. *BMC Health Services Research*. 2009; 9:58. [PubMed: 19338655]

## Additional references

- Ashford 1999 . Ashford J, Eccles M, Bond S, Hall LA, Bond J. Improving health care through professional behaviour change: introducing a framework for identifying behaviour change strategies. *British Journal of Clinical Governance*. 1999; 4(1):14–23.
- Bosch 2007 . Bosch M, van der Weijden T, Wensing M, Grol R. Tailoring quality improvement interventions to identified barriers: a multiple case analysis. *Journal of Evaluation in Clinical Practice*. 2007; 13:161–8. [PubMed: 17378860]
- Cabana 1999 . Cabana MD, Rand CS, Powe NR, Wu AW, Wilson MH, Abbound PC, et al. Why don't physicians follow clinical practice guidelines? A framework for improvement. *JAMA*. 1999; 282(15):1458–65. [PubMed: 10535437]
- Chaillet 2006 . Chaillet N, Dube E, Dugas M, Audibert F, Tourigny C, Fraser W, et al. Evidence-based strategies for implementing guidelines in obstetrics. *Obstetrics and Gynecology*. 2006; 108:1234–45. [PubMed: 17077251]



- Cochrane TSC User Guide 2008 . [last accessed: 24 November 2009] TSC User Guide to Managing Specialized Registers and Handsearch Records. Version 1.12008. <http://www.cochrane.org/tsc/TSC%20User%20Guide%20for%20SRs&HS.Version%201.1.RF.pdf>
- EPOC 2002 . Cochrane Effective Practice and Organisation of Care Group. Data Collection Checklist. EPOC resources for review authors. 2002. <http://www.epoc.cochrane.org/en/handsearchers.html>Revised
- EPOC 2007a . Cochrane Effective Practice and Organisation of Care Group. [Updated 2007] Guide for Review Authors. 3 - Developing a protocol. <http://www.epoc.cochrane.org/en/handsearchers.html>
- EPOC 2007b . Cochrane Effective Practice and Organisation of Care Group. [last accessed: 24 November 2009] EPOC resources for review authors. <http://www.epoc.cochrane.org/en/handsearchers.html>
- EPOC 2009 . Cochrane Effective Practice and Organisation of Care Group. Specialised register. <http://www.epoc.cochrane.org/en/newPage1.html>
- GRADE Working Group 2004 . GRADE working group. Grading quality of evidence and strength of recommendations. *BMJ*. 2004; 328:1490. [PubMed: 15205295]
- Grimshaw 2004 . Grimshaw JM, Thomas RE, MacLennan G, Fraser C, Ramsay CR, Vale L, et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. 2004; Vol. 8Health Technology Assessment Monograph Series
- Grol 2005 . Grol, R.; Wensing, M.; Eccles, M. Improving Patient Care. The Implementation of Change in Clinical Practice. Elsevier; Edinburgh: 2005.
- Hopewell 2002 . Hopewell S, Clarke M, Lusher A, Lefebvre C, Westby M. A comparison of handsearching versus MEDLINE searching to identify reports of randomized controlled trials. *Statistics in Medicine*. Jun 15; 2002 21(11):1625–34. [PubMed: 12111923]
- Jamtvedt 2003 . Jamtvedt G, Young JM, Kristoffersen DT, Thomson O'Brien MA, Oxman AD. Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews*. 2003; (Issue 3) [DOI: 10.1002/14651858.CD000259.pub2].
- Kroenke 2000 . Kroenke K, Taylor-Vaisey A, Dietrich AJ, Oxman TE. Interventions to improve provider diagnosis and treatment of mental disorders in primary care. A critical review of the literature. *Psychosomatics*. 2000; 41:39–52. [PubMed: 10665267]
- Lomas 1994 . Lomas, J. Teaching old (and not so old) dogs new tricks: effective ways to implement research findings. In: Dunn, EV.; Norton, PG.; Stewart, M.; Tudiver, F.; Bass, MJ., editors. Disseminating research / changing practice. Sage; London: 1994. p. 1-18.
- Légaré 2009 . Légaré, F. Assessing barriers and facilitators to knowledge use. In: Straus, S.; Tetroe, J.; Graham, ID., editors. Knowledge Translation in Health Care. Blackwell Publishing Ltd; Oxford: 2009. Chapter 3.4
- McGlynn 2003 . McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. *New England Journal of Medicine*. 2003; 348:2635–45. [PubMed: 12826639]
- Oxman 1995 . Oxman AD, Thomson MA, Davis DA, Haynes RB. No magic bullets. A systematic review of 102 trials of interventions to improve professional practice. *Canadian Medical Association Journal*. 1995; 153(10):1423–31. [PubMed: 7585368]
- Rao 1992 . Rao JNK, Scott AJ. A simple method for the analysis of clustered binary data. *Biometrics*. 1992; 48:577–85. [PubMed: 1637980]
- Robertson 1996 . Robertson N, Baker R, Hearnshaw H. Changing the clinical behaviour of doctors - a psychological framework. *Quality in Health Care*. 1996; 5:51–4. [PubMed: 10157273]
- Shaw 2005 . Shaw B, Cheater F, Baker R, Gillies C, Hearnshaw H, Flottorp S, et al. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*. 2005; (Issue 3) [DOI: 10.1002/14651858.CD005470].
- Sutton 2000 . Sutton, AJ.; Jones, DR.; Abrams, KR.; Sheldon, TA.; Song, F. Methods for Meta-analysis in Medical Research. John Wiley; London: 2000.

Ukoumunne 2002 . Ukoumunne OC. A comparison of confidence interval methods for the intraclass correlation coefficient in cluster randomized trials. *Statistics in Medicine*. 2002; 21:3757–74. [PubMed: 12483765]

\* *Indicates the major publication for the study*

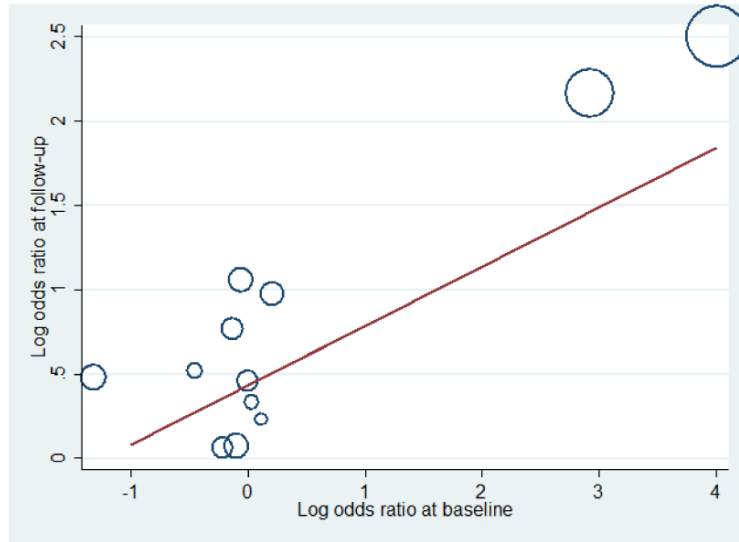
## PLAIN LANGUAGE SUMMARY

### **Tailored interventions to overcome identified barriers to change effects on professional practice and health care outcomes**

Tailored interventions to change professional practice are interventions planned following an investigation into the factors that explain current professional practice and any reasons for resisting new practice. These factors are referred to as barriers to change. The barriers may vary in different healthcare settings, groups of healthcare professionals or clinical tasks. It is widely assumed that efforts to change professional practice have a lower likelihood of success unless these barriers are identified and taken into account.

In a previous review that was able to include only 15 studies, we were unable to conclude that tailoring was effective. However, more studies of tailoring have been published and therefore we have incorporated the new studies into an update of the review.

We have included 26 studies in the new review. The findings indicate that tailored interventions can change professional practice. As yet, there is insufficient evidence on the most effective approaches to tailoring, including how barriers should be identified and how interventions should be selected to address the barriers. In addition, there is no evidence about the cost-effectiveness of tailored interventions compared to other interventions to change professional practice. Consequently, it is reasonable to employ low-cost tailored interventions in practice, but evidence on the cost-effectiveness of the alternative methods of tailoring is required before use of more costly tailored approaches can be justified.



**Figure 1.**

Meta-regression plot The log odds ratio at follow-up is plotted against the log odds ratio at baseline, with each circle representing one study in the analysis, and the red line indicating the pooled estimated follow-up log odds ratio for each value of the baseline log odds ratio. Circle size is relative to the standard error of the log odds ratio. The result from the classical analysis can be read from the graph in that when the intervention and control groups are equal at baseline (i.e. when the baseline odds ratio=0) then the estimated log odds ratio from the plot is 0.42. When exponentiated this gives the pooled effect size of 1.52.

Table 1

## Tailored interventions: effects on professional practice &amp; health care outcomes

| Risk of Bias                                 | Study ID      | Primary outcome(s)   | Effect size  | Authors' Conclusions   |
|--|---------------|--|--|--|
| <b>Studies included in the meta-analysis</b> |               |  |  |  |
| Moderate                                     | Avorn 1992    | 1. Residents not on psychoactive drugs   | 1. Decrease of 27% in intervention arm and 8% in control arm (P = 0.02)  | An educational program targeted to physicians, nurses, and aides can reduce the use of psychoactive drugs in nursing homes without adversely affecting the overall behaviour and level of functioning of the patient |
| Low  | Baker 2001    | 1. Suicide risk assessed at diagnosis<br>2. Beck depression Inventory score < 11 at 16 weeks   | 1. OR 5.6 (95% CI, 2.8 to 11.3)<br>2. OR 2.5 (95% CI, 1.2 to 5.2)*<br>(both ORs adjusted for baseline)   | The findings suggest that this approach to implementation may be effective and should be further investigated  |
| High   | Callahan 1994 | 1. Frequency of recording a depression diagnosis<br>2. Stopping medications associated with depression<br>3. Initiating anti-depressant medication<br>4. Psychiatry referral | 1. 12% control and 32% intervention arm (P < 0.01)<br>2. 22% control and 23% intervention arm<br>3. 8% control and 26% intervention arm (P < 0.01)<br>4. 14% control and 12% intervention arm  | Intensive screening and feedback of patient-specific treatment recommendations increased the recognition and treatment of late life depression by GPs  |
| Low  | Cheater 2006  | 1. Nurse performance assessed by examining patients' nursing records against a list of review criteria   | Mean improvement in aggregate compliance scores in percentage points:<br>1. -2.3 (95% CI, -1.63 to 1.7) for audit and feedback compared to control<br>2. 0.9 (95% CI, -3.3 to 5.1) for educational outreach compared to control                          | In comparison with educational materials alone, the implementation methods did not improve care at 6 months follow up  |
| Moderate                                     | Coenen 2004   | 1. Anti-biotic prescribing rate by GPs for adult patients with acute cough   | 1. OR 0.56 (95% CI, 0.36 to 0.87)<br>Risk of prescribing antibiotics for intervention group versus controls, adjusted for relevant clinical symptoms   | Implementing a guideline for acute cough is successful in optimizing antibiotic prescribing  |
| Moderate                                     | Davies 2002   | 1. Rate of electronic foetal monitoring<br>2. Time spent practising labour support   | 1. Reduced significantly in intervention secondary hospital (P < 0.001) and control tertiary hospital (P < 0.001)*<br>2. Increased in intervention tertiary hospital (P < 0.001) and decreased in control secondary hospital (P < 0.001)                 | The results are mixed and the tailored intervention thus appeared to have limited effects  |
| Low  | Evans 1997    | 1. Rate of diagnosis of asthma<br>2. Continuity of care (patients returning)<br>3. Use of recommended treatments (inhaled $\beta$ agonists)<br>4. Received patient education | 1. 40/1000 vs. 16/1000, P < 0.01<br>2. 42% vs. 12%, P < 0.001*<br>3. 52% vs. 15%, P < 0.001<br>4. 71% vs 58%, P < 0.01   | The intervention substantially increased child health staff's ability to identify children with asthma, involve them in continuing care, and provide them with state-of-the-art care for asthma                      |
| Low  | Flottorp 2002 | 1. Rate of antibiotic use<br>2. Rate of laboratory test use<br>3. Rate of telephone consultations  | 1. 3% less likely to receive antibiotics after intervention in sore throat arm (P = 0.032), no change in UTI arm.<br>2. Women in UTI arm 5.1% (P = 0.046) less likely to have lab test after intervention. No change in sore throat arm.<br>3. No change | Passively delivered, complex interventions targeted at identified barriers to change had little effect in changing practice  |

| Risk of Bias                            | Study ID       | Primary outcome(s)   | Effect size  | Authors' Conclusions  |
|---|----------------|--|--|---|
| Low                                     | Fretheim 2006  | 1. Proportion of patients prescribed a thiazide among patients prescribed an antihypertensive for the first time<br>2. Proportion of those started on antihypertensive or cholesterol lowering treatment having a cardiovascular risk assessment<br>3. Proportion satisfying treatment goals for BP or cholesterol | 1. Prescribing thiazides relative risk intervention vs control 1.94 (1.49 to 2.49)<br>2. Risk assessment done relative risk intervention vs control 1.04 (0.60 to 1.71)<br>3. Treatment goal achieved, intervention vs control relative risk 0.98 (0.93 to 1.02) | The intervention had an impact on prescribing patterns, but not on other outcomes   |
| Moderate                                | Leviton 1999   | 1. Use of corticosteroids  | 1. Use increased by 108% in active dissemination hospitals and by 75% in usual dissemination hospitals (P < 0.01)  | An active, focused dissemination effort increased the effectiveness of usual dissemination methods when combined with key principles to change physician practices                |
| Moderate                                | Schouten 2007  | 1. guideline adherent antibiotic prescription<br>2. adjustment of antibiotic to renal function<br>3. switches in therapy<br>4. streamlining of therapy<br>5. gram staining and culture of sputum samples   | 1. Difference between intervention and control hospitals OR 2.63 (95% CI, 1.57 to 4.42)<br>2. OR 12.9 (95% CI, 3.64 to 45.8)<br>3. OR 1.20 (95% CI, 0.02 to 76.51)<br>4. OR 1.94 (95% CI, 0.34 to 11.03)<br>5. OR 1.13 (95% CI, 0.64 to 2.00)                    | For some indicators, the intervention led to improvements. Secular trends may have had an effect on indicators that did not improve to a greater extent in the intervention group |
| Moderate                                | Simon 2005     | 1. Proportion of patients with hypertension receiving a diuretic or beta-blocker   | Difference between control and group detailing OR 1.40 (95% CI, 1.11 to 1.76)<br>Difference between control and individual detailing OR 1.30 (95% CI, 0.95 to 1.79)<br>Difference between group and individual detailing OR 1.10 (95% CI, 0.86 to 1.42)          | Both detailing interventions resulted in approximately 13% absolute increase in guideline recommended drugs   |
| <b>Studies not in the meta-analysis</b> |                |  |  |   |
| Moderate                                | Avorn 1983     | 1. Prescribing of targeted drugs (amount and costs)<br>No suitable dichotomous outcome reported  | Costs reduced in intervention arm v control by 14% (P = 0.0001)  | Academic based 'detailing' was a useful and cost effective way to improve the quality of drug therapy decisions and reduce unnecessary expenditures                               |
| Moderate                                | Engers 2005    | 1. Referrals to a therapist.<br>2. Prescription of pain medication on a time-contingent basis<br>3. Prescription of paracetamol versus NSAIDs.<br>No baseline data reported  | Intervention compared to control:<br>1. OR 0.8 (95% CI, 0.5 to 1.4)<br>2. OR 1.0 (95% CI, 0.3 to 3.0)<br>3. OR 2.0 (95% CI, 0.8 to 5.5)  | The intervention modestly improved implementation of the Dutch low back pain guideline by GPs   |
| Low                                     | Figueiras 2006 | 1. Number of reported adverse drugs reactions (ADRs)<br>2. Number of serious ADRs<br>3. Number of high causality ADRs<br>4. Number of unexpected ADRs<br>5. Number of new-drug related ADRs<br>Results not in a suitable format  | 1. RR 10.23 (95% CI, 3.81 to 27.51)<br>2. RR 6.32 (95% CI, 2.09 to 19.16)<br>3. RR 8.75 (95% CI, 3.05 to 25.07)<br>4. RR 30.21 (95% CI, 4.54 to 200.84)<br>5. RR 8.04 (95% CI, 2.10 to 30.83)  | The intervention increased reporting of ADRs, with effect maximal at 4 months, and no longer significant from 13 months after intervention  |
| Moderate                                | Foy 2004       | 1. assessment appointment within 5 days<br>2. ascertainment of cervical cytology history   | Difference between intervention and control groups<br>1. OR 0.89 (95% CI, 0.50 to 1.58)  | The intervention was ineffective, possibly because of high pre-intervention compliance and limited impact of the intervention   |

| Risk of Bias | Study ID         | Primary outcome(s)   | Effect size  | Authors' Conclusions  |
|--------------|------------------|--|--|---|
|              |                  | 3. screening or antibiotic prophylaxis for genital tract infection<br>4. misoprostol used for cervical priming and early and mid-trimester abortion<br>5. supply of contraception at discharge<br>Results reported as percentages, | 2. OR 0.93 (95% CI, 0.36 to 2.40)<br>3. OR 1.70 (95% CI, 0.71 to 5.99)<br>4. OR 1.00 (95% CI, 0.27 to 1.77)<br>5. OR 1.11 (95% CI, 0.48 to 2.53)   | on barriers outside the control of clinical staff   |
| Moderate     | Goodwin 2001     | 1. Rate of up-to-date preventative services<br>Results reported as percentages, numbers of patients not given  | 1. Intervention: 31% to 42%, control: 35% to 37% (P = 0.015)   | An approach to increasing preventive service delivery that is individualised to meet particular practice needs can increase global preventive service delivery rates  |
| Moderate     | Hux 1999         | 1. Median antibiotic cost<br>2. Antibiotic choice - first line<br>Results reported as percentages, numbers of patients not given   | 1. Change of \$0.05 intervention v. \$3.37 control, P < 0.002<br>2. Change of 2.6% v. -1.7%, P < 0.01  | A simple program of confidential feedback and educational materials blunted cost increases, increased the use of first-line antibiotics, and was highly acceptable to Ontario primary care physicians                 |
| Moderate     | Karuza 1995      | 1. Physician vaccination rates for influenza<br>Results reported as percentages, numbers of patients not given   | 1. The intervention arm had a significantly higher adjusted vaccination rate (62.39%) compared to controls (46.46%), P < 0.001   | Interventions using small groups can be useful in facilitating adoption of guidelines by physicians   |
| Moderate     | Langham 2002     | 1. Adequate recording of three risk factors.<br>n/N not reported   | 1. Difference of 10.5% (95% CI, -3.9 to 24.9) between information and no information and 6.6% (95% CI, -8.9 to 22.0) between evidence and no evidence  | Adequate risk factor recording did not differ between the information (versus not information) or the evidence (versus not evidence) intervention groups  |
| Low          | Matchar 2002     | 1. % time in target range<br>2. Rate of thromboembolic events<br>No suitable dichotomous outcome reported.   | 1. Difference (intervention minus control) adjusted for minor baseline differences was 5% (95% CI, -5% to 14%), P = 0.32<br>2. No significant difference   | A properly administered anticoagulation service can successfully manage the anticoagulation of most patients with atrial fibrillation; however, these services did not improve anticoagulation compared to usual care |
| Moderate     | Ross-Degnan 1996 | 1. Sales of oral rehydration salts<br>Results reported as percentages, numbers of patients not given   | 1. Increased by 21% in intervention arms compared to controls (P < 0.05)   | Face to face training of pharmacy attendants which targets deficits in knowledge and specific problem behaviours can result in significant short-term improvements in product sales and communication with customers  |
| High         | Santoso 1996     | 1. Prescribing of oral rehydration solution<br>2. Prescribing of anti-microbials<br>3. Prescribing of anti-diarrhoeals<br>Results reported as percentages, numbers of patients not given   | 1. Increase after intervention, but not significantly after both interventions<br>2. Significant reduction in antimicrobial usage for both face-to-face and seminar interventions.<br>3. Significantly reduced after both interventions. | The small group face-to-face intervention did not appear to offer greater impacts over large seminars in improving the appropriate use of drugs in acute diarrhoea  |
| Low          | Sehgal 2002      | 1. Increase in Kt/V at 6 months<br>2. Change in level of dialysis prescribing<br>3. Change in from catheter use to fistulas/grfts<br>No suitable dichotomous outcome reported  | 1. +0.2 intervention vs. +0.1 control, P < 0.001<br>2. +0.16 intervention vs. +0.06 control, P < 0.001<br>3. 28% intervention vs 7% control, P = 0.04  | An intervention tailored to patient-specific barriers resulted in increased haemodialysis dose  |
| Moderate     | Soumerai 1998    | 1. Appropriateness of the prescribing of selected drugs (aspirin in eligible elderly patients)   | 1. Median change +0.13 in intervention and -0.03 in controls P = 0.04  | Working with opinion leaders and providing performance feedback can accelerate adoption of some   |

| Risk of Bias | Study ID       | Primary outcome(s)   | Effect size   | Authors' Conclusions  |
|--------------|----------------|--|---|---|
|              |                | Data reported as percentages, numbers not given.   |   | beneficial acute myocardial infarction therapies                                      |
| Moderate     | Verhoeven 2005 | 1. Patients undergoing risk assessment and testing<br>2. Proportion appropriately tested<br>No baseline data reported. | 1. Difference between intervention and control 2.28 (95% CI, -0.51 to 5.07), P = 0.106<br>2. Difference between intervention and control 25.4% (95% CI, 4.5 to 46.3), P = 0.019 | GPs who had received the intervention performed consistently more appropriate testing |



**Table 2**

Effect sizes used in the meta-regression (adjusted for clustering)

| <b>Study ID</b> | <b>Outcome</b>   | <b>Baseline odds ratios (95% CI)</b> | <b>Follow-up odds ratios (95% CI)</b> |
|-----------------|--|--------------------------------------|---------------------------------------|
| Avorn (1992)    | Residents not on antipsychotic drugs                   | 0.90 (0.51, 1.61)                    | 1.08 (0.76, 1.51)                     |
| Baker (2001)    | Beck depression inventory < 11                         | 0.89 (0.40, 2.00)                    | 5.50 (3.53, 8.57)                     |
| Callahan (1994) | Depression diagnosis                                   | 1.23 (0.52, 2.91)                    | 2.65 (1.42, 4.98)                     |
| Cheater (2006)  | Recording of management criteria                       | 18.54 (3.53, 97.34)                  | 8.75 (1.07, 71.85)                    |
| Coenen (2004)   | Antibiotics not prescribed                             | 0.80 (0.49, 1.32)                    | 1.07 (0.76, 1.49)                     |
| Davies (2002)   | No electronic fetal monitoring                         | 54.90 (10.53, 286.35)                | 12.25 (7.22, 20.77)                   |
| Evans (1997)    | Returning asthma patients from previous year           | 0.94 (0.45, 1.95)                    | 2.88 (2.18, 3.81)                     |
| Flottorp (2002) | Antibiotics not prescribed                             | 1.12 (0.96, 1.30)                    | 1.26 (1.15, 1.38)                     |
| Fretheim (2006) | Thiazides prescribed for hypertension                  | 0.63 (0.42, 0.94)                    | 1.68 (1.40, 2.01)                     |
| Leviton (1999)  | Use of antenatal corticosteroids                       | 1.00 (0.66, 1.50)                    | 1.59 (1.41, 1.78)                     |
| Schouten (2007) | Guideline adherent antibiotic prescription             | 0.87 (0.52, 1.45)                    | 2.16 (1.62, 2.87)                     |
| Simon (2005)    | Beta-blockers or diuretics prescribed for hypertension | 1.03 (0.83, 1.27)                    | 1.40 (1.22, 1.61)                     |