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Supporting the delivery of cost-effective interventions in primary health care systems: findings relevant to low- and middle-income countries from a global overview of the evidence

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Summary

Background
Strengthening health systems is a key challenge to improving the delivery of cost-effective interventions in primary health care (PHC) and achieving the vision of the Alma-Ata Declaration. Effective governance, financial and delivery arrangements within health systems and effective implementation strategies are needed urgently in low- and middle-income countries (LMICs). This overview summarises the evidence from systematic reviews of the effects of health system arrangements and implementation strategies, with a particular focus on evidence relevant to PHC in LMICs.

Methods
We searched the Cochrane Effective Practice and Organisation of Care (EPOC) Review Group register of systematic reviews and a database of systematic reviews of the effects of governance, financial and delivery arrangements. We included reviews that had a methods section with explicit selection criteria, that appeared relevant to PHC in LMICs, and that assessed the effects of governance, financial or delivery arrangements, or implementation strategies. Two reviewers independently screened abstracts to identify eligible reviews. Twenty high-priority reviews were chosen by consensus. These reviews were summarized and indicators of relevance to PHC and LMICs extracted, the strength of evidence graded, and applicability and equity considerations identified.

Findings
Some reviews included few LMIC studies and the quality of evidence for many outcomes was very low. Key messages from the included reviews regarding the effects of health systems arrangements for PHC are: 1) Financial incentives can be used to influence provider and patient behaviours, but can also have undesirable effects. 2) User fees reduce the use of both essential and non-essential health services. However, removing user fees needs to be implemented with care as it can have undesirable consequences. Alternative health financing strategies have not been evaluated adequately. 3) Task shifting from doctors to nurses and from health professionals to lay providers offers opportunities for expanding coverage and addressing human resource shortfalls. 4) While multiple vertical programmes can lead to service duplication, fragmentation and inefficiency, the impacts of strategies to integrate PHC services have not been evaluated adequately. 5) Quality improvement strategies, including those tailored to address identified barriers, can have important, although modest, impacts on PHC quality.

Interpretation
Although evidence is sparse, there are a number of promising health systems arrangements and implementation strategies for strengthening PHC in LMICs. However, it is essential that implementation of these strategies be accompanied by rigorous evaluations. The evidence base needs urgently to be strengthened, synthesized, and taken into account in policy and practice, particularly for the benefit of those who have so far been excluded from the health care advances of recent decades.

Introduction

In 1978 representatives from 134 countries gathered in Alma-Ata and declared that primary health care (PHC), "based on practical, scientifically sound and socially acceptable methods and technology made universally accessible through people's full participation", was key to delivering health for all by the year 2000. Recent years have seen a renewed interest in PHC, particularly in low- and middle-income countries (LMICs). There is a range of reasons for this, including profound inequities in health; inadequate progress towards the Millennium Development Goals, especially in Sub Saharan Africa; major shortfalls in the human resources required to improve delivery of cost-effective interventions; and the fragmented and weakened state of health systems in many countries.

More generally there have been calls to re-balance the mix between the now dominant vertical, disease-focused programmes and the horizontal, systems-focused perspective that underpins most PHC approaches. The GAVI Alliance Board, for example, has committed US $800 million over a five-year period 'to help countries overcome health system weaknesses that impede sustainable increases in immunisation coverage' (http://www.gavialliance.org/vision/policies/hss/index.php) and the Global Fund to Fight AIDS, Tuberculosis and Malaria is also calling for integrated responses (http://www.theglobalfund.org/documents/rounds/8/R8HSS_Factsheet_en.pdf)

Strengthening health systems to improve the delivery of cost-effective interventions in PHC is complicted by different understandings of what constitutes PHC. This is influenced, in part, by financial and human resources and the underlying political/ideological perspective. The broader PHC approach is seen as encompassing equitable distribution, community participation, an emphasis on prevention, the use of appropriate technology and a multi-sectoral orientation. In contrast, narrower views of PHC, often from high income settings, emphasize the first contact of the patient with the health care system and focus specifically on the roles of health professionals. These different approaches are discussed elsewhere.

There is also a range of understandings of what constitutes health systems. The World Health Organization's 'building blocks of health systems' include leadership and governance, financing, service delivery, health workforce, medical products and technologies, and information and evidence. A taxonomy of health system arrangements

provides additional categorization, distinguishing between governance arrangements (which includes political, economic and administrative authority in the management of health systems), financial arrangements (which includes funding and incentive systems, not just financing), delivery arrangements (which includes human resources for health, not just service delivery), and interventions (programmes, services, and technologies). Most descriptions of health system elements omit mention of the implementation strategies to support the use of cost-effective interventions.

In this overview we summarise the evidence from systematic reviews on the effects of governance, financial and delivery arrangements and implementation strategies that have the potential to improve the delivery of cost-effective interventions in PHC in LMICs. We do not address specific clinical or public health interventions but rather the health system arrangements and implementation strategies that support their delivery in PHC. We indicate in the findings how the available evidence relates to both the aspirations of the Alma-Ata Declaration and a taxonomy of health system arrangements.(Box 1) We have also reviewed indicators of relevance to PHC and LMICs, graded the strength of evidence, and identified applicability and equity considerations.

Methods

We searched two electronic databases of systematic reviews: the Cochrane Effective Practice and Organisation of Care (EPOC) register of systematic reviews and the Program in Policy Decision-Making / Canadian Cochrane Network and Centre (PPD/CCNC) database of systematic reviews of the effects of governance, financial and delivery arrangements. The EPOC register of systematic reviews included 1020 records as of 12 February 2008. These were identified through electronic searches of MEDLINE (up to August 2007) and the Cochrane Database of Systematic Reviews (CDSR), the Database of Abstracts of Reviews of Effectiveness (DARE) and EMBASE (all up to October 2006). The PPD/CCNC database was derived from the searches used to create the EPOC register and hand searching of CDSR (Issue 3, 2007). All reviews contained in the PPD/CCNC database have been coded according to the aforementioned taxonomy (Box 1). The EPOC register MEDLINE search was updated in March 2008 and screened for additional relevant reviews. The full MEDLINE search strategy is available online (Appendix 1). Search strategies for the other databases are available on request.

We included reviews that had a methods section with explicit selection criteria, that were potentially relevant to PHC in LMIC, and that assessed the effects of governance, financial or delivery arrangements, or implementation strategies. Given the range of viewpoints on what constitutes PHC, we took an inclusive approach ranging from research focused on primary medical care to research focused on PHC as envisaged in the Alma Ata declaration. The searches did not employ a language restriction.

Two authors independently screened the abstracts included in the PPD/CCNC database to identify reviews that appeared to be relevant to PHC and LMICs (highly relevant; fairly relevant; not relevant). This relevance was assessed by searching for links to LMICs and PHC through the focus of the review (LMIC country / region or PHC mentioned in the abstract or title; review question focused explicitly on LMICs or PHC; studies included in the review focused on LMICs or PHC). A second pair of authors screened the EPOC register for reviews of implementation strategies to support the delivery of cost-effective interventions (or more generally to improve the quality of care), building on a recently published overview of systematic reviews of this topic. A third pair then examined independently the full text reports of both sets of reviews and selected those of highest priority for PHC in LMICs. The final selection of high priority reviews for inclusion was based on a consensus of the authors regarding reviews of highest relevance for PHC in LMIC.

We summarised each included review using an approach developed by the SUPPORT Collaboration (http://www.support-collaboration.org/index.htm). Using standardised forms, we extracted data on the background of the review; the interventions, participants, settings and outcomes; the key findings; and considerations of applicability (Box 2), equity, cost-effectiveness and monitoring and evaluation. The quality of the evidence for the main comparisons was assessed using the GRADE approach (Box 3). Each completed summary was peer-reviewed. This process formed part of a larger project to summarise and make widely available the findings of reviews relevant to health systems in LMICs.

Finally, drawing on the taxonomy mentioned above, we developed a matrix relating questions about governance, financial and delivery arrangements and implementation strategies (Box 1) to the aspirations of the Alma-Ata Declaration. We used this matrix to summarise the available evidence from the included systematic reviews, important uncertainties, and important questions for which we could not identify a systematic review.

Role of the funding sources: the funding sources for the individuals involved in this review had no involvement in the writing of this paper.

Results

Over 20,000 references were screened to develop the two databases of reviews that were screened.195 of over 1000 reviews in the two databases were considered potentially relevant based on screening the abstracts. Twenty reviews were selected for summarising, based on our assessment of their relevance to PHC in LMICs and the feasibility of reviewing them within resource and time constraints (Figure 1), as described above. The 20 selected systematic reviews include a total of 733 randomized controlled trials (RCTs), interrupted time-series (ITS) studies, and controlled before/after (CBA) evaluations, although some studies were included in more than one review. Structured summaries of the included reviews are available at www.support-collaboration.org. A list of other relevant reviews that were not included is available at www.support-collaboration.org.

Tables 1 and 2 show the included reviews grouped according to whether the interventions reviewed assess primarily the effects of governance, financial or delivery arrangements for PHC systems or the effects of implementation strategies. Some reviews cut across more than one of these broad categories. Most reviews (n=13) addressed delivery and financial arrangements. Some of the reviews were overlapping in that they considered similar interventions, such as educational meetings, for different health issues. We have tried to highlight where this is the case and to note any differences in findings between these reviews.

Approximately 114 studies (16%) were undertaken in LMICs. However, six reviews included no studies from LMICs. Approximately 417 studies (57%) were conducted in primary care or involved a mix of primary and other health care settings. However, most of these studies were of primary medical care rather than PHC as envisaged in the Alma-Ata Declaration. Reviews including non-primary care settings focused mainly on quality improvement studies across primary and other health care settings. The reviews also included a range of health care providers (primary care physicians/general medical practitioners, nurses, pharmacists and lay health workers); patients/consumers; and outcomes. We interpreted the findings of the reviews bearing in mind the selection criteria they used and the contexts of the included studies. For most of the reviews there was uncertainty about the applicability of the findings (and the directness of the evidence) because of the low proportion of LMIC studies. Tables

1 and 3 provide more detailed descriptions of the included reviews and their findings.

Table 2 illustrates the extent to which the interventions assessed in the included reviews address the goals and aspirations of the Alma-Ata Declaration. The included reviews are 'based on the application of the relevant results of social, biomedical and health services research' and most address the provision of quality care and ways to improve coverage and access. Several of the interventions attempt directly or indirectly to reduce inequalities in access to care , but most of the included reviews provided little data on equity or cost-effectiveness. We did not identify any systematic reviews of interventions to explicitly improve intersectoral action or community participation in PHC in LMICs. Only one review focused on interventions to improve the referral system in PHC. We have listed in Box 3 important topics for which reviews were not identified.

Governance arrangements

One of the prioritised reviews focused in part on the effects of governance strategies. This review addressed strategies for working with the private for-profit sector – including franchising, regulation and accreditation – to improve the utilization of quality health services by the poor. There was some evidence that regulation may improve the quality of pharmacy services. The review also showed that the accreditation of pharmacy outlets may have weak positive effects on the use of unregistered drugs, compared to non-accredited facilities. Franchising interventions had mixed effects on quality of care, health care behaviours and client satisfaction. Although few studies included detailed socio-economic data on participants, the authors concluded that many of these interventions were likely to be effective in poor communities.

We did not find any systematic reviews that addressed other questions regarding governance arrangements for PHC, including decentralization of decision-making, the regulation of training or the control of corruption.

Financial arrangements

Six included reviews addressed financial arrangements for health systems, focusing primarily on the financing of health services and paying for performance. Two of these reviews addressed the impacts of user fees. The first review addressed the impacts of cap and co-payment policies on drug use, health service use, health outcomes and costs. This review found that these polices can reduce drug use and

expenditures. However, reductions in drug use were found for both life-sustaining drugs and drugs that are important in treating chronic conditions, as well as for other drugs. Although insufficient data on health outcomes were available, large decreases in the use of essential drugs are likely to have negative effects and could lead to increased use of healthcare services and, therefore, of overall spending. Policies in which people pay directly for their drugs are less likely to cause harm if only non-essential drugs are included in these policies or if there are exemptions to ensure that people receive essential health care.

Another systematic review examined the impacts on access to health services in LMICs of introducing, removing or changing user fees. Seventeen studies were included, mostly conducted in primary care, and these suggest that, in most cases, increasing or introducing user fees reduced health service utilization significantly and that removing user fees increased service utilization immediately. The authors concluded that user fees decrease demand for health care, although the evidence is of low quality. The removal of user fees may, however, result in increased demands for unnecessary services; create demands that cannot be met; and further demoralise public sector providers, who may rely on these fees to supplement very meager salaries or to provide additional funds for local health facilities.

Transferring funds directly to households, particularly to women, conditional on these being spent on health-seeking behaviour, has been used as a means of providing positive financial incentives, as well as removing financial disincentives, to accessing care. A review of such conditional cash transfer programmes in LMICs found, based on six programmes from PHC settings, that these interventions are effective in increasing the use of preventive services but have mixed effects on objectively measured health outcomes. Well designed schemes tend to have positive effects but some studies showed that perverse incentives could sometimes have adverse consequences such as, for example, when mothers appeared to keep one of their children malnourished in order not to lose entitlement for the conditional cash transfer. Overall, the evidence on conditional cash transfers was of low to moderate quality and was largely restricted to Latin American countries with relatively well functioning health and social security systems.

A review of the effects of explicit financial incentives to improve health care quality found seventeen studies. Five of six studies found partial or positive effects of incentives directed at individual physicians. Seven of nine studies of incentives directed at provider groups found partial or positive effects of incentives on quality

measures. Most of the effect sizes were small. Two studies evaluating financial incentives at the payment system level had mixed results. Unintended effects of paying for performance included adverse selection of patients and other ways of gaming the system. None of these studies were conducted in LMICs, but most were in primary care.

A review of prospective payments for health care, or 'risk protection mechanisms' identified only one study from LMICs. This indicated that community-based health insurance (CBHI), compared with no insurance, may increase the utilization of primary and secondary health care for prenatal consulations and vaccination but may reduce per capita curative consultations. However, because the quality of the evidence was low, it is difficult to draw firm conclusions from these findings. Many studies of CBHI are of very small schemes and provide little evidence regarding scaling up. No impact evaluations of social health insurance schemes were identified that met the inclusion criteria for the review.

One review found vouchers, compared with usual practice, to be effective in increasing the uptake of goods and services, such as insecticide treated nets, particularly among the poorest.

Delivery arrangements

Ten reviews addressed approaches to improving delivery arrangements for health systems.

Task shifting – "a process whereby specific tasks are moved, where appropriate, to health workers with shorter training and fewer qualifications" – was the underlying concern for three reviews. Traditional birth attendants (TBAs) – people who assist mothers during childbirth and who initially acquired their skills through delivering babies or through an apprenticeship to a TBA – are one approach to extending first level care for pregnant women and neonates. A review of four studies from LMICs, comparing TBAs that received training with those that did not, found evidence of moderate to low quality that TBA training may reduce perinatal and neonatal deaths and stillbirths. The impact on maternal mortality was unclear and there was mixed evidence on the effects on maternal morbidity; advice-giving regarding infant feeding; and appropriate referral of complications.

A related systematic review examined 48 RCTs on the effects of community or lay health worker (LHW) interventions – programmes

utilizing health workers who are trained in the context of the intervention but have no formal professional, certificated or degreed tertiary education – in PHC. LHWs show promising benefits, compared to usual care, in increasing the uptake of childhood immunization; promoting breastfeeding; reducing childhood mortality; reducing morbidity from common childhood illnesses; and improving TB treatment outcomes. As approximately one-third of the included studies were conducted in LMICs, and the findings were consistent across studies, the measured effects may be transferable across settings.

A review of 17 RCTs of substituting doctors working in primary care by nurse practitioners found low to moderate quality evidence that patient outcomes and care processes were similar for nurses and doctors and that patients were more satisfied with care from nurses than from doctors. Nurse practitioners also provided longer consultations, carried out more investigations, and were more likely to admit patients to hospital than doctors. No significant differences in costs were found, possibly due to nurses' increased use of resources or their lower productivity. There was also little evidence on whether shifting tasks from doctors to nurses reduced doctors' workload, although this seems unlikely in many LMIC settings where demand for doctors' time greatly exceeds supply. None of the included studies were conducted in LMICs, and differences in the training of nurses and doctors, as well as differences in working conditions, patient populations and the organisation of primary care, may limit the applicability of the findings to such settings. A recent systematic overview of this literature drew similar conclusions.

Two reviews focused on the primary-secondary care interface – a key component of the primary health care system. The first review included seventeen studies of the effects of a wide range of interventions to change outpatient referral rates or appropriateness. The passive dissemination of guidelines and organisational interventions appear unlikely to improve referral practices but several other approaches were promising, including the use of 'in-house'(i.e. from another health worker in the same facility) second opinion and the involvement of secondary care providers in guideline dissemination. The quality of the evidence, however, was mostly low or very low and only one study was undertaken in a LMIC. The second review explored the effectiveness of specialist outreach clinics – planned and regular visits by specialist practitioners to primary care settings. Such clinics had promising effects on access to care, quality of care, health outcomes, patient satisfaction and the use of hospital services, although the quality of the evidence was poor. While none of the evaluations were conducted in LMICs, the review identified a

number of descriptive studies from such settings, demonstrating that specialist outreach can be implemented where resources are available to provide these services. Taken together, the two reviews suggested a number of potential strategies for better integrating appropriate care provision across the primary-secondary interface.

One review examined strategies to improve immunization delivery. Based on 43 studies of the effectiveness of patient or parent reminder and recall systems, such as letter and telephone calls, the review found moderate quality evidence that these can increase immunizations. These interventions were evaluated in HICs and could only be applied in LMICs able to establish immunization tracking systems. One of the other reviews looking at delivery arrangements found that LHWs appear to be a promising strategy for promoting immunization. The use of text messaging reminders may also have promise, as mobile phone use increases in LMICs.

Service integration is often seen as a key element of PHC. One review examined the effects of strategies to integrate PHC services in LMICs. The review found limited evidence from four studies of the effects of strategies for integrating PHC services at the point of delivery, from comparisons between integrated and vertical approaches to delivering services. The 'Integrated Management of Childhood Illness' (http://www.who.int/imci-mce/) appears to have promising impacts on care delivery, but co-interventions, including the provision of drugs, may have confounded these results.

One review, focusing on strategies for working with the private for-profit sector, considered the use of social marketing and drug pre-packaging. The included studies showed significant increases in utilization of programme commodities and services, although effect sizes varied. Two of the studies combined social marketing with pre-packaged drugs.

A review of studies of contracting out primary and secondary health care services in LMICs found some evidence that contracting non-governmental organisations to deliver care may increase access to and utilization of health services; improve patient outcomes; and reduce household health expenditures. These findings are compatible with those from a review by Patouillard et al. which showed mixed effects of contracting out on the quality of hospital and primary care services for specific conditions, drawing on a different set of studies. However, for both reviews the low quality of the evidence makes difficult the attribution of these effects to the interventions because they were confounded, for example, by increased expenditure on health care in the contracted out group.

The final review explored the effects of interventions to increase the proportion of health professionals practicing in underserved communities. It found no rigorous evidence to support strategies to improve health professional distribution. Some evidence of very low quality suggests that professionals from a rural background are more likely to practice in rural areas and that clinical rotations in such settings may influence medical students' decisions to work in underserved areas. Incentive and support programmes may also increase physician retention rates.

Implementation strategies

Five included reviews assessed exclusively strategies to change professional behaviours or performance to improve the implementation of care. These strategies included guideline dissemination, audit and feedback, educational outreach visits and educational meetings. Drawing largely on studies from high income settings, the reviews suggested that these interventions may result in small to moderate improvements in professional performance and health outcomes, compared to no intervention. A substantial number of these studies were conducted in primary care settings and the findings may be generalisable to such settings in LMICs, as supported by several recently published trials from LMICs. Key findings from the five reviews are summarized in Box 4. A sixth review that addressed strategies for working with the private for-profit sector found that a range of training interventions improved the quality of treatment for a variety of different conditions.

Discussion

This overview of systematic reviews addresses health system arrangements and implementation strategies to support the delivery of cost-effective interventions in PHC in LMICs. Most of the included reviews were of high quality, with only minor deficiencies although the primary research that was reviewed was often of low to moderate quality. This overview has a number of limitations which result partly from the relative dearth of evidence from LMICs and partly from the need to focus on the most relevant reviews, so as to make the overview process manageable. We considered only systematic reviews and may therefore have excluded non-systematic reviews with useful information as well as studies not included in a systematic review. We also excluded disease specific reviews although many of the studies in them are included in the reviews summarized here. This is particularly true for reviews of implementation strategies. Our

judgement of each review's relevance to PHC in LMICs, and hence whether it was included, was based on consensus among the authors and was sometimes difficult to make. We did, however, seek comments on these judgements from people working in a variety of LMICs. Both the relevance of the reviews and the applicability of the findings can vary across settings. Similarly, a number of systematic reviews not included in this overview might be considered relevant to PHC in at least some LMIC settings (see web Table of excluded reviews). Other systematic reviews are considered in accompanying papers.

Our assessments of applicability and equity considerations are based on the data presented in the reviews; the judgement and experience of the overview team; and comments from colleagues across a range of LMICs on the summaries upon which this overview is based. Few of the included reviews provided any data on the differential effects of the interventions for disadvantaged populations (Table 3). Most likely this is because the studies included in these reviews did not report this. Assessments of applicability were particularly difficult for reviews that included few studies from LMIC settings, as noted elsewhere . Others may have made different assessments based on the same data. Nonetheless, there is a great deal of variation within and across LMICs and judgements must always be made about the applicability of the overview findings, or any research, in the specific settings in which decisions are taken. Similarly, context is important in interpreting the evidence. For example, the background and training of LHWs and the tasks undertaken by them varies significantly across contexts.

Thus, while this overview is valuable in providing a broad summary of relevant information for decision-makers, it clearly cannot provide a sufficient basis by itself for making informed decisions about PHC systems in a specific setting.

We did not identify systematic reviews that included studies in LMICs for two key aspirations of the Alma-Ata Declaration: intersectoral action and participation in health care. Although several reviews have been undertaken in the latter area, they either included studies from HICs only or were not systematic reviews. Two included reviews address this issue indirectly and a further article discusses how and why community mobilisation is central to effective PHC.

We also identified few reviews relevant to the aspiration of appropriate health care, including referral systems, or focusing on health systems governance arrangements. The last issue relates closely to the Alma-Ata aspiration of participation in health care in its focus on the involvement of different actors - including citizens, health

care consumers and health care providers - in decision-making for health care delivery, and is receiving increasing attention internationally. The lack of systematic reviews on these topics does not mean that they are not important or that there is no evidence, but it does suggest there is a need to systematically review what evidence there is to inform decisions and future research.

Evidence regarding costs and cost-effectiveness was often not available in the included reviews for the health system arrangements and implementation strategies considered here. For example, while strong evidence is available on the effectiveness of lay health worker programmes for certain health issues in LMICs, most of the studies included in that review did not report data on costs or cost-effectiveness , particularly in comparison to similar interventions delivered by health professionals. Such data may have to be obtained from other types of studies.

The relatively small proportion of effectiveness studies undertaken in LMICs may suggest that much research funding has been dissipated on poor quality research that does not meet the quality criteria for entry into systematic reviews or that little research in this area has been funded. Funders, including the GAVI Alliance, the Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Bank and others, need to ensure that new programmes are evaluated rigorously so that the knowledge base on the effects of health systems arrangements for PHC can be strengthened. Funders also need to explore mechanisms for better co-ordination of their research and implementation activities.

This overview has a number of important findings: firstly, there is evidence that user fees reduce the use of necessary, as well as non-essential, health services and drugs, thereby further disadvantaging the poor. However, removal of user fees needs to be accompanied by policies to remunerate health workers adequately, as well as alternative means of financing health care. Other financial mechanisms to improve access to health care need to be evaluated, including community-based health insurance (CBHI) and social health insurance schemes. Evidence of the effects of CBHI, particularly on the poor, remains weak. While there are a few case reports of promising attempts to scale up CBHI, such as in Rwanda, subsidies will be needed to achieve coverage for the poorest because even the $1 per annum payment is beyond their reach. In general, the removal of financial barriers to essential medicines and services should be considered. Some form of risk sharing is needed, although how best to do this will differ across contexts. A systematic approach is needed to the design, monitoring and evaluation of alternative models. This

should include, for example, description of how revenue is collected (e.g. through general taxes, health insurance, donor funding), the type of organization that collects revenues (e.g. public, private not for profit, private for profit), who and what is covered, how funds are allocated, from whom services are purchased, and how service providers are paid.

Secondly, there is some evidence of effective strategies for improving quality of care in the private for-profit sector. Given the importance of this sector in many LMICs, these approaches may be worth pursuing. However, other reviews have shown that care provided in for-profit hospitals or for-profit dialysis clinics generally results in worse outcomes and, in the case of care provided in for-profit hospitals, is generally more expensive. Although this evidence is largely from hospitals in the USA, the findings were remarkably consistent across several decades and the same underlying mechanisms could apply in LMICs. Furthermore, evidence of the effects of strategies for working with both the not-for-profit and the for-profit private sector remains limited, and there are important questions regarding the weight to be given to investing in strengthening the private sector versus strengthening the public sector. Whatever choices are made, governments need to develop capacity to ensure effective, efficient and equitable health care delivery, since this stewardship role cannot be left to the market alone.

Thirdly, there is promising, although limited, evidence on the effects of strategies to increase integration of PHC services. Delivering packages of interventions, for example to improve child health, may also contribute to service integration, but evidence here too appears to be limited. While integration may improve service delivery and outcomes, the impacts of strategies to achieve integration need to be evaluated. Although integration is intended to reduce differences in access and utilization of health services between geographical and socio-economic groups, this can only be expected to the extent that it is targeted at disadvantaged populations and is effective. It may have unintended and unwanted outcomes if it results in overloaded or deskilled health workers or reduces ability and capacity to deliver specific technical services compared to vertical programmes. Vertical programmes, while contrary to the PHC vision of Alma-Ata, may therefore have an important role where health systems are weak. However, only a limited number of these can be sustained and they can drain resources from the wider health system and lead to service duplication, inefficiency and fragmentation. ‘Diagonal’ approaches – which attempt to improve disease-specific outcomes through health systems strengthening – have been proposed as a mechanism for addressing health systems weaknesses. A framework to guide the

design and implementation of changes between vertical and integrated services may be useful.

Fourth, the review identified encouraging evidence for the effectiveness, for a wide range of services, of task-shifting from doctors to nurse practitioners and from health professionals to a wide range of lay providers who have had only short periods of formal training. Another review of the effects of community-based interventions, including TBAs, on perinatal, neonatal and maternal outcomes also had positive findings, suggesting that these interventions may reduce neonatal and perinatal mortality but showing a non-significant reduction in stillbirths. Community-based interventions also had a significant impact on maternal morbidity but only a marginally significant impact on maternal mortality. These findings regarding task shifting are particularly important given the lack of robust evidence on interventions to improve the distribution and retention of health professionals, and also follow the principle that care should be delivered at the lowest effective level of care. The scaling up of LHW programmes should therefore receive greater attention. Alongside this, effective and supportive supervision of PHC is also key to improving service delivery. While we did not include any reviews on this topic, a recently published review, drawing on limited evidence, suggests that it may be a promising approach.

Fifth, the review indicates that implementation strategies can have important, although modest, impacts. For some such interventions, such as audit and feedback, both relative and absolute effects are likely to be larger where baseline compliance to recommended practice is low. Although few studies of quality improvement interventions were undertaken in LMICs, many of the evaluated strategies are feasible in LMIC settings and similar effects could be expected. However, nearly all of the evaluations were one-off studies initiated by researchers and there is a paucity of evaluations of quality improvement systems. For example, the effects of outreach visits on prescribing are well documented and this strategy has also been tested in LMICs. However, while some national authorities are now investing in systems for publicly funded outreach visits, evaluations of the cost-effectiveness of such systems have not been reported. Systems for quality improvement as an integral part of PHC therefore need to be developed and evaluated. The effects of specific interventions also need to be examined. Overall, it is likely that a range and mix of implementation strategies, selected based on a diagnosis of the underlying problems, will be needed to ensure quality of PHC.

We have focused here on systematic reviews of the effects of strategies for strengthening PHC systems. Other types of systematic reviews, single studies and other types of information are necessary to inform decisions about how best to achieve the aspirations of the Alma-Ata Declaration and the MDGs. In addition to information on effects, policymakers need information about costs, values, local needs and the availability of resources. Process evaluations and evidence of mechanisms are needed to understand why strategies succeed or fail and how their effects vary under different conditions. Nonetheless, systematic reviews of effects are a critically important and neglected input to policymaking processes. The evidence summarised here can help policymakers make better use of scarce resources and avoid unintentionally impairing the efficient and equitable delivery of effective PHC.

A wide range of proactive efforts is needed to support policymakers' use of the evidence from reviews. Promoting databases of optimally packaged reviews is an example of a strategy to address one of the factors – timeliness – that emerged from a systematic review of the factors that increased the prospects for research use in policymaking. Convening national policy dialogues is an example of a strategy that can address a second factor, namely interactions between research and policymakers. Integrated national initiatives, such as the WHO-sponsored Evidence-Informed Policy Networks, also hold promise.

Conclusion

Progress in achieving universal access to PHC since Alma Ata has faltered in many countries. Action needs to be taken urgently to improve PHC systems in order to achieve the MDGs and the aspirations of the Alma-Ata declaration. There are a number of promising health systems strategies to improve the delivery and performance of PHC in LMIC settings. These need to be tailored to local circumstances and health systems and accompanied by rigorous evaluation until the evidence base is stronger. However, the overriding message of this overview is that actions need to be accompanied by rigorous evaluations of the strategies that are used (see Box 2). The alternative is to remain as uncertain thirty years from now as we are currently about the impacts of governance, financial, delivery and implementation strategies on PHC.

Contributors
AH, AO, JL and SL conceived and wrote the paper. AH, AO, JL, NS and SL screened studies for inclusion in the review. AO, BG, CM, CA, FS, SGM, TP, GR, ST, CSW and SL assessed and summarized the included reviews. All authors commented on drafts of the paper. SL will act as the guarantor.

Conflict of interest statements
There are no conflicts of interest.

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References

Box 1: Taxonomy of governance, financial and delivery arrangements within health systems for PHC (adapted from) *

Governance arrangements	**Financial arrangements**	**Delivery arrangements**
What are the effects of changes in or interventions to improve:	*What are the effects of changes in or interventions to improve:*	*What are the effects of changes in or interventions to improve:*
Policy authority – e.g., Who makes policy decisions about what PHC encompasses (such as whether such decisions are centralized or decentralized)?	Financing – e.g., How revenue is raised for core PHC programmes and services (such as through community-based insurance schemes).	To whom care is provided and the efforts are made to reach them (such as interventions to ensure culturally appropriate PHC).
Organizational authority – e.g., Who owns and manages PHC clinics (such as whether private for-profit clinics exist).	Funding – e.g., How PHC clinics are paid for the programmes and services they provide (such as through global budgets).	By whom care is provided (such as PHC providers working autonomously versus as part of multidisciplinary teams).
Commercial authority – e.g., Who can sell and dispense antibiotics in PHC and how they are regulated.	Remuneration – e.g., How PHC providers are remunerated (such as via capitation).	Where care is provided – e.g., Whether PHC is delivered in the home or community health facilities
Professional authority – e.g., Who is licensed to deliver PHC services; how is their scope of practice determined; and how they are accredited.	Financial incentives – e.g., Whether PHC patients are paid to adhere to care plans.	With what information and communication technology is care provided – e.g., Whether PHC record systems are conducive to providing continuity of care.
Consumer and stakeholder involvement	Resource allocation – e.g., Whether drug	How the quality and safety of care is

– Who from outside government is invited to participate in PHC policymaking processes and how are their views taken into consideration.	formularies are used to decide which medications PHC patients receive for free.	monitored – e.g., Whether PHC-focused quality-monitoring systems are in place.

*This is an abbreviated summary of this taxonomy with examples of questions about the effects of key interventions or changes within each domain.

Box 2: Assessing the applicability to LMICs of the findings of incuded reviews

The following criteria were used to assess the applicability of the findings of included reviews to LMICs:

- Are there important differences in the structural elements of health systems (i.e., governance, financial and delivery arrangements) between where the research was done and where it could be applied in LMICs that might mean an intervention could not work in the same way?
- Are there important differences in on-the-ground realities and constraints (i.e., governance, financial and delivery arrangements) between where the research was done and where it could be applied in LMICs that might substantially alter the potential benefits of the intervention? And can these challenges be addressed in the short-term to medium-term?
- Are there likely to be important differences in the baseline conditions between where the research was done and where it could be applied in LMICs? If so, this would mean that an intervention would have different absolute effects, even if the relative effectiveness was the same.
- Are there important differences in the perspectives and influences of health system stakeholders (i.e., political challenges) between where the research was done and where it could be applied in LMICs that might mean an intervention will not be accepted or taken up in the same way? And can these challenges be addressed in the short-term to medium-term?

Box 3: Assessing the quality of evidence reported in the included reviews

The GRADE approach defines “quality of evidence” as the extent to which we can be confident that the estimates of effect are correct. These judgements are made for each important outcome based on the type of study design (randomised trials versus observational studies), study limitations (the risk of bias), the consistency of the results across studies, the precision of the overall estimate across studies, the likelihood of publication bias, and the directness of the evidence. We lowered our assessment of the quality of the evidence when there was important uncertainty regarding the directness (applicability) of the evidence (from HICs) to LMICs. For each outcome, the quality of the evidence is rated as high, moderate, low or very low using the following definitions:

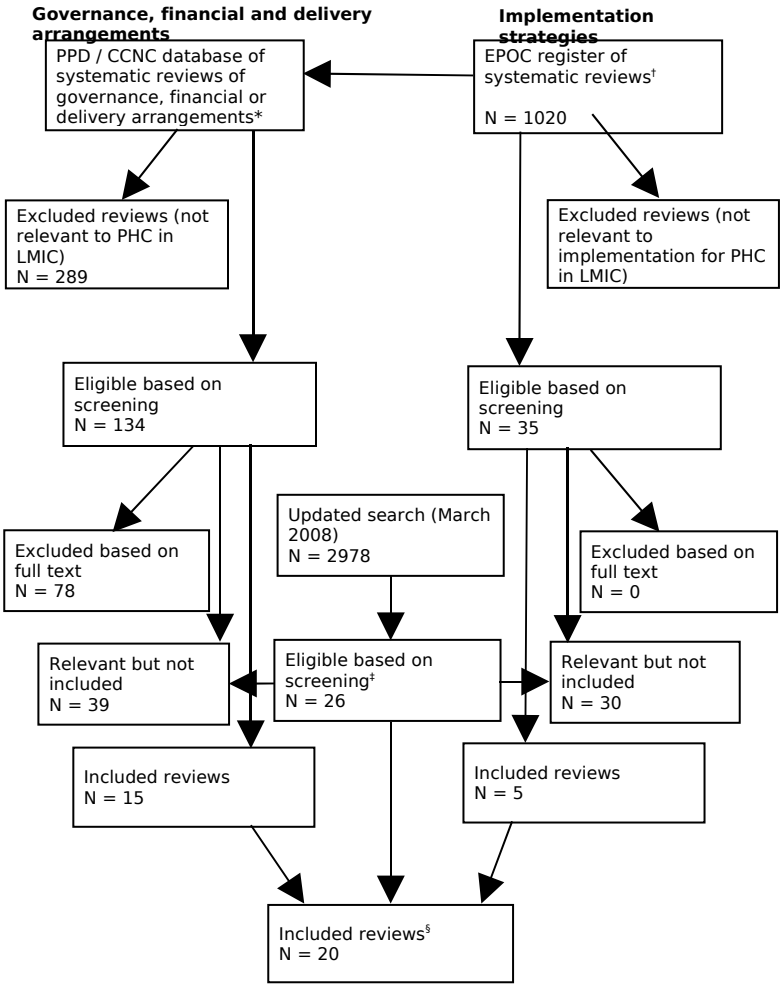
⊕⊕⊕⊕ **High:** Further research is very unlikely to change our confidence in the estimate of effect.

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

⊕⊕○○ **Low:** 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:** We are very uncertain about the estimate.

Figure 1. Flow diagram of review selection



*Reviews from the EPOC register and the Cochrane Database of Systematic Reviews were screened. The PPD/CCNC database (www.researchtopolicy.ca) included a total of 684 systematic reviews, however, not all of the reviews were reviews of effects.
†Over 20,000 references were screened, of which 1020 reviews were included in the EPOC register.
‡26 reviews from the updated search were relevant but not included (15 reviews of health system arrangements and 11 reviews of implementation strategies). In addition 2 health system reviews that had already been included were also identified by the updated search.
§We included reviews that we considered to be the most relevant to PHC in LMIC. Relevant but not
included reviews are listed at www.weblink2.

Table 1: Description of included reviews

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Patouillard 2007	To assess the effects of interventions working with the private for-profit sector to improve utilization of quality health services by the poor	Governance arrangements	52 studies: either a pre-post, controlled or pre-post with control design, with or without randomization	Populations that would potentially access health services (users and non-users) in LMICs	All LMICs	52 (Guinea, Botswana, Cameroon, South Africa, Kenya, Tanzania, Philippines, Nigeria, Uganda, Zambia, Nicaragnua, Nepal, Lao PDR, India, Pakistan, Mexico, Ghana, Perua, Vietnam, Thailand, Indonesia, Benin, Ethiopia, Madagascar, Lesotho)	All	Utilization or quality of care

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Austvoll-Dahlgren 2008	To assess the effects of policies regarding direct patient payments for drugs on drug use, healthcare utilisation, health outcomes and costs (expenditures)	Financial arrangements –Several sub-categories	21 studies: RCT (4 interventions); repeated measures (3), ITS (12), and CBA (14)	Healthcare consumers and providers within a regional, national or international jurisdiction or system of care, and organisations, such as multi-sited health maintenance organisations serving a large population.	Large jurisdictions or sytems of care	1 (Nepal)	1 (Nepal) based in PHC only. Others probably include PHC, but unclear	Objectively measured of at least one of the following outcomes: 1. Drug use 2. Healthcare utilisation 3. Health outcomes 4. Costs (drug expenditures and other healthcare and policy administration expenditures)

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Lagarde, forthcoming	To assess the effectiveness of a risk protection mechanisms in improving access to care in LMICs	Financial arrangements –Financing	1 CBA	Populations who would potentially access health services, it can be either well delineated (e.g. members of a health insurance, pregnant women targeted by a voucher scheme) or more broad	LMICs	1 (Rwanda)	Mix of primary and secondary care services	• Primary outcomes: changes in access to care or health care expenditure. • Secondary outcomes: equity and patient outcomes.

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Lagarde, forthcoming	To assess the effectiveness of introducing, removing or changing user fees in improving access to care in low and middle income countries, and, where possible, health outcomes	Financial arrangements – Financing	17 studies: 2 cRCTs, 6 CBAs, 9 ITS	Populations who would potentially access health services, either well delineated (e.g. members of a health insurance, pregnant women targeted by a voucher scheme) or more broad	Health systems in LMICs	Ecuador, Colombia, Cameroon, Niger, Sudan, Gabon, Uganda, South Africa, Lesotho and Kenya	Mostly primary care, but some mixed (Papua New Guinea; Lesotho; Gabon; Kenya)	Primary outcomes: changes in access to care or health care expenditure. Secondary outcomes: equity and patient outcomes.
Peterse n 2006	To assess the effects on measures of health care quality of explicit financial incentives for improved performance	Financial arrangements – Remuneration	17 studies: 9 RCTs, 4 CBAs, and 4 cross-sectional surveys	Studies were categorised according to the level of the financial incentive: individual physician, provider group, or health care payment system.	Any setting where explicit financial incentives have been used to improve quality of care	Unclear	At least 13 are in PHC	Quality of care domains: access to care, structure of care, process of care, outcomes of care, and patient experience of care

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Lagarde 2007	To assess the effectiveness of conditional monetary transfers in improving access to and use of health services, as well as improving health outcomes, in low- and middle-income countries	Financial arrangements – Financial incentives for patients	6 studies: 4 cRCTs, 1 quasi-randomised evaluation, 1 CBA	Disadvantaged households in low-income areas of selected Latin American countries, and individuals who underwent human immunodeficiency virus testing in rural areas	LMICs	6 (Mexico, Nicaragua, Colombia, Honduras and Brazil, Malawi)	6	Health care utilisation or access to health care, household health expenditure, or health or anthropometric outcomes

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Lagarde, forthcoming	To assess the effects of contracting out health care services in health services utilization, equity of access, health expenditure and patient outcomes in LMICs	Delivery arrangements – By whom care is provided	3 studies: 1 cRCT, 1 ITS, 1 CBA	Populations that would potentially access health services (users and non-users) in LMIC	Cambodia, Pakistan, Bolivia	3 (Cambodia, Pakistan, Bolivia)	Primary care only (Cambodia and Pakistan); mix of primary and secondary care (Bolivia)	Objective measures of health services utilisation, access to care and health care expenditure. Changes in equity of access and changes in health outcomes.
Laurant 2005	To assess whether nurse practitioners working in primary care can provide equivalent care to doctors	Delivery arrangements – By whom is care provided	17 RCTs in total across the two reviews	Unselected patients coming to either primary care facilities or emergency departments	Studies from Canada, the UK and the USA	None	17	Patient satisfaction, health status, process measures, quality of care, costs

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Lewin 2006	To assess the effects of lay health worker (LHW) interventions in improving maternal and child health in low and middle-income countries	Delivery arrangements – By whom is care provided	48 RCTs	• LHWs: any health worker without formal • certification who was trained in some way • in the context of the intervention. • No restriction on types of patients	All primary care and community health settings globally	16 (South America 3, Africa 6, Asia 7)	48	Primary outcomes: health behaviours and health care outcomes including harms. Secondary outcomes: utilization of LHW services, consultation processes, satisfaction with care, costs, social development measures

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Sibley 2007	To assess the effects of traditional birth attendant (TBA) training on TBA and maternal behaviours thought to mediate positive pregnancy outcomes, as well as on maternal, perinatal, and newborn mortality and morbidity	Delivery arrangements – By whom is care provided	4 studies: 1 cRCT, 2 RCTs, 1 CBA	TBAs: a person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or through an apprenticeship to other TBAs. Mothers and neonates cared for by trained and untrained TBAs	Rural communities	Bangladesh, Guatemala, Malawi, Pakistan	4	TBA or maternal behaviours thought to mediate positive pregnancy outcomes; maternal mortality; perinatal and neonatal mortality.

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Akbari 2005	To assess the effects of interventions to change outpatient referral rates or improve outpatient referral appropriateness	Delivery arrangements – Where care is provided	17 studies: 10 RCTs; 1 CCT; 5 CBAs; 1 ITS	Primary care physicians, defined broadly as any medically qualified physician who provides primary health care	Primary care	1 (Palestine)	17	Objectively measured provider performance in a health care setting (e.g. referral rates or appropriateness of referral) or health outcomes
Briggs 2006	To assess the effects of strategies to integrate primary healthcare services	Delivery arrangements – Where care is provided	Childhood illness (1 RCT, 1 CBA) and family planning (1 RCT, 1 CBA)	Primary healthcare facilities in low and middle-income countries	Primary healthcare facilities in low and middle-income countries	Bangladesh, Tanzania (2 studies), Togo, Nepal	5	Health care delivery (4 studies); health status (3 studies); acceptability (2 studies) intermediary outcomes (4 studies)

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Grobler, forthcoming	To assess the effectiveness of interventions aimed at increasing the proportion of health professionals working in rural and other underserved communities	Delivery arrangements – Where care is provided	None found	All qualified health care professionals	All primary care and community health settings globally	No eligible studies found	None	Proportion of health care professionals who initially choose to work in rural or urban underserved communities (recruitment), or continue to work in such communities (retention), as a consequence of being exposed to the intervention
Gruen 2004	To assess the effectiveness of specialist outreach clinics on access, quality, health outcomes, patient satisfaction, use of services and costs	Delivery arrangements – Where care is provided	9 studies: 5 RCTs, 2 CBAs and 2 ITSs	• Patients who are eligible for specialist care • Primary health care practitioners • Specialists	All primary care and rural hospital settings globally	None	9	Access, quality of care (guideline-consistent referral and treatment; adherence to treatment), health outcomes, patient and provider satisfaction, use of hospital and primary care services, costs.

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Jacobson Vann 2005	To assess the effectiveness of parent or patient reminder and recall systems in improving immunization rates and to compare the effects of various types of reminders in different settings or patient populations	Delivery arrangements – With what information and communication technology is care provided	43 studies: 40 RCTs and 3 CBAs	Healthcare personnel who deliver immunizations. Children (birth to 18 years) or adults (18 years and up) who receive immunizations	Diverse settings including rural, urban, private, public and university-based. Studies from the USA (32), Australia (2), Canada (5), Denmark (1), New Zealand (2) and UK (1)	None	Multiple settings including PHC	Primary outcomes: immunization rates and the proportion of the target population up-to-date on recommended immunizations. Secondary outcomes: costs.

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Forsetlund 2008	To assess the effects of educational meetings on professional practice and health care outcomes	Implementation strategies	81 trials (74 cluster RCTs, 7 randomised by providers).	Qualified health professionals or health professionals in post-graduate education	Any health care setting	11 (Indonesia (2), South-Africa (2); Mali, Thailand, Peru, Mexico, Zambia, Sri Lanka, Brazil (1 each).)	19	Objectively measured health professional perfornance or patient outcomes in a health care setting
Grimshaw 2004	To assess the effects of guideline dissemination strategies in improving professional practice	Implementation strategies	235 studies: 139 RCTs, 17 CCTs, 40 CBAs, and 39 ITS	Medically qualified healthcare professionals	Any health care setting e.g. primary care, inpatient, and mixed settings	2 (Mexico, Thailand)	Primary care = 39%; generalist outpatient settings in the USA = 19%; mixed settings = 15%	Objective measures of provider behaviour and/or patient outcome
Hulscher 2001	To assess the effects of interventions to improve the delivery of preventive services in primary care	Implementation strategies	55 studies: 37 RCTs, 18 non-RCTs	Mostly physicians. Also nurse practitioners	All primary care and community health settings	None	55	Any objective measure of professional performance or patient health outcomes

Review	Review objective	Principal focus	Studies reviewed	Participants	Settings	Number of included studies from LMIC settings	Number of included studies from PHC settings	Outcomes
Jamtvedt 2006	To assess the effects of audit and feedback on the practice of healthcare professionals and patient outcomes	Implementation strategies	118 RCTs	Mostly physicians. Also dentists (1 study); nurses (3); pharmacists (2); mixed providers (14)	Any healthcare setting	4 (Thailand [2], Uganda, Laos)	Unclear	Objectively measured provider performance or healthcare outcomes
O'Brien 2007	To assess the effects of educational outreach visits on health professional practice or patient outcomes	Implementation strategies	69 RCTs	Healthcare professionals responsible for patient care. PCPs or teams practising in community settings (53 studies), physicians in hospital settings (6), nurses and nursing assistants (4), pharmacists/owners and counter attendants (2), dentists (1).	Mostly primary and community healthcare settings	3: Indonesia (2); Thailand (1)	53	Objectively measured professional performance in a healthcare setting or healthcare outcomes

Table 2: How the included reviews address the goals and aspiration of Alma-Ata

Focus of health system interventions	*Alma-Ata goals and aspirations*						
	Intersectoral action	**Equity / reduce inequalities**	**Participation in health by consumers**	**Quality care**	**Effective care**	**Coverage / access**	**Appropriate health care, including referral systems**
Governance arrangements				Working with for-profit providers			
Financial arrangements		Community-based insurance		User fees; Pay-for-performance; Working with for-profit providers	Contracting out of health services*; Working with for-profit providers	User payments for drugs; Community-based insurance; Contracting out of health services; Conditional cash transfers to households	
Delivery arrangements		Distribution of health workers; Specialist outreach clinics; Lay health workers; Training of traditional	Lay health workers; Training of traditional birth attendants		Contracting out of health services; Integrating PHC services; Reminders and recall for immunization; Working with for-profit	Contracting out of health services; Integrating PHC services; Distribution of health workers; Specialist outreach clinics; Substitution of doctors by nurses;	Outpatient referrals

		birth attendants			providers	Lay health workers; Training of traditional birth attendants	
Implementation				Guideline dissemination; Audit and feedback; Educational meetings for providers; Educational outreach visits to providers; Working with for-profit providers	Guideline dissemination; Audit and feedback; Educational meetings for providers; Educational outreach visits to providers; Delivery of preventive services in PHC; Working with for-profit providers		

* This review could be classified under either delivery or financial arrangements, but we have placed it under delivery in this overview.

Table 3: Summary of review findings

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Patouillard 2007	Interventions working with private for-profit providers including training (26 studies), social marketing (14), contracting-out (3), franchising (6), regulation (2), and accreditation (1).	• Compared to no intervention or usual care, social marketing, vouchers and pre-packaging of drugs resulted in significant increases in utilization of programme commodities and services, though of differing magnitudes across interventions. • There is some evidence that regulation may improve the quality of pharmacy services. • The training of private practitioners led to improvement in the quality of treatment of a range of different conditions • Franchising interventions had mixed effects on quality of care, health care behaviours and client satisfaction • Contracting out had mixed effects on hospital and primary care services • Accreditation of pharmacy outlets decreased the use of unregistered drugs	Low	Important factors include: • the availability of routine data on who might benefit from the intervention • resources to provide supervision, monitoring and evaluation of the private providers • the availability of competent private sector providers	• Only 5 of the 52 studies provided data on the socioeconomic status of the source populations, but it is evident that many of the interventions worked successfully in poor communities. • Positive equity effects might require targeting those providers predominantly used by poor people

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Austvoll-Dahlgren 2008	Policies that regulate out-of-pocket payments for drugs by patients, including changes in the amount paid directly by patients or limits on the amount reimbursed, including caps, fixed co-payments, coinsurance, maximum co-payment ceilings and tier co-payments	• Caps can reduce both “limited efficacy” and “essential” drug use and can increase hospitalisations in vulnerable subgroups. • Fixed co-payments may reduce “non-essential” drug use and have mixed effects on “essential” drug use. • Fixed co-payments with ceiling can reduce both “non-essential” and “essential” drug use • Coinsurance with ceiling can reduce overall drug use. “Non-essential” and “essential” drug use may also be reduced • Increasing tier co-payments can reduce brand drug use. The effects on generic drug use are unclear. Increasing tier co-payments does not appear to increase health care utilization.	Low	The studies reviewed covered mostly developed countries settings (USA, Canada), but included some low–income populations. Only 1 study was conducted in a LMIC. The broad effects of these policies may be transferable across settings but the magnitude of the effect and consequences of these policies in other settings are unclear.	Little data. Restricting reimbursement and higher ceilings had the unintended effect of reducing necessary drug use when applied to "essential" drugs, and may put extra strain on already vulnerable populations.
Lagarde, forthcoming	Prospective payments for health care, such as pre-payment schemes, community-based insurance or social insurance	One study suggested that, compared to areas where community based health insurance was not available, CBHI may increase utilization of health care for prenatal care consulations, deliveries and vaccination but may reduce per capita curative consultations. Health insurance enrolment rates in the study population were low and variable.	Low	CBHI schemes are complex to implement and sustain. In addition it has been claimed that strong trust is required by the community in the implementing organisation, or the persons who manage the scheme.	Little data. If the poorest parts of the population are not able to afford the CBHI premiums, the approach may increase existing inequities.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Lagarde, forthcoming	Introduction, removal and changes in user fees (increase or decrease).	• Equivocal evidence of the effects of user fees on health care utilization • Removing user fees in low-income settings seems to have a positive impact on health care utilization, including children and women assisted in health centres and the numbers of new users	Low	Factors that need to be considered when removing user fees: • Planning for the additional resources required, such as increased drug supply • Monitoring and regulation of informal charging by health workers to compensate for the additional workload and the loss of revenue	Little data
Lagarde 2007	Programmes in which money was transferred directly to households conditional on some requirements, at least 1 of which had to be related to health-seeking behaviour	• Conditional cash transfers may result in the increased use of health services, compared to no cash transfer • Mixed effects on immunisation coverage and health status of women and children, compared to no cash transfer.	Low to moderate	A key issue is the capacity of the health system to deal with the increased demand related to cash transfers. In resource-poor settings where public spending on health is low and access to effective intervention limited, health system capacity should expanded before cash transfers are introduced	It may be more difficult and costly for people living in rural and other underserved areas to have access to specific health services targeted by cash transfers. Therefore, if some kind of adjustment is not incorporated in the transfers, those people will be further disadvantated.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Petersen 2006	Empirical studies of the relationship between explicit financial incentives designed to improve health care quality and a quantitative measures of health care quality	Compared to no incentives, the use of explicit financial incentives at different levels in the health system might: • Decrease hospital admission rates or mortality in nursing home patients • Produce “adverse-selection” in specific groups of users as applied at the payment-system level • Improve access to community mental health care • Improve some processes of care such as influenza immunisation rates, or diabetes care (however, it was unclear if only an improvement in documentation is achieved)	Low or very low	Most of the studies were carried out in the USA making difficult the translation of any evidence to LMICs	Little data. There was evidence of adverse selection of “most severe users” in one study. Depending on which quality indicators are bound to the financial incentives, there may be differential effects in disadvantaged populations

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Lagarde, forthcoming	Contracting out of health care services (formal contractual relationship between government and non-state provider)	• In the three studies included in the review, the contracts were carried out with non-governmental organizations (NGOs). • The studies suggest that contracting out services to non-state providers can increase access and utilization of health services. Patient outcomes may also have been improved and household health expenditures reduced by contracting out. However, in all three studies, the effects might have been attributable to causes unrelated with the intervention.	Low	• Differences in health systems, patient and physician attitudes towards NGOs, and legal restrictions, may limit wider applicability. • No data on the private for-profit sector. • Little description of the measures implemented by the contractor to achieve the contract goals, making implementation elsewhere difficult.	If the contractor is available to deliver services in underserved or rural areas not covered by public-funded services the impact could be positive. Where contractors do not serve disadvantaged populations, inequalities in access or health could be increased.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Laurant 2005	Substituting doctors working in primary care by nurse practitioners	• Patients were more satisfied with care from a nurse practitioner than from a doctor • Patient health outcomes were similar for nurse practitioners and doctors • Nurse practitioners provided longer consultations, carried out more investigations, and were more likely to admit patients to hospital than doctors	Low to moderate	Economic and cultural differences as well as differences in the training of nurses and doctors, working conditions, patient populations, and the types of services provided in primary care settings may limit the applicability of the review findings to LMICs.	Little data. Given the scarcity of doctors serving disadvantaged populations, using nurse practitioners has the potential to reduce inequities in access to healthcare, provided they are recruited and retained in underserved communities.
Lewin 2006	LHW (paid or voluntary) interventions in maternal and child health	The use of LHWs in maternal and child health programmes shows promising benefits compared to usual care in: − increasing the uptake of immunization in children − promoting breastfeeding − reducing mortality in children − reducing morbidity from common childhood illnesses Little evidence on the effectiveness of substituting LHWs for professionals or the effectiveness of alternative strategies for training, supporting and sustaining LHWs	Moderate to high	The range of study settings and the consistent pattern of findings suggest that the measured effects may be transferable across settings for these health issues. Factors that need to be taken into account include: − resources to provide clinical and managerial support for LHWs − the availability of drugs − financial support for LHW programmes	Little data. Some interventions relied on technologies that may not always be appropriate when attempting to contact low income households and may therefore exacerbate health inequities

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Sibley 2007	Training of TBAs; delivery kits; training of lay health workers to support TBAs; improved referral	• The impacts of TBA training on maternal mortality are unclear • There is some evidence that TBA training may reduce perinatal and neonatal deaths and stillbirths • There is mixed evidence on the impacts of TBA training on: maternal morbidity, including from haemorrhage; puerperal sepsis; and obstructed labour; improving advice-giving regarding infant feeding; and the appropriate referral of mothers with complications of pregnancy and childbirth.	Moderate to low	All of the studies were conducted in LICs and their findings should be applicable to similar settings. Factors to consider include: • an existing network of TBAs that can be targeted for further training • referral access to improved health services • resources to provide support for TBAs • acceptance of non-professional providers within the formal health system • cultural norms and values regarding pregnancy, childbirth and child rearing • local causes of maternal and perinatal ill-health and death • women's ability to access health care	Little data. TBA training may have potential to reduce inequalities in health experienced by disadvantaged populations through facilitating timely referral of pregnant women where improved health services are available.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Akbari 2005	Any intervention intended to change outpatient referral rates or improve outpatient referral appropriateness.	• Passive dissemination of referral guidelines is unlikely to lead to improvements in referral practice. • There is little evidence on the effects of organisational interventions but the use of 'in-house' second opinion and other intermediate primary care based alternatives to outpatient referral appear promising. • Financial interventions can change referral rates but their effect on the appropriateness of referral is uncertain. • Guidelines for appropriate referral are more likely to be effective if local secondary care providers are involved in dissemination activities and structured referral sheets are used	Very low to low	Factors that should be considered in applying this evidence in LMICs : • the existence of a formal referral system and its ability to absorb additional referrals • the availability of resources to implement the intervention • the extent to which referrals are made by physicians or by other health workers	Little data. There is a danger that financial interventions may reduce appropriate referrals as well as inappropriate referrals, putting disadvantaged populations at greater risk of not benefiting from appropriate referrals

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Briggs 2006	Any management or organisational change strategy applied to existing systems that aimed to increase integration at the service delivery level in primary healthcare. The comparison groups were highly varied	There is limited evidence of the effects of alternative strategies for integrating primary healthcare services at the point of delivery, from comparisons between integrated and vertical approaches to delivering services. The '*Integrated Management of Childhood Illness*' appears to have promising impacts on care delivery, but co-interventions, including provision of drugs, may confound this. There is low quality evidence that adding a concurrent family planning clinic for mothers attending expanded programme of immunization (EPI) clinics increases the number of new mothers accepting family planning services.	Low to moderate	All of the studies were conducted in LMICs. Differences in what is included in the 'Integrated Management of Childhood Illness' (or other integration strategies), how it is implemented and what current practice is will all affect the applicability of these findings to other LMICs.	Integration is intended to reduce differences in access and utilization of health services between geographical and socio-economic groups. This can be expected to the extent that it is targeted at disadvantaged populations and it is effective. However, it can have unintended and unwanted outcomes if it results in overloaded or deskilled health workers or reduces ability and capacity to deliver specific technical services compared to vertical programs. Adding additional services to existing clinics may worsen inequities if the services are increased for those with access and not for those who do not have access to the clinics. Where health systems are absent

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Grobler, forthcoming	Interventions to improve the distribution of health workers	• There is little rigorous evidence to support any financial, regulatory, selection or training strategy to improve distribution of health professionals From other studies identified: • Those from rural background more likely to practice in rural areas (observational studies only) • Clinical rotations in a rural setting may influence medical students' decision to work in an underserved area (4 quasi-RCTs) • The effectiveness of compulsory placement is inconclusive (descriptive surveys) • Loan repayment, direct incentive and resident-support programs had the highest service completion rates and physician retention rates	Very low	Review did not find any eligible studies	Review did not find any eligible studies

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Gruen 2004	Specialist outreach clinics: planned and regular visits by specialist medical practitioners to primary care or rural hospital settings	• Compared to usual care or hospital outpatient clinics or other interventions that did not include specialist outreach, specialist outreach clinics in primary care and rural hospital settings may improve access to care, quality of care, health outcomes, patient satisfaction and use of hospital services. • Rural communities possibly have the most to gain from outreach, since specialist services are usually disproportionately concentrated in major urban areas • It is unclear whether specialist outreach clinics improve use of servcies like other non-hospital services, laboratory and radiological tests, medication etc. • There is some evidence that outreach clinics may be cost-effective	Low	The 9 included studies covered different specialists and interventions in HICs. However, the review identified descriptive studies from LMIC, demonstrating that specialist outreach clinics can be implemented in those settings.	People living in rural and remote areas, and disadvantaged populations in urban areas, may benefit from specialist outreach services, if they improve access to care. However, there is little evidence that this is the best use of potentially scarce health personel resources. .
Jacobson Vann 2005	Letters, postcards, person-to-person telephone calls, computer-to-person telephone calls and outreach	Reminders and recall strategies can increase routine immunizations	Moderate	All the studies were done in HICs, which have health systems that follow potential recipients of immunizations over time. Without such systems there is little ability to identify the population of eligible vaccine recipiants.	Little data. Some interventions relied on technologies that may not always be appropriate when attempting to contact low income households (eg. a telephone call) and may therefore exacerbate health inequities, or fail to address them adequately.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Forsetlund 2008	Planned educational activities, including meetings, conferences, lectures, workshops, seminars and symposia	• Educational meetings alone or combined with other interventions can improve professional practice and health care outcomes for the patients. • The median effect is small to modest and comparable to the effect of other continuing medical education activities such as audit and feedback and educational outreach visits. • The effect of educational meetings alone on professional practice was the same as for multifaceted interventions that included educational meetings. Co-interventions could for instance be reminders, patient education material, supportive services, feedback reports and educational outreach visits. • There are large variations in the effects found in different studies. • Few studies have compared different types of educational meetings. No firm conclusions can be drawn about what is the most effective form. • The effect appears to be larger with higher attendance at the educational meetings and with mixed interactive and didactic educational meetings. Educational meetings did not appear to be effective for complex behaviours and they appeared to be less effective for less serious outcomes.	Moderate	The 81 included studies covered an extensive range of settings, targeted behaviours and interventions. Eleven of the trials were conducted in low and middle-income countries.	Overall, the included studies provided little data regarding differential effects of the interventions for disadvantaged populations.

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Grimshaw 2004	Guideline dissemination to improve professional practice	Compared to no intervention, the use of various dissemination strategies (either individually or in combination) led to modest to moderate improvements in guideline implementation. Median absolute improvements in performance: • 20.8% for patient-mediated interventions • 14.1% for reminders • 8.1% for dissemination of educational materials • 7.0% for audit and feedback • 6.0% for multifaceted interventions involving educational outreach	Moderate	Studies covered a wide range of dissemination strategies across a wide range of targeted behaviours and in an extensive range of settings. Only three studies from LMICs were included.	No data
Hulscher 2001	Interventions to improve the delivery of preventive services by primary care professionals	Considerable variation in the level of change in the promotion of preventive services, with effect sizes usually small or moderate: • Physician education compared with no intervention: little effect • Feedback compared with no intervention: moderate effect • Physician reminders compared with no intervention: moderate effect • Increasing appointment length compared with no intervention: moderate effect Tailoring interventions to address specific barriers to change in a particular setting is probably important	Low to moderate	Most studies conducted in HICs but covered a wide range of settings. Some of the uni-faceted interventions could be applied in LMICs.	Little data

Review	Intervention	Main findings	Quality of evidence	Applicability	Equity: differential effects of the interventions for disadvantaged populations
Jamtvedt 2006	Audit and feedback, defined as any summary of clinical performance of health care over a specified period of time with or without other interventions	• Compared to no intervention or other interventions, audit and feedback may have small to moderate effects in improving professional practice • The relative effects of audit and feedback are more likely to be larger when baseline compliance to recommended practice is low and when feedback is provided more intensively	Low	The included trials covered an extensive range of settings, but only four of the studies were from LMICs. It is not possible to determine when or why audit and feedback was more effective.	Little data. The resources needed for audit and feedback may be less easily available in poorer settings
O'Brien 2007	Educational outreach visits to healthcare professionals by trained persons that may be from the same organisation, but not from the same practice site. The information given may include feedback about their performance	• Compared to no intervention or other interventions, educational outreach visits alone, or combined with other interventions, appeared to improve the care delivered to patients: • for prescribing the effects were relatively consistent and small, but potentially important (evidence of high quality) • for other types of professional performance the effects varied widely from small to modest improvements (evidence of low to moderate quality). •	Mixed	The RCTs covered mostly HIC settings, including only 3 from low and middle income countries. The consistent pattern of findings about prescribing suggests that the measured effects could be transferable across settings only for this health issue.	Little data. Some co-interventions such as feedback about healthcare professionals' performance or reminders might require sophisticated information systems that are not always available in LMICs

Box 4: Key messages from systematic reviews of implementation strategies

The use of various implementation strategies (either individually or in combination) most often achieves small to moderate (but important) improvements in performance. For example, median absolute improvements in performance for implementing clinical practice guidelines were:

- 21% (range +10 to +25%) for patient-mediated interventions
- 14% (range –1 to +34%) for reminders
- 8% (range +4 to +17%) for dissemination of educational materials
- 7% (range +1 to +16%) for audit and feedback
- 6% (range –4 to +17%) for multifaceted interventions involving educational outreach visits.

The effects of some interventions, such as audit and feedback, are more likely to be larger when baseline compliance to recommended practice is low and when the intervention is provided more intensively.

Other factors may increase the effects of interventions. For example, for educational meetings, which are likely the most widely used implementation strategy in LMIC, more interactive meetings and higher attendance rates may increase their effectiveness.

The effects of interventions may also depend on the targeted behaviour. For example, the effects of educational outreach visits were relatively consistent for prescribing and varied widely for other behaviours.

Tailoring interventions to address specific barriers to change in a particular setting is probably important but further work on identifying, selecting and addressing barriers to change is needed.

Box 5: Priorities for systematic reviews and primary research on supporting the delivery of effective PHC interventions in LMICs

Domain	Systematic reviews needed*	Primary research needed†
Governance arrangements	- Interventions to prevent or reduce corruption - Drug sales and dispensing policies - Public versus private not-for-profit versus private for-profit ownership and management of PHC facilities - Public versus private not-for-profit versus private for-profit ownership and management of health insurance plans - Decentralization of PHC planning	Although only one included review addressed governance, in part, there appears to be a need for developing and evaluating a wide range of interventions to improve governance arrangements.
Financial arrangements	- Revenue generation mechanisms to pay for PHC - Policies that determine who provides health insurance and who receives it - Policies that determine what PHC services are covered by public programmes or by insurance - Results-based financing targeted at recipients of healthcare, healthcare providers, and governments - Remuneration of PHC health workers in LMIC - Financial and other incentives for patients	- Rigorous evaluations are needed for most of the financial arrangements addressed by the included reviews, including the reduction or elimination of user fees, risk protection mechanisms, and contracting out. - Conditional cash transfers have been rigorously evaluated in Latin America, but rigorous evaluations are needed in low-income settings such as sub-Saharan Africa prior to expanding its use in those settings.
Delivery arrangements	- Interventions to promote intersectoral collaboration at district, regional and central levels to improve PHC delivery and outcomes - Approaches to the organisation of referral systems - Substitution of health workers in LMIC, including as part of task shifting - PHC health record systems in LMIC - PHC safety and quality monitoring systems	Development and rigorous evaluation of strategies to: - Improve the quality of PHC through consumer-mediated approaches - Promote effective referral and communication across the primary-secondary care interface - Integrate PHC service delivery - Increase the proportion of health professionals practising in underserved communities - Implement task-shifting / substitution of health workers

Implementation strategies		- Development and evaluation of LMIC-appropriate interventions to promote effective practice among PHC health workers - Development and evaluation of systems for quality improvement that are integrated into PHC delivery systems

* Based on key areas in the taxonomy of health systems arrangements (Box 1) for which we did not find a systematic review of the effects of alternative arrangements or policies.
† We have included here only priorities for research on the effects of health system arrangements or implementation strategies that were considered in the included reviews, although there clearly are other priorities for research outside of the areas covered by the included reviews and addressing other types of questions.

Appendix 1: Ovid MEDLINE search strategy (for web)

1. *Fee-for-Service Plans/

2. fee? for service.tw.

3. *Physician Incentive Plans/

4. incentive?.tw.

5. *Reimbursement Mechanisms/ or *Reimbursement, Incentive/

6. reimburse$.tw.

7. *Prepaid Health Plans/

8. *Group Practice, Prepaid/

9. prepaid.tw.

10. *Capitation Fee/

11. capitation.tw.

12. *"Salaries and Fringe Benefits"/

13. *Income/

14. ((salary or salaries or salaried or income? or pay$ or wages or fringe benefit?) adj2 provid$).tw.

15. *Prospective Payment System/

16. (prospective payment? or prospective pricing).tw.

17. ((provider? or institution? or group? or patient?) adj2 (incentive? or reward? or benefit?)).tw.

18. *Financing, Organized/

19. ((provider? or patient?) adj2 (grant? or allowance or reward? or benefit?)).tw.

20. (penalty or penalties).tw.

21. exp *Formularies/

22. (formulary or formularies).tw.

23. premium?.tw.

24. exp *Insurance/

25. insurance.tw.

26. (co payment? or copayment?).tw.

27. exp *"Fees and Charges"/

28. *Fees, Medical/

29. *Fees, Pharmaceutical/

30. *Prescription Fees/

31. (fee or fees or remunerat$ or user payment or patient payment).tw.

32. ((financ$ or econom$ or pay$) adj (incentive? or intervention? or program? or system? or mechanism? or strateg$ or compensat$)).tw.

33. or/1-32

34. exp *Professional Role/

35. (professional adj role?).tw.

36. or/34-35

37. exp *Patient Care Team/

38. *Interprofessional Relations/

39. (multidisciplinary team? or multi disciplinary team? or interdisciplinary team? or inter disciplinary team? or patient care team?).tw.

40. ((doctor? or physician?) adj3 nurse? adj3 collaborat$).tw.

41. or/37-40

42. *Delivery of Health Care/

43. (service deliver$ or care deliver$).tw.

44. (distribut$ adj2 (care or service?)).tw.

45. *Delivery of Health Care, Integrated/

46. ((integrat$ or seamless) adj2 (health care system? or health care service? or health care)).tw.

47. *Community Health Services/

48. *Women's Health Services/

49. *Rural Health Services/

50. *Adolescent Health Services/

51. *Comprehensive Health Care/

52. *Ambulatory Care/

53. *National Health Programs/

54. *Regional Medical Programs/

55. ((community or women or rural or adolescent?) adj2 service?).tw.

56. ((comprehensive or ambulatory) adj (care or healthcare)).tw.

57. ((national or rural or regional) adj program$).tw.

58. or/42-57

59. ((skill? or competence) adj3 mix$).tw.

60. exp *Interprofessional Relations/

61. *Patient Care Team/

62. *Personnel Management/

63. *Personnel Delegation/

64. *"Personnel Staffing and Scheduling"/

65. exp *Health Personnel/

66. ((health or healthcare or health care or medical) adj (staff or worker? or professional? or personnel)).tw.

67. *Voluntary Workers/

68. ((lay or voluntary) adj3 (worker? or aide? or personnel)).tw.

69. (or/59-64) and (or/65-68)

70. *Continuity of Patient Care/

71. (continu$ of care or continu$ of healthcare).tw.

72. *Comprehensive Health Care/

73. (comprehensive care or comprehensive healthcare).tw.

74. or/70-73

75. *Case Management/

76. exp *Managed Care Programs/

77. exp *Patient Care Planning/

78. (patient care adj1 planning).tw.

79. ((health care or healthcare) adj (management or program? or planning)).tw.

80. ((care or treat$ or assess$) adj2 (co ordinat$ or coordinat$)).tw.

81. *"Referral and Consultation"/

82. referral.tw.

83. or/75-82

84. *Social Support/

85. support$.tw.

86. *Stress, Psychological/

87. stress$.tw.

88. *Job Satisfaction/

89. job satisfaction.tw.

90. *Workplace/

91. workplace.tw.

92. *Workload/

93. workload.tw.

94. exp *Health Personnel/

95. ((health or healthcare or health care or medical) adj (staff or worker? or professional? or personnel)).tw.

96. (or/84-85) and (or/86-93) and (or/94-95)

97. *Burnout, Professional/

98. (burnout or burn$ out).tw.

99. *Personnel Turnover/

100. ((staff or doctor? or nurse? or personnel) adj3 (turnover or turn over)).tw.

101. or/97-100

102. exp *Interprofessional Relations/

103. *Interdisciplinary Communication/

104. ((interprofessional or professional or interdisciplinary or inter disciplinary or multidisiplinary or multi disiplinary or cross disiplinary) adj (communicat$ or consult$ or relation? or contact)).tw.

105. exp *Health Personnel/

106. ((health or healthcare or health care or medical) adj (staff or worker? or professional? or personnel)).tw.

107. *Telemedicine/

108. telemedicine.tw.

109. *Telecommunications/

110. telecommunicat$.tw.

111. *Remote Consultation/

112. ((remote or distant or distance) adj2 consultation?).tw.

113. *Teleradiology/

114. teleradiology.tw.

115. *Telepathology/

116. telepathology.tw.

117. *Telemetry/

118. telemetry.tw.

119. teleconsult$.tw.

120. teleconferenc$.tw.

121. (videoconferenc$ or video conferenc$).tw.

122. *Electronic Mail/

123. (email? or e-mail?).tw.

124. *Telephone/

125. (telephon$ or phone).tw.

126. *Television/

127. (television$ or video$).tw.

128. *Computer Communication Networks/

129. (communication network? or (internet or intranet or extranet)).tw.

130. (or/102-106) and (or/107-129)

131. *Mass Media/

132. (mass media or broadcast$).tw.

133. or/131-132

134. *Pharmaceutical Services/

135. *Drug Information Services/

136. *Community Pharmacy Services/

137. *Pharmacies/

138. *Pharmacy/

139. (pharmacy or pharmacies).tw.

140. *Postal Service/

141. ((post$ or mail$) adj2 service?).tw.

142. (mail adj2 pharmac$).tw.

143. ((or/134-139) and (or/140-141)) or 142

144. (consumer? or patient? or client? or receiver? recipient?).tw.

145. exp *Insurance/

146. insurance$.tw.

147. 144 and (or/145-146)

148. *Consumer Participation/

149. *Patient Participation/

150. (consumer participat$ or consumer involv$ or patient participat$ or patient involv$).tw.

151. or/148-150

152. *Delivery of Health Care/

153. (service deliver$ or care deliver$).tw.

154. (distribut$ adj2 (care or service?)).tw.

155. *Community Health Services/

156. *Women's Health Services/

157. *Rural Health Services/

158. *Adolescent Health Services/

159. exp *Health facilities/

160. *Health Facility Closure/

161. *Health Facility Merge/

162. *Health Facility Moving/

163. ((health or healthcare) adj (facility or facilities)).tw.

164. *Technology, Medical/

165. ((medical or health) adj1 (technolog$ or equipment?)).tw.

166. or/152-164

167. *Medical Records/

168. *Medical Records Systems, Computerized/

169. *Medical Records, Problem-oriented/

170. *Nursing Records/

171. *Information Systems/

172. *Hospital Information Systems/

173. ((medical or nurs$) adj record?).tw.

174. information system?.tw.

175. or/167-174

176. *Ownership/

177. *Organizational Affiliation/

178. (ownership or affiliation).tw.

179. exp *Health Facilities/

180. (((health or healthcare or medical) adj (facility or facilities or clinic? or center? or centre? or unit?)) or hospital?).tw.

181. (or/176-178) and (or/179-180)

182. exp *Health Personnel/

183. ((health or healthcare or health care or medical) adj (staff or worker? or professional? or personnel)).tw.

184. *"Organization and Administration"/

185. ((health care or health care) adj (organiz$ or organis$ or administrat$)).tw.

186. (or/182-183) and (or/184-185)

187. *Aftercare/

188. aftercare.tw.

189. *Home Nursing/

190. *Home Care Services/

191. (home adj (nursing or service?)).tw.

192. *Family Practice/

193. ((family or general or private) adj practice).tw.

194. follow up?.tw.

195. or/187-194

196. *Government Regulation/

197. ((government or state or federal) adj1 (regulat$ or intervention?)).tw.

198. *Social Control, Formal/

199. *Mandatory Programs/

200. *Legislation/

201. *Legislation, Medical/

202. *Legislation, Drug/

203. *Legislation, Hospital/

204. *Legislation, Pharmacy/

205. *Legislation, Dental/

206. *Legislation, Nursing/

207. ((medical or drug or pharmacy or dental or nursing) adj (law or legislation)).tw.

208. *"Facility Regulation and Control"/

209. ((facility or facilities) adj3 (regulat$ or control$)).tw.

210. *Liability, Legal/

211. ((medical or legal or professional or institutional) adj1 liability).tw.

212. *Peer Review/

213. *Peer Review, Health Care/

214. peer review$.tw.

215. exp *Licensure/

216. (licensure or licensing or licence or license).tw.

217. *Credentialing/

218. credentialing.tw.

219. *Accreditation/

220. accreditation.tw.

221. ((patient? or consumer? or client? or receiver? or recipient?) adj2 complaint?).tw.

222. deregulation.tw.

223. (regulat$ adj (intervention? or approach$ or action? or strategy or strategies)).tw.

224. or/196-223

225. *Quality Control/

226. *Total Quality Management/

227. exp *Quality Assurance, Health Care/

228. ((quality or improv$ or monitor$ or control$) adj mechanism?).tw.

229. (quality adj (control or manage$ or assess$ or assurance)).tw.

230. *Evidence Based Medicine/

231. (evidence based adj (medicine or health care or healthcare or practice)).tw.

232. *"Outcome and Process Assessment (Health Care)"/

233. *"Outcome Assessment (Health Care)"/

234. *"Process Assessment (Health Care)"/

235. ((outcome or process) adj assess$).tw.

236. *Program Evaluation/

237. program evaluation.tw.

238. *Benchmarking/

239. benchmarking.tw.

240. continuous quality improvement.tw.

241. (ISO adj3 (standard$ or specification? or require$ or demand$ or request$ or order? or instruct$ or classification? or framework?)).tw.

242. *Quality Indicators, Health Care/

243. (quality adj2 indicator?).tw.

244. (quality adj (measure? or score?)).tw.

245. (quality adj1 (criteria or criterion or standard? or norm?)).tw.

246. (performance adj (indicator? or measure? or data or rating)).tw.

247. outcome indicator?.tw.

248. (process adj (indicator? or measure?)).tw.

249. (best practice adj1 (analysis or standard?)).tw.

250. *Disclosure/ and (quality or report$ card? or performance or outcome? or ranking?).tw.

251. *Information Dissemination/ and (quality or report$ card? or performance or outcome? or ranking?).tw.

252. (public adj (report? or reporting or release or disclosure?)).tw.

253. ((report? or reporting or disclosure? or releas$ or publish$ or publication or disseminat$ or announc$) adj3 (quality or report$ card? or performance or outcome? or ranking?)).tw.

254. or/225-253

255. *Professional-Patient Relations/

256. *Dentist-Patient Relations/

257. *Nurse-Patient Relations/

258. *Physician-Patient Relations/

259. ((professional? or dentist? or nurse? or physician?) adj3 patient relation?).tw.

260. or/255-259

261. Health Manpower/

262. *Foreign Professional Personnel/

263. *Foreign Medical Graduates/

264. *"Emigration and Immigration"/

265. human resource?.tw.

266. health manpower.tw.

267. (foreign adj2 (personnel or graduate?)).tw.

268. (emigration or immigration or migration).tw.

269. (brain drain or border crossing).tw.

270. or/261-269

271. exp *Health Personnel/

272. exp *Personnel Management/

273. *"Health Services Needs and Demand"/

274. *Resource Allocation/

275. *Health Care Rationing/

276. *International Educational Exchange/

277. ((health personnel or health care personnel or healthcare personnel or medical personnel or health professional? or health care professional? or healthcare professional? or medical professional? or health worker? or health care worker? or healthcare worker? or medical worker? or health workforce or health care workforce or healthcare workforce or medical workforce) and (demand or need? or supply or shortage or capacity or employment or distribut$ or maldistribut$ or recruit$ or allocat$ or mobility)).tw.

278. manpower.fs.

279. or/271-278

280. Developing Countries/

281. exp Africa/

282. exp Caribbean Region/

283. exp Central America/

284. exp Latin America/

285. exp South America/

286. exp Asia/

287. exp Europe, Eastern/

288. *International Cooperation/

289. *World Health/

290. ((developing or less developed or third world or under developed or poor or low$ income or middle income or "low and middle income") adj (countries or country or nation?)).tw.

291. lmic.tw.

292. ((developing or less developed or under developed) adj world).tw.

293. (africa or caribbean or central america or latin america or south america or asia or east$ europe).tw.

294. (international adj (cooperation or co operation)).tw.

295. or/280-294

296. 270 or (279 and 295)

297. 33 or 36 or 41 or 58 or 69 or 74 or 83 or 96 or 101 or 130 or 133 or 143 or 147 or 151 or 166 or 175 or 181 or 186 or 195 or 224 or 254 or 260 or 296

298. limit 297 to yr=1979-2006

299. exp *Education, Continuing/

300. (education$ adj1 (program$ or intervention? or meeting? or session? or strateg$ or workshop? or visit?)).tw.

301. *Pamphlets/

302. (behavio?r$ adj2 intervention?).tw.

303. (leaflet? or booklet? or poster or posters).tw.

304. ((written or printed or oral) adj information).tw.

305. (information$ adj2 campaign?).tw.

306. (education$ adj2 (method? or material?)).tw.

307. outreach.tw.

308. ((opinion or education$ or influential) adj2 leader?).tw.

309. facilitator?.tw.

310. academic detailing.tw.

311. consensus conference?.tw.

312. *Guidelines/

313. *Practice Guidelines/

314. ((guideline? or standard? or protocol?) adj2 education).tw.

315. (guideline? adj2 (introduc$ or issu$ or impact or effect? or disseminat$ or distribut$)).tw.

316. ((effect? or impact or evaluat$ or introduc$ or compar$) adj2 training program$).tw.

317. *Reminder Systems/

318. reminder?.tw.

319. (recall adj2 system$).tw.

320. (prompter? or prompting).tw.

321. algorith?.tw.

322. *Feedback/ or feedback.tw.

323. (feedback adj1 (loop? or control? or regula$ or mechanism? or inhib$ or system? or circuit? or sensory or visual or audi$)).tw.

324. 322 not 323

325. chart review$.tw.

326. *Management Audit/

327. *Medical Audit/

328. *Nursing Audit/

329. *Dental Audit/

330. ((effect? or impact or records or chart?) adj3 audit).tw.

331. *Patient Education/

332. marketing.tw.

333. ((effect? or impact or evaluat? or introduc$ or compara$) adj2 (prevent$ program$ or screening program$)).tw.

334. ((intoduc$ or impact or effect? or implement$ or computer$) adj2 protocol?).tw.

335. (computer$ adj2 (dosage or dosing or diagnosis or therapy or decision?)).tw.

336. *Physician's Practice Patterns/

337. or/299-321,324-336

338. limit 337 to yr=1998-2006

339. 298 or 338

340. meta-analysis.tw.

341. meta-analysis.pt.

342. systematic review.tw.

343. or/340-342

344. Animals/

345. Humans/

346. 344 not (344 and 345)

347. (letter or comment or editorial).pt.

348. 343 not (346 or 347)

349. 339 and 348