Strategies for improving the quality of health care in maternal and child health in low- and middle-income countries: an overview of systematic reviews

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Summary

There are many systematic reviews of continuing education programmes and educational strategies for quality improvement in health care. Most of the reviewed studies are one-off evaluations rather than impact evaluations with long-term follow-up. There are few systematic reviews of organisational, financial and regulatory interventions, and few high-quality studies. These interventions are probably as or more important than educational strategies, although they are less well evaluated. Few studies have been undertaken in low- and middle-income countries (LMIC) or that address maternal and child health (MCH). Thus, the results of the available studies and reviews need to be interpreted cautiously when applied to LMIC.

Interactive workshops, reminders and multifaceted interventions can improve professional practice, and they generally have moderate effects. Educational outreach visits consistently improve prescribing but have variable effects on other behaviours. Audit and feedback interventions have variable effects on professional practice, but most often these are small to moderate effects. Mass-media and patient-mediated interventions may change professional practice. Multifaceted interventions that combine several quality-improvement strategies are also effective but may not be more so than single interventions. While all of these strategies are applicable to MCH in LMIC, the applicability of the results to rural settings, in particular, may be limited. Use of these strategies could exacerbate inequalities, and this should be taken into consideration when planning implementation. Scaling up and sustainability may be difficult to achieve in LMIC contexts and need careful consideration.

The use of financial interventions has not been well studied; financial incentives and disincentives may be difficult to use effectively and efficiently, although their impact on practice needs to be considered. Organisational interventions are likely to be important, given that there are often underlying organisational or system problems. Regulatory interventions have not been well evaluated, but may sometimes be both inexpensive and effective. There are no ‘magic bullets’ or simple solutions for ensuring the quality of health care services. Interventions should be selected or tailored to address the underlying reasons for a failure to deliver effective services. Decision-makers should select the most appropriate interventions for specific problems. This requires a governance structure that clearly assigns responsibility for quality-improvement activities, priority setting, selection and design of interventions, and evaluation.
Introduction

Almost all maternal, neonatal, infant and child deaths (99%) arise in low- and middle-income countries (LMIC), yet most research is focused on the 1% of these deaths that occur in high-income countries (HIC).1

One of the main challenges in developing countries is to make interventions of demonstrated efficacy widely available to underserved populations, thus bridging the ‘know-do gap.’ There is a series of interventions that could, if implemented, result in a significant reduction of maternal, infant and child morbidity and mortality globally.2–4 However, those interventions are not widely used in LMIC. Effective interventions to reduce neonatal mortality, such as newborn temperature management, are only used in 20% of births, and the administration of antenatal steroids is used in no more than 5% of preterm births.2 Theoretically, the implementation of known interventions could reduce neonatal and child mortality by 40–70% in less developed countries.2,3 There is an urgent need to use effective approaches in order to disseminate and scale up effective interventions.

Decision-makers in LMIC should have access to evidence-based information regarding which strategies have been proven to be effective in ensuring that health care providers involved in maternal and child care administer beneficial, preventive or therapeutic interventions to the population of mothers and children. There is support for the concept that quality-improvement interventions (broadly defined as strategies to ensure delivery of effective services efficiently and equitably) can be used effectively to disseminate evidence-based practices among clinicians in industrialised countries.5–7 Whether this can be shown in resource-poor developing countries is uncertain, as there is little research done in LMIC. Therefore, any summary of effective strategies needs to discuss their applicability in LMIC settings. Approximately 50% of births in LMIC occur at home; often, these births take place in rural areas without skilled attendants. Ignoring this fact could result in the selection of inappropriate strategies that fail to promote the use of beneficial practices among those who most need them, thus increasing health inequalities.

It is widely recognised that a systematic approach to judging and summarising the evidence helps protect against errors, resolve disagreements, facilitate critical appraisal and communicate information. Therefore, when making decisions, policy-makers should have access to information from systematic reviews of research studies.

Our objective is to systematically analyse the results of systematic reviews of strategies for improving the quality of care, where these strategies are relevant to maternal and child health (MCH) in developing countries. The implications of this evidence for decision-makers are the main focus of this overview.

Methods

To be included, a review should have examined the effects of governance or quality-of-care improvement interventions on health-professional practice or health care outcomes, where this is directly or indirectly relevant to MCH in developing countries.

The following inclusion criteria were used for selection of studies for data extraction and quality assessment: (1) interventions should be related to continuing education, quality-improvement, organisation of care, financial or other reimbursement, or should be regulatory interventions; (2) interventions should be targeted at MCH, or be directly applicable to MCH (such as primary care, prevention services or emergency health care); reviews dealing with specific interventions to improve quality of care in chronic disorders were excluded; (3) interventions that could target health care providers in developing countries (professions available in developing countries and/or levels of training available or attainable in developing countries); (4) interventions potentially applicable on a large-scale basis to improve quality of care in poor and vulnerable populations in developing countries; (5) the reviews should report measures of professional performance and/or patient outcomes; and (6) the reviews should have a methods section describing explicit selection criteria, including methodological quality assessment.

Two independent groups of reviewers assessed the reviews for eligibility. Disagreements were solved by consensus between the groups, or by decision by a
Reviews that met the inclusion criteria were subject to data extraction for quality assessment. One group of reviewers assessed the quality of included reviews against a validated checklist used by the Cochrane Effective Practice and Organisation of Care (EPOC) group. For reviews focused on one or several specific strategies, only reviews with a quality score of greater than 4 were included for further data extraction. Such criteria ensured that included reviews had: (1) stated the search methods used to find studies, (2) made a reasonably comprehensive search for studies, (3) reported inclusion criteria adequately, (4) avoided bias in the selection of articles, and, at least partially, (5) reported criteria used for assessing the validity of the studies that were reviewed. Reviews of interventions specifically targeting MCH care were included irrespective of their quality, as there were only a few of these. We made specific comments regarding the quality of these reviews.

The reviewers extracted data about the focus, inclusion criteria, main results and conclusions of the review of each intervention, using specific data-extraction forms. Data were analysed qualitatively to identify broad conclusions across the interventions, and summarised in tables. For each intervention, the analysis included the evaluation of applicability to LMIC and MCH care areas (antenatal care, intrapartum and postpartum care, neonatal care at birth, neonatal special care and infant primary care), considerations about equality (equitable access to the strategies in community and urban settings, for the most disadvantaged health providers, and for the most vulnerable women and children), and scaling-up considerations. When applicable, the analysis was stratified for rural settings (i.e. with a large proportion of home births, and health services provided at the community level) and urban settings (i.e. a large proportion of births and health services in general provided at health facilities such as hospitals and health centres).

Results

We identified 30 systematic reviews that fulfilled our inclusion criteria, covering a wide range of interventions and several specific behaviours related to MCH. After quality assessment, seven reviews were excluded for having a score of four or less, and 23 were finally included for data extraction. Of these, 16 had been published since 2000; nine were Cochrane reviews and the remainder had been published in nine different journals. A review assessing interventions for rural and remote areas did not include any eligible studies; thus, data extraction was not done. Similarly, one of the two reviews of interventions specifically targeting MCH, which assessed audit and feedback on critical incidents, did not include trials, and therefore data extraction was not performed. The second MCH review, which included four studies, evaluated the implementation of training programmes for labour ward personnel. However, none evaluated objective measures of effect either on professional practice or health outcomes, and thus no data extraction was done.

Seventeen reviews focused on continuing education and quality improvement, two included financial and reimbursement strategies such as provider incentives, and four focused on organisation of care strategies.

Below, we present a summary of the evidence for each revised strategy, and for the review specifically targeting MCH care. The results are summarised in Table 1 and described in more details in Appendix S1 (published as supplementary material on the journal web site).

Passive distribution of printed or audiovisual educational materials was reported in six reviews, which revised between one and 64 studies. Five reviews agreed that this strategy used alone was ineffective in changing professional practice, unless combined with other more active strategies like interactive meetings or educational outreach visits. One review reported a median effect of +8.1% (range from +3.6 to +17.0) on absolute performance improvement in the implementation of guidelines.

Audit and feedback is defined as any summary of clinical performance of health care over a specified period of time, which may be given in a written, electronic or verbal format, and which may also include recommendations for clinical action. This was examined in 10 reviews, which dealt with between two and 51 studies. A recent Cochrane review, exclusively focused on audit and feedback, reported a small to moderate effect of audit and feedback alone. The adjusted-risk differences ranged from −16% to 32% (median = 4%). This review also found that audit and feedback are less effective than reminders and opinion leaders, more effective than incentives, and equally as effective as patient education, self-study education and practice-based education. Health care outcomes were...
<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
<th>Targeted health care providers</th>
<th>Number of reviews (range of studies included in the reviews)</th>
<th>Review quality</th>
<th>Observed results</th>
<th>Compared with other single strategies?</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Distribution of educational materials</td>
<td>Passive distribution of printed or audiovisual educational materials</td>
<td>Any health care provider</td>
<td>6 reviews (1–28 studies)</td>
<td>4.5–6</td>
<td>Mostly ineffective (4 reviews) or modest effect (1 review). Median effect +8.1% absolute improvement in performance (range +3.6 to +17.0)</td>
<td>Not compared (5 reviews). Less effective (1 review)</td>
<td>Usually ineffective unless combined with other strategies</td>
</tr>
<tr>
<td>Audit and feedback</td>
<td>Any summary of clinical performance of health care over a specified period of time. The summary may also include recommendations for clinical action. The information may be given in a written, electronic or verbal format</td>
<td>Any type of health care professionals responsible for patient care</td>
<td>10 reviews (2–51 studies)</td>
<td>Median 5 (range 4.5–6)</td>
<td>Small to moderate positive effects reported in the 9 reviews. Not effective in 1 review. The magnitude of the effect varied from −17% to +49% change</td>
<td>Less effective than reminders (2 reviews) and opinion leaders (1 review)</td>
<td>–</td>
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<tr>
<td>Reminders</td>
<td>Any intervention (manual or computerized) that prompts the provider to perform a clinical action</td>
<td>All type of providers</td>
<td>7 reviews (3–52 studies)</td>
<td>4.5–6</td>
<td>All reviews showed some degree of positive change (small to moderate changes). The effect size range from −1.0% to +34.0%</td>
<td>No statistically significant differences in most studies (1 review)</td>
<td>Equally effective as giving the patient a handout and a questionnaire about her or his current preventive care status (1 review)</td>
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<tr>
<td>Educational meetings</td>
<td>Planned educational activities: meetings, conferences, lectures, workshops, seminars, symposia, and courses that occurred off-site from the practice setting</td>
<td>All types of health care providers</td>
<td>7 reviews (3–45 studies)</td>
<td>4.5–6</td>
<td>Small to moderately large effects (absolute change 1%–30%) observed in the 5 reviews with active approaches (interactive workshops, small group sessions, tutorial sessions). More passive approaches (didactic sessions like conferences or lectures) did not show effects</td>
<td>Unclear. Only one study in one review showed beneficial effects in asthma symptoms in children</td>
<td>Less effective than multifaceted strategies that included education meetings as one component (3 reviews). Two reviews did not report such comparisons</td>
</tr>
<tr>
<td>Intervention</td>
<td>Description</td>
<td>Targeted health care providers</td>
<td>Number of reviews (range of studies included in the reviews)</td>
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<td>Compared with other single strategies?</td>
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<tr>
<td>Local consensus processes</td>
<td>Inclusion of participating providers in discussion to ensure agreement that the chosen clinical problem is important and the approach to managing it appropriate.</td>
<td>All type of health care providers</td>
<td>1 review (10 studies)</td>
<td>5.5</td>
<td>No evidence of effectiveness</td>
<td>–</td>
<td>Not reported</td>
</tr>
<tr>
<td>Problem-based learning in continuing medical education</td>
<td>Tutor facilitated, problem-based learning session in which a small, self-directed group starts with a brainstorming session. A problem is posed that challenges their knowledge and experience. Learning goals are formulated by consensus and new information is learnt by self-directed study. It ends with a group discussion and evaluation.</td>
<td>General practitioners</td>
<td>1 review (6 studies)</td>
<td>4.5</td>
<td>Not effective</td>
<td>Unclear</td>
<td>More effective than lectures</td>
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<tr>
<td>Education outreach visits</td>
<td>Use of a trained person who meets with providers in their practice settings to provide information. The information given may include feedback on the provider’s performance.</td>
<td>All types of health care providers</td>
<td>5 reviews (1–8 studies)</td>
<td>4.5–6</td>
<td>Effective for prescribing (50% of relative improvement in one study). Unclear if effective for preventive services.</td>
<td>Unclear</td>
<td>Outreach visits are more effective than audit and feedback (1 review)</td>
</tr>
<tr>
<td>Local opinion leaders</td>
<td>Those health providers perceived by their colleagues as ‘educationally influential’.</td>
<td>Health care professionals in charge of patient care</td>
<td>2 reviews (8–12 studies)</td>
<td>5.5</td>
<td>Likely to produce small positive changes (ARD varied from −0.06 (favours control group) to +0.12 (favours intervention))</td>
<td>–</td>
<td>Shown to be more effective than feedback or didactic educational meetings</td>
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</table>
### Patient-mediated interventions

Any interventions aimed at changing the performance of health care providers for which information was sought from or given directly to patients by others.

- **Targeted health care providers:** All types of health care providers
- **Number of reviews:** 2 reviews (7–10 studies)
- **Review Quality:** 5.5–6
- **Observed results:** Not effective when implemented alone (1 review)
- **Comments:** Moderate to large effects. Median absolute effects of +20.8% (range +10.0 to +25.4%) (1 review)

### Mass media

Channels of mass communication (including radio, television, newspapers, magazines, leaflets, posters, and pamphlets) on the utilisation of health services.

- **Targeted health care providers:** Health care providers, patients and general public
- **Number of reviews:** 1 review (20 studies)
- **Review Quality:** 5.5
- **Observed results:** Effective strategy. Change in effect size ranging from 0.1% to −13.1% in the desired direction

### Multifaceted interventions

Any intervention that includes two or more of the following interventions: educational materials, conferences, outreach visits, local opinion leaders, patient-mediated, audit and feedback, office systems, and economic incentives.

- **Targeted health care providers:** All types of health care providers
- **Number of reviews:** 10 reviews (1–117 studies)
- **Review Quality:** 4.5–6
- **Observed results:** Effective: 10 reviews found positive changes. The range of the absolute changes found was from 1% to 64%
- **Comments:** Unclear: 3 reviews reported evidence in favour and against. Unclear: 3 reviews showed combined strategies were more effective than single; 2 reviews found heterogeneous results

### Tailored interventions to overcome identified barriers to change

Interventions tailored to address specified barriers to change in health providers: focus group discussions, surveys, interviews.

- **Targeted health care providers:** Health providers
- **Number of reviews:** 2 reviews (3–15 studies)
- **Review Quality:** 5.5
- **Observed results:** Tailored interventions may improve health providers' performance and health care outcomes, but the results are inconclusive. Combined OR in one review: 2.18 [1.09, 4.34] in favour of tailored interventions
- **Comments:** Effectiveness remains uncertain and more rigorous trials (including process evaluations) are needed

## Organisation of care

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Description</th>
<th>Targeted health care providers</th>
<th>Number of reviews (range of studies included in the reviews)</th>
<th>Review quality</th>
<th>Professional practice</th>
<th>Health care outcomes</th>
<th>Compared with other single strategies?</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Formal integration of services</td>
<td>Integration of primary health care services</td>
<td>Health workers delivering care at primary level</td>
<td>2 reviews (2 and 5 studies)</td>
<td>6</td>
<td>No consistency in the results, or partially effective (+2.1% relative improvement)</td>
<td>–</td>
<td>No consistent pattern of benefit</td>
<td>–</td>
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<tr>
<td>Intervention</td>
<td>Description</td>
<td>Targeted health care providers</td>
<td>Number of reviews (range of studies included in the reviews)</td>
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<tr>
<td>Improving office systems</td>
<td>Organisation of office systems to increase the use of health service procedures</td>
<td>Health workers</td>
<td>2 reviews (3 and 6 studies)</td>
<td>5-6</td>
<td>Effective to increase use of health services</td>
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<td>Screening and referral by nurses, more effective than only screening by nurses</td>
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<td>Screening during a routine visit more effective than physician reminder.</td>
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<td>Assistance from facilitators of nurses in the design and implementation of office routines and tools for increasing screening uptake more effective than continuing medical education</td>
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<td>Financial interventions</td>
<td></td>
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<tr>
<td>Providers’ incentives</td>
<td>Fundholding in practices</td>
<td>Health providers</td>
<td>2 reviews (3–6 studies)</td>
<td>4.5</td>
<td>Unclear</td>
<td>–</td>
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ARD, adjusted risk difference; OR, odds ratio; RCT, randomised controlled trials.
evaluated in one review only and showed no statistically significant differences. One review, which assessed audit and feedback specifically on critical incidents in MCH (i.e. maternal and perinatal deaths) to improve perinatal and maternal mortality and morbidity, did not find eligible trials to include.

Use of reminders (defined as any intervention, manual or computerised, that prompts the health care provider to perform a clinical action) was reviewed in seven reviews, which included between three and 92 studies. All reviews showed some degree of positive change (small to moderate changes) in improving professional practice. Only three reviews reported a quantitative size effect: one showed absolute changes in post-intervention data varying between 5% and 24% and relative changes varying between 13% and 264%; another showed an increase of preventive-care performance of 13.1% [95% CI 10.5%; 15.6%] in the intervention group; and the third review showed, in 14 comparisons, a median effect size of +14.1% (range from −1.0% to +34.0%); three of these comparisons observed a median effect of +20.0% (+13.0% to +20.0%).

Planned educational activities (meetings, conferences, lectures, workshops, seminars, symposia and courses) that occurred off-site from the practice setting have been considered in eight reviews including between three and 129 studies. One Cochrane review focused exclusively on educational meetings. Small to moderately large positive effects on professional practice were observed with active approaches (interactive workshops, small group sessions, tutorial sessions) in six reviews. Absolute improvements in the use of targeted behaviours ranged from approximately 1% to 30%. More passive approaches, like didactic sessions, conferences or lectures, did not show effects. The effects on health outcomes are unclear. One study in one review showed beneficial effects in asthma symptoms in children, and one review, which evaluated educational interventions for the use of clinical practice guidelines, assessed health outcomes and showed that education sessions and training sessions may be partially effective.

Local consensus processes (inclusion of participating providers in discussion to ensure agreement that the chosen clinical problem is important and the approach to managing it appropriate) were assessed in one review that included 10 studies. The review concluded that the importance of local consensus processes is not clear in improving professional practice. In these studies, it is not clear whether the interventions were evaluated alone or combined with other interventions. Health outcomes were not assessed.

One review assessed problem-based learning, an intervention that consists of a tutor-facilitated, problem-based learning session in which a small, self-directed group starts with a brainstorming session; a problem is posed that challenges their knowledge and experience; learning goals are formulated by consensus and new information is learnt by self-directed study; it ends with a group discussion and evaluation. The review included six studies, three randomised controlled trials and three controlled trials. Problem-based learning did not show any effect in improving professional practice in the randomised controlled trials and was shown to be partially effective in the controlled trials. Problem-based learning was more effective than lectures. There is no consistent evidence that problem-based learning was more effective in improving professional practices. Health outcomes were not evaluated.

Educational outreach visits are defined as the use of a trained person who meets with providers in their practice settings to provide information. The information given may include feedback on the provider’s performance. This strategy was revised in five reviews that included between one and 11 studies. The five reviews observed that the strategy was effective in changing professional practice, mainly regarding prescribing. One study observed a 50% relative improvement. It is unclear whether the strategy is effective for changing non-prescribing practices, such as clinical preventive services, or the effect on health care outcomes. Outreach visits were shown to be more effective than audit and feedback in one study included in one review. An updated version of this review found small positive effects for prescribing, variable effects for other behaviours, and little evidence of the cost-effectiveness of outreach interventions (A. Oxman, pers. comm.).

Local opinion leaders were reported in two reviews, which included between 10 and 28 studies. This strategy is likely to produce small absolute positive changes in professional practice (between 5% and 10%), and it has been shown to be more effective than feedback and didactic educational meetings. Doumit et al. reported a 7% median absolute decrease in non-compliance due to opinion leaders’ intervention vs. no intervention. (Adjusted-risk difference of non-compliance with desired practice varied from −6% to +15%.) In one study, the local opinion-leaders’ strategy

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was shown to be more effective than feedback and didactic educational meetings.

One review, including 10 studies, evaluated patient-mediated interventions, in which the performance of health care providers is modified by information sought from or given directly to patients. This intervention was found to be not effective when implemented alone. However, one review that evaluated patient-mediated interventions showed moderate to large effects with a median absolute effect of +20.8% (range from +10.0 to +25.4%). Another review, including 20 studies, found that mass-media interventions were effective in changing health care providers’ practice. Absolute changes in effect size in the desired direction went from 0.1% to 13%.

Multifaceted interventions can be defined as any intervention that combines two or more of the following: educational materials, conferences, outreach visits, local opinion leaders, patient mediated, audit and feedback, office systems and economic incentives. Several combinations were considered in 10 reviews that included between one and 117 studies. This strategy showed an adjusted risk ratio of compliance with desired practice ranging from 0.78 to 18.3 (median = 1.10). Multifaceted interventions to disseminate guidelines showed a modest to moderate improvement of between 5% and 20%. The 10 reviews showed positive changes in professional practice. The effect on health outcomes was unclear, as three reviews reported inconsistent results. It is also unclear if multifaceted interventions were more effective than single interventions. Two reviews using more explicit methods suggested that multifaceted interventions were no more effective than single interventions.

Two reviews, including 18 studies, evaluated interventions tailored to address specified barriers to change in health providers: focus-group discussions, surveys, interviews and interventions to improve professional practice and health care outcomes. The results are not conclusive. However, the result of pooling six studies suggested that the intervention arms of the trials had a better outcome (combined odds ratio of 2.18 [1.09, 4.34], in favour of tailored interventions). Both reviews reported that although the implementation of tailored interventions may improve professional performance and health care outcomes, their effectiveness remains uncertain, and more rigorous trials (including process evaluations) are needed. The effect of tailoring alone could not be evaluated, because there were no direct comparisons on tailored vs. untailored interventions.

One systematic review that evaluated the integration of primary services, including five studies, found no consistent pattern of benefit. All five studies were conducted in developing countries and are relevant to MCH. Another review, which included two studies conducted in developed countries, evaluated organizational interventions. One study assessed continuity of care in diabetes in primary care and showed a small effect: +2.1% relative improvement.

One review, including three studies, found that booking appointments at longer time intervals was associated with an 88% increase in the number of patients tested. The review also found that screening and referral by nurses are more effective than screening by nurses (3–6% increase) and that screening by a nurse during a routine visit is more effective than a generic physician reminder (30% more patients treated). Another review, including six studies, showed that assistance from nurse facilitators in the design and implementation of office routines and tools can increase screening uptake. One review, including eight randomised controlled trials, reported that an intervention to improve nursing record systems is ineffective.

Use of fund holding in practices was evaluated in two reviews of nine studies. The intervention was shown to be partly effective in improving professional practice in one of the reviews, which included observational studies (reports of data). In the other review, which included randomised controlled trials, only one study out of six reported that financial incentives improved professional practices. Therefore, the conclusion is that there is not sufficient evidence to judge the effectiveness of this strategy. Health outcomes are not stated. A quantitative overall size effect is not reported in any of the reviews.

Discussion

This is the first overview that addresses quality-improvement interventions from a LMIC perspective and the only one with a focus on MCH. The systematic consideration of equity, applicability and scaling up is also new.

However, several limitations should be acknowledged. Due to the limited time that we had to complete this overview, the criteria used to select systematic reviews were very stringent. As a consequence, we

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may have excluded reviews with relevant information. Reviews were selected according to methodological quality, and only those considered of very high quality were included. Reviews were also selected according to relevance, and we acknowledge that this criterion is highly subjective. For example, reviews dealing with disease-specific interventions that were not directly relevant to MCH were excluded. A main focus of this overview was the analysis of applicability, equality and scaling-up issues. Such an analysis is probably biased because of the particular setting and experience of the reviewers. LMIC settings are very heterogeneous, with marked differences between middle- and low-income countries. In particular, interventions that may look promising for urban settings can be completely out of context in rural (i.e. community) settings. An added challenge was that the vast majority of the studies included in the reviews were conducted in developed countries. This overview included 35 systematic reviews involving more than 300 studies, but only 18 were conducted in LMIC. This finding is consistent with a similar analysis conducted elsewhere. While we have tried to address these contrasts in this overview, and to systematically consider issues of applicability to a wide range of LMIC settings, decision-makers must consider the results of this overview in relation to their own context and priorities (see checklists for overviews of systematic reviews and applicability).

Low- and middle-income countries have poorly organised health systems, disadvantaged socio-economic conditions and very heterogeneous cultural contexts. A main determinant of the applicability of the abovementioned strategies to LMIC is the setting in which the MCH care is provided. We focused our analysis in two distinct settings: (1) urban settings, where more than 70% of births occur at health facilities, with access to skilled attendants, and (2) rural settings, where more than 70% of births are home deliveries, with limited access to skilled attendants. Access to skilled health providers in rural settings is complicated by limited means of transportation and long distances to urban centres; this represents a challenge to implementing effective governance strategies. One published systematic review of interventions for implementing evidence-based practice in rural and remote areas found no experimental evidence to evaluate. The authors commented that, in rural and remote locations, isolation, lack of time and locum cover, and poor information technology infrastructure create particular obstacles for any strategy directed to those settings.

Access to rural settings also represents a challenge for the equitable implementation of these strategies. The least skilled attendants are those who frequently provide care in distant rural settings – in which the most underprivileged women and children usually live. Finally, the feasibility of scaling up effective strategies in a cost-effective way also depends on the characteristics of the rural settings within each country.

Another general issue of applicability is that almost all of the studies included in these reviews evaluated one-off interventions initiated by researchers. There are few impact evaluations of quality-improvement programmes and few studies with long-term follow-up.

We now discuss these considerations for each category of interventions, grouping those strategies that share similar characteristics regarding potential applicability, equitable implementation and scaling up (also, see Table 2).

**Distribution of educational materials**

This strategy implemented alone was found to be ineffective, but may be useful when implemented combined with other strategies. The strategy may be inexpensive and effective when lack of knowledge is an important reason for people not doing what they should be doing. The strategy is applicable in LMIC for health care providers working in any setting, and is currently widely used. None of the revised studies have been conducted in developing countries. The strategy is also applicable to all areas of MCH.

Access to educational materials could be limited in distant rural areas with difficult access or communication. Health providers with limited technical training, such as traditional birth attendants, traditional nurses or lay health workers, should be targets of materials adapted to their level of expertise and literacy. The easier access to educational materials that the Internet has facilitated worldwide has a clear inequitable distribution in LMIC as public institutions and rural areas are less likely to have Internet access.

Distribution of educational materials should ideally be combined with another continuing education strategy to be effective. For scaling up, the limitations are the same as those mentioned above.
### Table 2. Applicability, equity and scaling-up considerations for each strategy

#### Continuing education strategies

<table>
<thead>
<tr>
<th>Intervention</th>
<th>To LMIC</th>
<th>To MCH</th>
<th>Equity considerations</th>
<th>Scaling up</th>
<th>Key messages for policy-makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution of educational materials</td>
<td>Applicable to health care providers working in all settings</td>
<td>Applicable to all areas of MCH care</td>
<td>Printed materials should be adapted to be understood by less educated health providers, like TBAs or traditional nurses in community settings. Electronic materials are more easily accessed in urban settings, in which health facilities are more likely to have Internet access. Printed materials are not easily accessed in rural community settings with bad communications systems. The limitations are those imposed by the size and efficiency of the country’s communications network, nowadays improved with Internet access. In most of the LMIC, this would mainly prevent reaching rural areas distant from urban centres.</td>
<td>The limitations are those imposed by the size and efficiency of the country’s communications network, nowadays improved with Internet access. In most of the LMIC, this would mainly prevent reaching rural areas distant from urban centres.</td>
<td>Distribution of educational materials should be ideally combined with another CE strategy to be effective. Adapting to less skilled health providers, and original solutions to provide access to health providers working in rural settings, are relevant issues.</td>
</tr>
<tr>
<td>Audit and feedback</td>
<td>Applicable to health care providers working in health facilities more than in community-based settings</td>
<td>Potentially applicable to all areas of MCH care</td>
<td>The lack of routine data collection systems is more prevalent in community-based settings, in which the most disadvantaged health care providers work, and the most underprivileged women and children live.</td>
<td>Only possible if routine data collection systems are implemented on a large scale. These systems should promote the routine collection of data on the use of the most important health care practices in MCH.</td>
<td>Potentially useful strategy, but difficult to implement on a large scale. Simple routine data collection systems that can be implemented in community-based settings, should be implemented to allow this strategy. Only the most important health care practices in MCH should be the focus of such a system.</td>
</tr>
<tr>
<td>Reminders</td>
<td>Applicable to health care providers working in communities or health facilities (excluding computerised reminders)</td>
<td>Applicable to all areas of MCH care</td>
<td>Can be implemented in an equitable way, at all settings and for all kinds and levels of health care providers. Literacy limitations in some non-skilled health providers should be overcome by the use of pictorial information if needed.</td>
<td>Only the most important health care practices in MCH should be the focus of such a system.</td>
<td>Potentially useful strategy, relatively easy to be implemented on a large scale, in all settings. It is the most effective single strategy for guideline implementation. Simple manual reminders, easy to understand, to promote the use of priority health care practices, could be a highly cost-effective strategy in LMIC.</td>
</tr>
<tr>
<td>Educational meetings (including local consensus processes and problem-based learning)</td>
<td>Applicable to health providers in rural settings. Small group interactive workshops are more difficult to implement in areas in which health providers are scarce and cannot be easily replaced during training activities.</td>
<td>Health care providers in rural settings are frequently the most disadvantaged and the most scarce at LMIC, and attend the most underprivileged population. The costs of conducting interactive workshops in these settings (or anywhere, but targeting rural health care providers) would probably be high compared with urban settings. If specific measures are not taken, there is a risk that these settings would be less likely to be the target of this type of educational strategy. Interactive workshops for small groups of trainees are costly. Training programmes using this strategy should consider preparing replicable workshops that can be conducted or tutored by widely available health care professionals at the local level. Train-the-trainers model could be a strategy to make programmes more cost-effective. Interactive workshops are important to effectively teach EOC, ENC and neonatal resuscitation skills. Specific measures should be taken to facilitate these activities in settings in which health care providers are scarce and cannot easily participate in these intensive activities. Train-the-trainers model could be a strategy to make cost-effective, easily replicable programmes.</td>
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<tr>
<td>Local opinion leaders</td>
<td>Applicable to health care providers working mainly at health facilities in urban settings. Health care providers in community settings, working in more isolated conditions, would have difficulty in identifying local leaders. Moreover, large rural settings with difficult access would prevent efficient implementation.</td>
<td>The more isolated working conditions of health care providers in rural settings, plus the difficulties of accessing those settings, would prevent equitable implementation. This strategy could be scaled up in urban settings, but this is less likely at the rural level. Potentially useful strategy, but less feasible in rural settings with health care providers working in more isolated conditions. In urban settings, where health care is provided at health facilities, it could be a feasible and effective strategy.</td>
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<tr>
<td>Patient-mediated interventions and mass-media interventions</td>
<td>Applicable mainly in urban settings and in rural settings with good communication systems. Not applicable in populations in which women are not sufficiently educated and empowered to challenge the authority of the health providers.</td>
<td>The intervention would probably only be implemented in educated and empowered women, who usually are less disadvantaged. Difficult to implement in rural settings, with less literate women and bad mass-communication systems. Likely to be resisted by health care providers at all levels of care. Not generalisable in low-income countries with large proportions of illiterate women and bad mass-communication systems.</td>
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<tr>
<td>Multifaceted interventions</td>
<td>The applicability should be judged by the included components. Interventions that include interactive workshops, distribution of printed materials and manual reminders are applicable in all settings.</td>
<td>Should be evaluated upon the selected strategies that are integrated in the intervention. An equitable intervention might include replicable interactive workshops, distribution of printed materials and manual reminders. An intervention including replicable interactive workshops (train-the-trainers methods), distribution of simple printed materials, and implementation of manual reminders, could be scaled up in all settings. The costs of these combined strategies are higher and should be evaluated against the potential benefits.</td>
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<td></td>
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<tr>
<td>Applicable to all areas of MCH care</td>
<td>Applicable to all areas of MCH care.</td>
<td>Applicable to all areas of MCH care.</td>
<td>Applicable to all areas of MCH care.</td>
<td>Applicable to all areas of MCH care.</td>
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<tr>
<td>Intervention</td>
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<tr>
<td>Integration of primary health care services</td>
<td>Highly relevant to LMIC. The intervention is applicable in settings where a partially developed and fragmented primary health care system is present</td>
<td>Highly relevant to MCH.</td>
<td>This strategy can potentially reduce inequality. One of its aims is to simplify and make access to health services more efficient for users in limited-resource settings, who have difficult access to health care facilities</td>
<td>Implementing this strategy might require considerable planning and resources, as it requires significant changes to the organisation of the delivery of health care</td>
<td>Policy-makers and planners considering integration could introduce this strategy using rigorous study design, to allow further evaluation and increase the base of studies from which to draw evidence</td>
</tr>
<tr>
<td>Improving office systems</td>
<td>The implementation of simple strategies to better organise the delivery of preventive measures in primary care is relevant to LMIC. However, the relevance is restricted to settings where an organised primary health care system is already in place</td>
<td>Relevant to LMIC</td>
<td>This strategy can be targeted to the prevention of problems that are prevalent in poor settings</td>
<td>The strategies are simple and scaling-up should not be difficult</td>
<td>Simple changes to improve the organisation of preventive services in primary care can increase coverage</td>
</tr>
<tr>
<td>Changes in medical record systems</td>
<td>Limited applicability as the intervention requires highly qualified health professionals to design and implement the systems</td>
<td>Applicable to MCH</td>
<td>No clear relation to equality improvement</td>
<td>Scaling is difficult; it requires professionals with expertise in medical records</td>
<td>This intervention does not seem attractive for implementation in LMIC</td>
</tr>
</tbody>
</table>

LMIC, low- and middle-income countries; MCH, maternal and child health; TBA, traditional birth attendant; CE, continuing education; EOC, essential obstetric care; ENC, essential newborn care.
Audit and feedback

This strategy was shown to have small to moderate positive effects on professional practice and is applicable in LMIC and to all MCH areas. Three trials have been conducted in developing countries, one in a paediatric outpatient hospital in Thailand and two others in health units in rural Uganda and Laos. In these last two studies, the strategy was a component of a multifaceted intervention. Nevertheless, the frequent lack of routine data-collection systems hinders the implementation of these strategies outside experimental contexts, especially in rural settings with community-based care. The lack of routine data systems is also a threat to equitable access for the most disadvantaged health care providers: women and children.

For feasible large-scale use, the local health system should organise and promote the routine collection of data on the use of the most important health care practices in MCH, in simple, standardised formats. The system should be acceptable to, and developed in conjunction with, health care providers, who should also be adequately trained in its use and necessary audit processes.

Reminders

This strategy was shown to have a small to moderate positive effect on professional practice. Use of manual reminders (e.g. chart reminders, posters) is applicable in LMIC to health care providers working in communities or at health facilities. The applicability of computerised reminders varies according to the financial resources of the settings. The strategy is also applicable to all areas of MCH care. Three reviews assessed the use of reminders in MCH preventive services.

Simple manual reminders can be implemented in an equitable way, in all settings and for all kinds and levels of health care providers. The literacy limitations that some non-skilled health provider documents or lay workers present could be overcome by the use of pictorials if needed. Manual reminders can be applicable on a large-scale basis and at relatively low cost, in both community or urban settings. Simple manual reminders, easy to understand, are a potentially useful strategy to promote the use of priority health care practices and could be a highly cost-effective strategy in LMIC.

Educational meetings, educational outreach visits, local consensus processes and problem-based learning

Evidence suggested that interactive workshops were more likely to be successful than didactic training workshops. However, this was only based on a small number of studies, where interactive workshops were used with the aim of improving skills or challenging attitudes. Educational outreach visits have also been shown to be effective in South African urban (management of childhood asthma around Cape Town) and rural (integrated management of respiratory diseases) settings (A. Oxman, pers. comm.). Although the costs are high and effects modest in one-off studies in HIC, the costs are probably less and the effects may be larger if outreach visits are organised as part of a programme, as they now are in some places (e.g. many provinces in Canada). Small-group interactive workshops are applicable in all settings in LMIC, but are probably more difficult to implement in isolated areas in which health providers are scarce and cannot be easily replaced for clinical-care activities during the training periods. Five of the included studies have been conducted in LMIC.

The strategy is applicable to all areas of MCH care and is particularly relevant for training health providers in specific obstetric and neonatal skills. Currently, this training format is being used by the Johns Hopkins Program for International Education in Gynecology and Obstetrics (JHPIEGO) for training in evidence-based essential obstetric care, by the World Health Organization (WHO) to train birth attendants in essential newborn care, and by other organisations for training in neonatal resuscitation skills. Of the studies included in the reviews, two have focused on MCH.

Educational outreach visits have also been conducted in developing countries, mainly to improve prescribing. Two trials were conducted in Indonesia to improve the management of acute diarrhoea in children by health providers and parents. The difficulties mentioned above, and the higher costs of implementing these activities in distant rural areas, unless recognised and overcome, could result in fewer training activities for those who are in greatest need, thus increasing health inequalities. Educational outreach programmes result in small to modest effects in guideline reviews. They are expensive, and so the likely benefits need to be carefully weighed against the likely costs. It could be argued that targeting
educational outreach visits to rural areas might be an effective strategy to prevent inequalities.

There are several potential advantages of outreach vs. meetings that should be considered: it is often easier to ensure good coverage, as it is often difficult to get people to come to meetings; it may be less costly, and it is probably easier to tailor outreach to the specific needs/circumstances of each professional/practice. Training programmes using this strategy should consider preparing workshops that can be easily delivered by the majority of health care professionals in LMIC. The use of a train-the-trainers model could be a strategy to make programmes more easily replicable and cost-effective, although there is no strong evidence to support this assumption.

**Local opinion leaders**

This strategy was shown to have small to moderate positive effects on professional practice, and is applicable to health facilities in urban areas, as the strategy requires a ‘team’ of health professionals to be implemented and is applicable to any area of MCH care. However, it is not known how sustainable the strategy is, and it has been rarely attempted outside the experimental context. In rural settings, where health providers work in relative isolation, this strategy would not be easily applicable.

**Patient-mediated and mass media**

Patient-mediated interventions alone do not seem to be effective and may be difficult to implement in low-resource settings. Literacy can be a limiting factor, and these interventions may be more appropriate for more educated audiences, who are usually less disadvantaged. However, these approaches, if properly developed and supported over time, could be important to empower women and ensure good-quality care. In low-resource settings, women may not be able, or want, to challenge the authority of a health provider. The intervention is also likely to be resisted by health care providers. Mass-media interventions seem to be effective in promoting quality of care and are attractive interventions in settings where media networks have coverage. They share the problems of patient-mediated interventions in very low-resource settings.

**Multifaceted interventions**

The evidence on the effectiveness of multifaceted interventions is unclear. Comparisons between studies are difficult because of the many options tested, including heterogeneous combinations of strategies. These combined strategies are attractive because they can be designed to overcome several barriers at the same time and can address training, dissemination and implementation objectives. However, they are likely to be more expensive. Multifaceted strategies that include interactive workshops, distribution of printed materials and manual reminders are combined strategies that are likely to be applicable in all settings, delivered equitably and organised on a large-scale basis.

**Organisational interventions**

Although the evidence on integration of services is not consistent, with studies showing contradictory results, this intervention is highly relevant to MCH in developing countries. Primary health care services are usually poorly organised and fragmented, and patients are required to visit health facilities on many occasions. Policy-makers and planners considering integration could introduce this strategy, using rigorous study design, to allow further evaluation and increase the base of studies from which to draw evidence.

Strategies directed at improving the timing, schedule and organisation of screening programmes seem to be effective in increasing screening uptake and should be relatively easy to implement but are applicable only to settings where a comprehensive health system with an established screening system is already in place. Five studies have been conducted in developing countries, and three are focused on MCH.

**Provider incentives**

The evidence for the effectiveness of this intervention is unclear. There is not enough data to judge applicability, equity and scaling-up issues regarding these strategies.

**Clinical practice guidelines**

Although it cannot be considered as an intervention *per se*, the effective implementation of clinical practice guidelines is likely to improve professional practice. Although the supporting evidence is weak, clinical practice guidelines are applicable in LMIC to both health care providers working either in community settings or health facilities and are currently used to guide management in many of these countries, including MCH. Nevertheless, only two studies of guideline
implementation, out of 235 included in the review by Grimshaw et al., were conducted in developing countries.\textsuperscript{16}

Applicability, equity and scaling-up considerations should be judged upon the components of the different strategies for implementation of clinical practice guidelines. Single interventions, like reminders, or multifaceted interventions that include interactive workshops, distribution of printed materials and manual reminders, could be potentially applicable in all settings, potentially equitable, and potentially implemented on a large-scale basis.

**Training programmes in MCH essential care**

The effective training of birth attendants and health care providers in general, in skills to manage critical moments and emergency situations in MCH care, is relevant to the improvement of professional practice and to the reduction of maternal and neonatal mortality and morbidity. The knowledge and skills that should be targeted by the training programme are evidence-based basic essential obstetric care, management of acute obstetric complications, essential newborn care and neonatal resuscitation, as most causes of maternal and perinatal deaths are related to these circumstances. Training programmes can be conducted as interactive workshops for relatively small groups, using dummies, simulation models and exercises. These strategies allow for: (1) the development or introduction and discussion of clinical practice guidelines recommending the best practices, (2) learning how to deliver preventive practices and identify and treat complications, and (3) certifying the health providers based on evaluation of competency on the simulation models, before applying the skills to real patients. These training workshops can also include plans and strategies to implement the recommended forms of care in the health care setting, including providing appropriate materials; the training workshops can be designed to be replicable and scaled up, using a train-the-trainers model.

These strategies are currently being used in developing countries by JHPIEGO and WHO to train in basic essential obstetric care,\textsuperscript{42} by WHO to train in essential newborn care,\textsuperscript{43} and by several countries’ paediatric societies to train in neonatal resuscitation skills.\textsuperscript{44} However, as far as we know, there are no rigorous published assessments of the effect of these programmes and formats on professional practice and health care outcomes. The only systematic review we found only covered training programmes in developed countries but with no evaluation of the effects on professional practice or health outcomes. The neonatal resuscitation training programme has been shown to be effective in reducing neonatal mortality in some observational studies using historical controls\textsuperscript{53,54} and is currently under evaluation in an international collaborative trial in several developing countries.\textsuperscript{55}

Regulatory interventions are not well evaluated, but may sometimes be both inexpensive and effective. For example, Fretheim et al. found in Norway that the implementation of a simple rule, requiring the use of thiazides as first-line treatment for newly diagnosed hypertension, was more effective and less costly than a tailored intervention delivered using outreach visits (A. Oxman, pers. comm.). However, the effectiveness of regulatory interventions is likely to vary, depending on the context in which they are used, the behaviours at which they are targeted, and the use of penalties or rewards.

Two EPOC overviews of quality-improvement strategies have been published, in 1999 and 2001.\textsuperscript{36,37} Both overviews included systematic reviews targeting any type of health care professional in any health care field and did not consider the strategy’s applicability to different settings. Nevertheless, our findings are in general consistent with both overviews, implying that the strategies found to be effective are unlikely to be dependant on the health area in which they are applied. However, applicability to LMIC and equity considerations were not addressed in either article. The main difference in our findings is related to our conclusion, regarding the effectiveness of multifaceted strategies compared with single strategies. Whereas both reviews concluded that multifaceted strategies seemed to be more effective than single strategies, our overview acknowledges that the most recent and rigorous evaluations do not support that conclusion. This evidence comes mainly from the Grimshaw et al. overview on strategies for guideline implementation, which used stricter methods to summarise the effects reported in the trials included.\textsuperscript{38} This overview also found that the passive distribution of educational materials, previously found to be an ineffective strategy, actually shows modest positive effects on professional practice.

A recent overview summarised implementation studies that were conducted in developing countries, and included in any of the EPOC systematic reviews in the Cochrane Library.\textsuperscript{31} As only nine studies were
found, the review was inconclusive regarding most of the strategies, except for educational outreach visits, which were found to be effective in the two studies evaluated.

Finally, Wensing et al. have recently published an overview of reviews of organisational interventions to improve patient care, including 36 reviews. Although our overview evaluated organisational interventions, the very restrictive eligibility criteria have resulted in only four reviews finally being included, mainly related to one type of intervention: the integration of services. Thus, for a more comprehensive evaluation of various types of organisational interventions, we refer the readers to the Wensing et al. paper.

There are no ‘magic bullets’ or simple solutions for ensuring the quality of health care services, i.e. the delivery of effective services efficiently and equitably. No single intervention is suitable for all types of problems, and most interventions have small to moderate variable effects. It follows from this that interventions should be selected or tailored to address the underlying reasons for a failure to deliver effective services. The broad categories of intervention that are considered in this overview should be considered as a tool box, from which the most appropriate tools must be selected for specific problems. Doing this requires a governance structure that clearly assigns responsibility for quality-improvement activities, for priority-setting (i.e. identifying which problems require the most urgent attention and use of limited resources), selection and design of interventions to address those problems, and evaluation. New tools are now available to facilitate and guide the design and evaluation of interventions to improve the quality of health care.

The use of manual reminders to promote effective care and the implementation of clinical guidelines seemed to be the most readily applicable strategies. A multifaceted strategy, integrating interactive workshops, distribution of simple printed materials and implementation of manual reminders, is also likely to be applicable on large-scale basis. This combined strategy could be potentially relevant to training birth attendants in essential obstetric and neonatal care and neonatal resuscitation and to developing and implementing clinical guidelines.

Training programmes on essential obstetric and neonatal care, management of obstetric emergencies and neonatal resuscitation, organised as interactive workshops, using dummies, simulation models and exercises, are potentially important in reducing maternal and infant mortality and morbidity. Although these programmes are currently being disseminated in developing countries, there are no rigorous evaluations of their effectiveness and costs, even in developed countries. These programmes should be a priority for research in developing countries.

Policy-makers in developing countries face a difficult challenge if they are hoping to improve MCH through governance interventions. Ideally, interventions should be selected on the basis of results of well-conducted research and summaries of systematic reviews. Given the paucity of information directly relevant to LMIC, and in particular to the poorest rural areas, such programmes should be implemented in the context of a strict programme evaluation or, even better, a research study. There is an urgent need for more good-quality research in these settings.

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Conflict of interest

The authors declare no conflict of interest in this work.

References


**Supplementary material**

The following supplementary material is available as part of the online article from http://www.blackwell-synergy.com

**Appendix S1.** Summary of findings for each strategy, by each included systematic review.