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POLICY SUMMARY 3

Using audit and feedback to health professionals to improve the quality and safety of health care

Signe Agnes Flottorp, Gro Jamtvedt,
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Contents	Page
Key messages	iv
Executive summary	v
1 Introduction	1
2 Audit and feedback as part of a strategy for improving performance and supporting quality and safety in European health care systems	2
3 What do we know about the effects of the different ways in which audit and feedback are used?	11
4 How to decide if – and how – audit and feedback should be implemented	23
5 Closing observations	27
References	28
Annexes	33

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Key messages

- There is now extensive evidence demonstrating that there is a gap between the health care that patients receive and the practice that is recommended. In both primary and secondary care there are unwarranted variations in practice and in resulting outcomes that cannot be explained by the characteristics of patients.
- While it is difficult to find examples of measures for addressing this issue from all 53 countries of the World Health Organization's European Region, there are interventions that can be identified in the 27 Member States of the European Union. However, the nature of these measures and the extent to which they are implemented vary considerably.
- Audit and feedback defined as "any summary of clinical performance of health care over a specified period of time aimed at providing information to health professionals to allow them to assess and adjust their performance" is an overarching term used to describe some of the measures that are used to improve professional practice.
- Audit and feedback can be used in all health care settings, involving all health professionals, either as individual professions or in multi-professional teams.
- In practical terms, health professionals can receive feedback on their performance based on data derived from their routine practice. Health professionals involved in audit and feedback may work either in a team or individually and in primary, secondary or tertiary care.
- While it seems intuitive that health care professionals would be prompted to modify their clinical practice if receiving feedback that it was inconsistent with that of their peers or accepted guidelines, this is in fact not always the case.
- The available evidence suggests that audit and feedback may be effective in improving professional practice but that the effects are generally small to moderate. Nonetheless, depending on the context, such small effects, particularly if shown to be cost-effective, may still be regarded as worthwhile.
- The benefits of audit and feedback measures are most likely to occur where existing practice is furthest away from what is desired, and when feedback is more intensive.
- Even on the basis of the best evidence available, no strong recommendations can be given regarding the best way to introduce audit and feedback into routine practice. However, decisions about if, and how, this approach can

be used to improve professional practice must be guided by pragmatism and the consideration of local circumstances. The following scenarios, for example, might indicate suitability for such an approach: the known (or anticipated) level of initial adherence to guidelines or desired practice is low; it is feasible to conduct an audit and the associated costs of collecting the data are low; routinely collected data are reliable and appropriate for use in an audit; and small to moderate improvements in quality would be worthwhile.

- The cost of audit and feedback is highly variable and is determined by local conditions, including the availability of reliable routinely collected data and personnel costs.
- The impact of audit and feedback, with or without additional interventions, should be monitored routinely by auditing practice after the intervention.

Executive summary

Audit and feedback as part of a strategy for improving performance and supporting quality and safety in European health care systems

There is now extensive evidence from every country in which it has been sought that there is a gap between the health care that patients receive, and the practice that is recommended. In both primary and secondary care there are unwarranted variations in practice and in the resulting outcomes, and which cannot be explained by characteristics of the patients. While it is difficult to ascertain the extent to which measures for tackling this exist in all 53 Member States of the World Health Organization's European Region, concrete examples can be identified in each of the 27 European Union Member States. In particular, there is growing interest in the use of audit and feedback for health professionals.

Audit and feedback can be defined as "any summary of clinical performance of health care over a specified period of time aimed at providing information to health professionals to allow them to assess and adjust their performance". In practical terms, health professionals, working either in a team or individually, receive feedback on their performance by reflecting on data derived from their routine practice. Audit and feedback are intended to enhance professional performance and thereby improve the quality of health care and patient safety. Although it seems intuitive that health professionals would be prompted to modify their clinical practice after receiving feedback showing that it was inconsistent with that of their peers or accepted guidelines, this has not been demonstrated consistently.

Feedback can be delivered in different ways, categorized in terms of the recipients, formats, sources, frequency, duration and content. Audit and feedback mechanisms can be used alone or linked to other interventions. Most research on the effects of audit and feedback has treated them as components of a multifaceted intervention, often combined with educational activities.

Audit and feedback systems have been used in many ways in European health systems. The spectrum covers mandatory schemes run by governmental bodies to voluntary professional (self-regulatory) initiatives, and it can be top-down or bottom-up or a combination of both. They can be internal, i.e. used by local groups of practitioners, or external, i.e. run by professional bodies, research groups or governmental structures.

What do we know about the effects of the different ways in which audit and feedback are used?

The material in this Policy Summary is largely based on a systematic review of the effectiveness of audit and feedback in changing clinical practice, and a review of experiences of how audit and feedback have been used in clinical practice. From this, the following have been identified as the main themes and policy approaches employed.

- Different types of audit and feedback mechanisms can be used, including:
 - different levels of responsibility and involvement;
 - mandatory or voluntary approaches;
 - approaches initiated and/or led by health professionals/professional organizations or by health authorities;
 - different ways of monitoring or auditing practice;
 - different recipients (e.g. individual or group);
 - different sources of feedback (e.g. supervisor, senior colleague, professional standards review organization, representative of the employer or the purchaser, investigators);
 - different feedback formats (e.g. verbal or written);
 - different frequencies, durations and content (e.g. information about patients, such as blood pressure or test results, adherence to standards or guidelines, peer comparisons, or information about costs, or numbers of prescriptions or tests ordered); and

feedback of individual or group-level data can be supplemented with information about where individuals are and/or specific recommendations for changes to practice.

- Audit and feedback can be linked to economic incentives or to reimbursement schemes, e.g. result-based financing or pay-for-performance schemes.
- Audit and feedback may be a governance or regulatory arrangement, or used in accreditation or organizational assessments.
- Performance and outcome data can be made public.

Several systematic reviews have assessed the effectiveness of audit and feedback. These provide an inconsistent picture, with some evaluations obtaining positive results but others not. Hence, the most important lessons for policy that can be taken from these reviews are their insights into what works in what circumstances. Even here, however, the findings are quite inconsistent.

A systematic review including 118 studies has assessed the effects of audit and feedback on the practice of health care professionals and on patient outcomes. Most of the studies used different interventions, covered different groups of health professionals and were confined to settings in North America and Western Europe. Additionally, many studies reported multiple outcomes, although most were measures of process, such as prescribing or use of laboratory tests. In the analysis, the intensity of the audit and feedback, the complexity of the targeted behaviour, the seriousness of the outcome and the level of baseline compliance were categorized.

The review suggests that audit and feedback may improve the performance of health care providers. The effects are generally moderate or small. Importantly, the scope for improvement is greatest in those areas where existing practice is furthest away from what is desired. It is to be noted, however, that the quality of evidence for these outcomes (as so often in the field of quality improvement measures) is low.

Audit and feedback thus include a diverse range of measures. The type of intervention (audit and feedback alone, or combined with educational activities or multifaceted interventions), the complexity of the behaviour being targeted, the study quality and the seriousness of the outcome do not serve to explain the variation in effects across studies. There is currently no basis for concluding that feedback involving peer-comparison is either more or less effective than audit and feedback generally.

How to decide if – and how – audit and feedback should be implemented

The studies presented in this Policy Summary show that audit and feedback can be used in almost all health care settings. Implementation of audit and feedback requires clear goals and a thorough analysis of the health care environment in question, especially if this approach is combined with incentives or penalties, or is made mandatory. Again, no strong evidence has been identified indicating that these combinations significantly improve outcomes and thus the health care delivered. The experience arising from some major initiatives taking place in certain European countries may provide some of the required evidence in the future.

The following key messages for decision-makers can be drawn from the reviews covered in this summary.

- Despite evidence from systematic reviews of more than 100 studies on audit and feedback, there is still limited information to support decisions on whether – or how best to – use audit and feedback. However, if audit and feedback are to be used, they are probably more effective when baseline adherence to good practice is low, and if the intensity of the feedback is high.
- Qualitative studies suggest that feedback is more effective if delivered in a timely fashion, if it is individualized, non-punitive and “actionable”, so that the health professional receiving the feedback understands how to improve his/her practice. Feedback seems less effective when it focuses on the recipient rather than on specific suggestions for improvement.
- The cost of audit and feedback is highly variable and will depend on specific local conditions, including whether reliable routinely collected data are available and the cost of personnel.
- The provision of adequate support to programmes for audit and feedback appears to be vital for maintaining effectiveness when interventions are being scaled up.
- Audit and feedback can be used as components of a multifaceted strategy to improve the quality of health care. Examples include the combination of quality-management initiatives with audit and feedback in order to close the quality-improvement cycle (plan–do–check–act), or the support of peer-group mechanisms, such as quality circles, where feedback reports potentially constitute a basis for discussion around the achieved and desired levels of health care quality.

- Decisions about whether – and how – to use audit and feedback to improve professional practice must be guided by pragmatism and a consideration of local circumstances. The following scenarios, for example, might indicate suitability for such an approach: the known (or anticipated) level of initial adherence to guidelines or desired practice is low; it is feasible to conduct an audit and the costs of collecting the data are low; routinely collected data are reliable and appropriate for use in an audit; and small to moderate improvements in quality would be worthwhile (particularly where the scope for cost-effective improvements in quality exists).
- The impact of audit and feedback, with or without additional interventions, should be monitored routinely by auditing practice after the intervention.

1 Introduction

Historically, the individual practitioner was considered the only person who could evaluate his or her own clinical practice. That clinical practice was traditionally based largely on intuition, often informed by knowledge gained many years earlier at university. This view is no longer tenable and there is widespread, although not yet universal, acceptance among health professionals of the benefits of peer review. That is, where clinical practice is assessed against evidence of best practice, feedback is provided and changes are made where appropriate. In many countries this process has been led by health professionals, although others also have an interest. For instance, health care funders have an interest in ensuring that the care they are purchasing is of the highest possible standard, and patients (and potential patients) have an interest in ensuring that the care they receive will be safe and effective.

In this regard, clinical audit is defined as “a quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the implementation of change. Aspects of the structure, processes, and outcomes of care are selected and systematically evaluated against explicit criteria. Where indicated, changes are implemented at an individual, team, or service level and further monitoring is used to confirm improvement in healthcare delivery” (1). And, building on this and the so-called “audit cycle”, audit and feedback can be seen as a single approach and defined as “any summary of clinical performance of health care over a specified period of time aimed at providing information to health professionals to allow them to assess and adjust their performance” (2).

We know that health professionals are not well qualified to assess their own performance accurately. Hence, the underlying idea of the audit and feedback approach is that the quality and safety of health care might be improved if the health professionals are given information about their clinical performance – ideally combined with specific advice – thereby allowing them to assess and adjust their performance.

Although there are many individual studies and systematic reviews of the effectiveness of audit and feedback systems, and reviews of the implementation of such approaches in countries of the European Union (EU), those of the European Economic Area and Switzerland, this material has not so far been brought together in a single document aimed at policy-makers. This Policy Summary is intended to fill this gap. In doing so, it will first review the reasons why it is important to take measures to ensure the quality and safety of health care and provide an overview of the potential roles that audit and feedback mechanisms might play. It will outline the research evidence supporting a number of commonly pursued options for audit and feedback, explore the

circumstances in which audit and feedback have been used, and examine the factors that should be taken into account to ensure maximum effectiveness for these measures.

2 Audit and feedback as part of a strategy for improving performance and supporting quality and safety in European health care systems

2.1 Gaps between best practice and the care that patients receive

There is now extensive evidence from every country in which it has been sought that there is a gap between the health care that patients receive and the practice that is recommended (3,4,5,6). In both primary and secondary care there are unwarranted variations in practice – and in the resulting outcomes – that cannot be explained on the basis of characteristics of the patients (7,8,9). There are also many examples of how health care has exposed patients to avoidable risks or even harmful interventions.

One factor is the difficulty in absorbing the available information. There has been an exponential growth in the volume of medical research over the past four decades. It is now inconceivable that an individual health professional could keep abreast of this growth in knowledge. However, there have been major advances in the generation, analysis and synthesis of research on quality of care. Evidence syntheses and, in particular, systematic reviews that have fed into health technology assessments and the production of evidence-based guidelines are now available to inform those working at all levels of health systems about optimal standards of care (10,11). Yet there is still a gap between what is known to be effective and what is actually done (5,12,13,14,15). Audit and feedback systems must therefore be based on the best available evidence of what works.

Another factor relates to the ability to assess one's own practice. Systematic reviews indicate that health professionals may not always assess their own performance accurately (16,17). While there are interventions that can help them to do so, Davis and colleagues (17), after reviewing the available evidence, concluded that external involvement may be necessary.

2.2 Quality of care: definitions and dimensions

A number of organizations have proposed definitions for quality of care, using different terms, labels and models (18). For the purposes of this Policy Summary, the definition adopted by the Council of Europe has been used: "Quality of care is the degree to which the treatment dispensed increases the patient's

chances of achieving the desired results and diminishes the chances of undesirable results, having regard to the current state of knowledge" (19). This builds on earlier work, in particular an exhaustive 1990 review by the United States Institute of Medicine (20).

Quality of care has been operationalized in relation to certain overlapping dimensions, including effectiveness, efficiency, access, safety, equity, appropriateness, timeliness, acceptability, patient responsiveness or patient-centredness, satisfaction, health improvement and continuity of care (18).

2.3 Governance and regulation

Given the need to put in place measures to ensure quality of care, what governance mechanisms are most supportive? An analysis from Australia (21) has proposed the concept of "responsive regulation", in which regulatory approaches can escalate upwards as required, from "soft" to "hard" instruments and by using "carrots" before "sticks". The authors illustrate the concept by means of a regulatory pyramid that has four levels. The base of the pyramid is formed by market mechanisms (e.g. payments to incentivize quality, published league tables), then comes self-regulation and voluntarism (e.g. clinical protocols, benchmarking, performance indicators/targets), followed by meta-regulation (mandated continuous improvement, mandated incident reporting systems) and, at the apex of the pyramid, command and control (criminal penalties, physician revalidation). On the basis of their review, the authors advocate networked governance as opposed to reliance on top-down government action. They argue for the addition of meta-regulation, in which self-regulation is monitored by an external third party. This approach emerges as the one that is most likely to ensure that health care providers have effective safety and quality programmes in place while promoting an expectation of continuous improvement and a culture of safety.

Traditionally, health-sector organizations have shown a preference for internal, rather than external, regulatory strategies (21). The adoption of many quality-assurance activities – continuous quality improvement, incident reporting, benchmarking, performance indicators, clinical protocols or peer review – has been voluntary. However, a voluntary approach treats an organization, such as a hospital, as though it exists in isolation from its environment. Yet the behaviour of a hospital and its staff is a product of both external pressures and the organizational structure and culture of that institution. If the external environment does not generate pressure to improve safety and quality, the hospital may have little reason to strive for better performance. On the other hand, external pressure and top-down control, without the involvement of health professionals, will not bring about improvement in the care of patients across health care systems.

2.4 Assessing quality of care

Donabedian (22), widely regarded as one of the pioneers in conceptualizing quality of care, distinguished between structure, process and outcome, drawing on concepts from industrial manufacturing. He argued that “good structure increases the likelihood of good process, and good process increases the likelihood of good outcome”. Traditionally, then, the focus of measures for enhancing quality was based on structures, such as systems designed to recognize professional qualifications and experience, approval of drugs and medical devices, and quality of facilities. More recently, the focus has shifted towards developing ways of measuring processes and outcomes.

It is important to measure both processes and outcomes. Where outcomes (such as cancer survival) are apparent only after long intervals, or where the magnitude of the difference in outcomes between excellent and poor-quality care is small, or where the condition being treated is rare, process measures may be more sensitive and specific than outcome data (23,24). There has been a remarkable growth in both the range of measures of processes and outcomes and in the understanding of their strengths and weaknesses in recent years. Although their use in routine clinical practice is increasing, this does, however, remain limited in many countries. A review of current indicator projects for hospital performance assessment worldwide found that major differences exist in philosophy, scope and coverage – manifested as differences in participation, disclosure of results and dimensions of hospital performance assessed (25).

Although many successful assessments of quality precede the development of computers, e.g. the United Kingdom’s confidential inquiry into maternal deaths (26), one important constraint on the greater uptake of clinical process and outcome measures is the inadequate data infrastructure in place to support evaluation. Health care lags behind most modern industries in its use of electronic systems for the management of essential processes (27).

Before evaluating clinical processes, the following questions should be clarified (28).

- What is to be measured?
- Is the required information available?
- How can an appropriate sample of patients be identified?
- How big should the sample be?
- How will the information be collected?
- How will the information be interpreted?

The answers to these questions should be derived from evidence about what care is effective and appropriate, and for whom. Ideally, this will take the form of evidence-based guidelines, based on systematic reviews of the evidence. The range of measures that can be applied is enormous, depending on the issue being examined. Outcomes might include different generic and disease-specific measures of the patient's health status (ideally assessed before, and at a suitable interval after, treatment), physiological measures (such as those used to monitor control of diabetes) and, ultimately, mortality. Process measures might include those such as the rate of appropriate prescribing or undertaking investigations (implying a clear understanding of what is appropriate). Data might be collected from routine sources, such as computerized patient information systems, or from ad hoc data-collection exercises. The incorporation of patient-reported outcome measures into routine practice is taking place in a few countries, e.g. the United Kingdom has developed and implemented them in both the National Health Service and the private sector. However, such examples are still rare.

Another important source is the medical record. There is extensive experience of abstracting records in the United States, but much less so in Europe. It is very important to know the expected variability in whatever is being measured, in order to calculate a sample size that will yield meaningful results. If the outcomes in question are rare, extremely large samples might be required, indicating that intermediate process measures would be more appropriate. Finally, the interpretation of data requires considerable skill (medical as well as those relating to health services research).

2.5 Quality of care strategies in the EU

Individuals and groups of professionals have engaged in activities designed to foster greater quality of care and enhanced patient safety in many European countries, although the extent to which these activities have spread beyond a small group of enthusiasts to become embedded in the routine activities of the health care system varies greatly (18). These activities have, in turn, been influenced by several national and international organizations. Among the most influential are the Institute of Medicine and the Joint Commission on Accreditation of Healthcare Organizations from the United States, as well as the International Society for Quality in Health Care, the European Society for Quality in Healthcare, the Council of Europe and the World Health Organization (WHO) Regional Office for Europe. The Cochrane Collaboration has played a major part in synthesizing the evidence on which quality of care is based. More specifically, the Cochrane Effective Practice and Organisation of Care Group has published several reviews on the effectiveness of strategies for changing clinical practice and ensuring quality of care.

In 1995, the Council of Europe established a committee of experts to examine the issue of quality in health care. Its report was entitled “Dimensions of Quality Improvement Systems” (19) and it provided a framework for comparing the activities under way in different countries. In 1998, health ministers agreed to collaborate on quality in the health sector. The Austrian Federal Ministry of Health and Women’s Affairs published a summary of policies on quality in EU Member States, followed, in 2001, by a similar summary of activities and policies in the then candidate countries. The EU adopted a new health policy in May 2000, taking account of the 1998 review (18).

Within the EU, delivery of health care is the responsibility of individual countries. The European Court of Justice has upheld the principle that health services provided according to national regulations in any EU country will be of adequate quality, applying the principle of mutual recognition in its rulings. Yet within Europe the approach to quality in different countries varies, often for historical reasons, reflecting factors such as whether doctors have been state employees, subject to oversight of their work, or whether they view themselves as belonging to a liberal profession demanding a high degree of professional autonomy (18).

This situation gives rise to a fundamental contradiction (18). While successive European treaties have clearly stated that health care is the responsibility of Member States, the delivery of health care involves people, goods and services that are subject to European law. Thus there is a wide legislative spectrum relevant to quality of health care, ranging from those areas that are addressed exclusively at European level, through areas for which some, or all, countries have adopted common solutions, to those for which the arrangements are based on entirely local decisions. The same is true of initiatives developed by health care providers: they range from purely local approaches to those that have been adopted across many countries.

While many of the elements required for the delivery of high-quality health care are subject to European standards, such as the licensing of pharmaceuticals and certain technical aspects of health technology, there is still much to be done to ensure that European citizens can be confident that any care they receive within, or outside, their own Member State will be safe and of high quality.

Summarizing their findings, Legido-Quigley and colleagues (18) concluded that the variation between and within EU Member States – in terms of the approach each has adopted and the extent to which legislative measures for ensuring quality of care have been implemented – to some extent reflects the prevailing view in each country about whether health care quality is a legitimate matter for legislation or for other measures such as voluntary agreements. This is determined by national circumstances, and lack of legislation is not necessarily a weakness.

Furthermore, they have created three broad categories of Member States according to the state of the legislation and policies on quality of care, beyond those provisions (such as those for drug licensing and professional qualifications) that are common throughout the EU. The first category consists of countries that do not have any explicit legislation on quality of care, or national policies on quality (Bulgaria, Cyprus, Estonia, Greece, Hungary, Malta, Luxembourg, Latvia, Poland, Portugal, Romania and Slovakia). Although these countries have some initiatives in place, these are not systematically applied at a national level. The second category comprises those countries that have only recently either enacted legislation or implemented policies relating to quality of care (the Czech Republic, Lithuania, Slovenia and Ireland). The third category includes those countries that have a long tradition of enacting legislation and/or implementing quality-of-care strategies. Two subcategories were identified within this last category: those where major reform was not envisaged (France, Finland, Germany, Italy, Spain and Sweden) and those where major reforms were envisaged or in progress because of perceived limitations of existing systems (Austria, Belgium, the Netherlands, the United Kingdom/England and Denmark).

The degree to which countries have systems in place for auditing or monitoring clinical practice (using valid and relevant data derived from routine care) varies, as do how the data are used and fed back to those concerned.

2.6 Audit and feedback as an instrument to improve quality and safety of health care

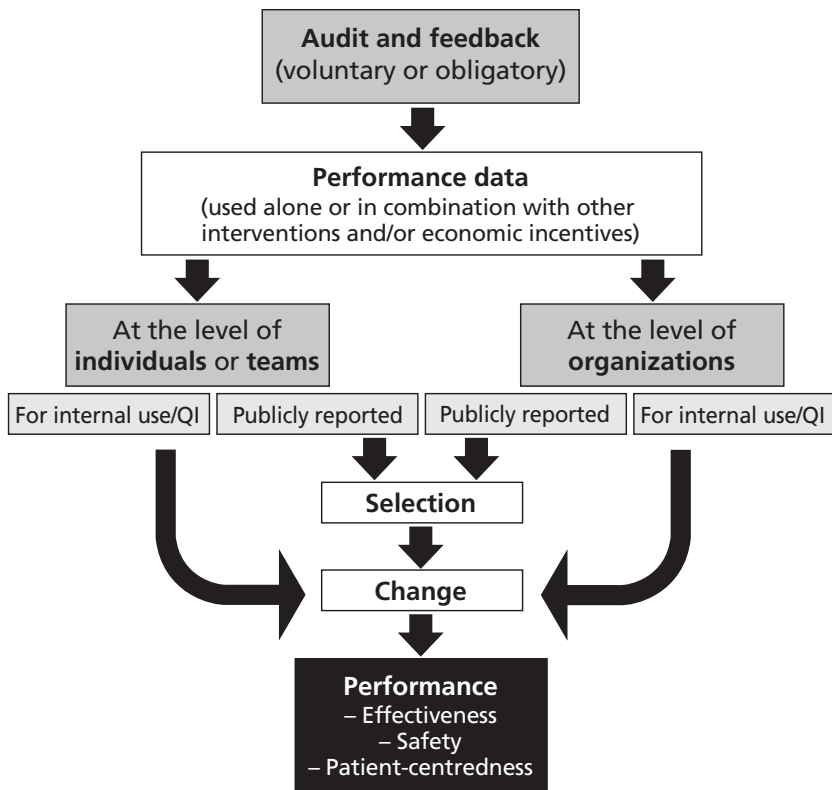
Audit and feedback, as a system for improving both the quality and safety of health care, can be applied in many different ways. Firstly, the aspects of performance that are being audited may vary, depending on the interests of those in charge of the audit, and the available information. An audit may, for instance, deal with prescriptions for specific health problems, test ordering, preventive tasks, communication skills or compliance with disease-specific clinical guidelines. Secondly, an audit can be based on routinely available data from electronic patient records or medical registries, or on data that are collected by the health professionals specifically for that purpose, as a kind of survey. Other kinds of audit are based on video observations, direct observations, or structured observations done by peers or by “simulated patients”.

Feedback can differ in terms of the recipients (individual or group), formats (verbal or written), sources (supervisor, senior colleague, professional standards review organization, representative of the employer or the purchaser, investigators), frequency, duration and content (information about patients, such as blood pressure or test results, adherence to standards or guidelines, peer comparisons, or information about costs, numbers of prescriptions or tests ordered). Audit and feedback mechanisms can be used alone or can be linked with other

interventions. In practice, most research on the effects of audit and feedback has studied the system as a component of a multifaceted intervention, often combined with educational activities.

Audit and feedback is a mechanism intended to enhance professional performance and thereby improve the quality of health care delivery, care and patient safety. Traditionally, this approach has been applied within service-delivery units, as internal activities. In some cases, the audit and feedback system is linked to financial measures, for instance as part of a system of paying for performance (see Section 3.3). It may also form part of the regulatory structures, being used in accreditation or organizational assessments. Fig. 1 illustrates different ways of organizing audit and feedback, and describes how the system might work.

Fig. 1. A model of audit and feedback



Source: adapted from (29).
 Note: QI: Quality improvement.

The audit and feedback system has been used in many ways in European health systems. The spectrum covers mandatory schemes run by governmental bodies through to voluntary professional (self-regulatory) initiatives. Audit and feedback can be top-down or bottom-up, or a combination of both. It can be applied as an internal system, it can be used by local groups of practitioners, or it can be used externally, i.e. run by professional bodies, research groups or governmental structures. These different approaches are illustrated here by some examples from various countries.

Ambulatory care: National Health Service, United Kingdom

In the United Kingdom in 2004, a national Government-driven programme was introduced to improve the quality of general practice, involving a new approach to the payment of general practitioners. The so-called Quality and Outcomes Framework currently covers 138 indicators encompassing administrative and clinical areas of the work of general practices. The salaries of general practitioners can improve as much as 25% when targets are reached. Although the cost was higher than anticipated (£1.76 billion, €2.14 billion) the initiative is deemed to be a success. However, criticism has arisen concerning continuity of care and the neglect of clinical areas for which no indicators have been introduced. Nursing representatives have complained that the arrangement does not reward nurses working in a general practice. The Quality and Outcomes Framework is an example of how increased funding can be linked with quality-improvement initiatives. Further information is available at <http://www.qof.ic.nhs.uk/>.

Specialist care: Visitatie Programme, the Netherlands

In the late 1980s, Dutch medical scientific organizations introduced a peer-review programme comprising a highly standardized on-site visit every 3–5 years called “Visitatie” (or “visit”). Conditions for realizing quality patient care (practice-keeping) and the systematic assurance and improvement of that care (the quality-management system) are stressed in the assessment. In an updated Visitatie model, a software-supported “professional quality profile” allows an in-depth view of specialist care facilities. The initiative is driven by the Kwaliteitsinstituut voor de Gezondheidszorg (Dutch Institute for Quality in Health Care; <http://www.cbo.nl>) to reassure the Government, the public and the insurers of the quality of specialist care, and to demonstrate the value of professional self-regulation. Visitatie is, therefore, an example of how health professionals can use audit and feedback as a tool for improving quality. Further information is available at <http://www.cbo.nl/thema/visitatie> (in Dutch).

Hospital care: BQS, Germany

With the introduction of diagnosis-related groups into German public hospital care, concerns about quality of care followed anticipated reductions in reimbursement rates. In 2001, therefore, a national mandatory benchmarking project for all German hospitals was introduced, comprising 26 areas of measurement, including patient-safety indicators. Public disclosure of data was introduced in 2007. Indicators were developed by a non-profit-making agency funded by public stakeholders (professionals, patient representatives and sick-fund experts). In 2008, 1730 acute-care hospitals participated, and the completeness of the data sets (cross-checked with reimbursement claims) was 97.6% in 2009. The feedback system is seen as providing a moderate stimulus for quality-improvement activities. To date, indicators relate to surgical procedures almost exclusively. The system is currently being reformed to broaden its scope. Further information is available at <http://www.g-ba.de> or www.bqs-outcome.de (both in German).

Community pharmacies: "simulated patients"

The use of simulated patients in research and audit (assessment) has become increasingly widespread in the last few decades. The use of so-called "pseudo customers", "pseudo patrons", "pseudo patients", "simulated patients", "standardized patients" and "mystery shoppers" originally gained popularity in business/marketing, but recently the technique has also been adapted in order to assess the quality of practice and the performance of individuals in the health sector, and to assess practice behaviour in pharmacies.

The simulated-patient technique is increasingly used in community pharmacies for audit and performance management purposes. Here, trained pharmacists simulate a patient and provide feedback to the colleague. There are standardized situations prepared for the actors, addressing various aspects of practice such as self-medication, interactions, medicines prescribed for the first time, etc. The unified criteria and standard guidelines are used to judge the results of individuals. Simulated-patient visits are regularly conducted by associations representing pharmacists in Germany, Sweden, Denmark, Finland, Belgium and the Netherlands, where, as in Ireland and Turkey it is conducted by the national regulatory authorities. As the simulated patients are paid and trained to be observant, it is believed that their feedback will be more reliable than that solicited from regular customers, assuming that the simulated patients are typical of regular patients. Indeed, as long as the simulated patient is assumed to be genuine, the technique will retain face validity.

In most cases, pharmacists receive feedback immediately after the assessment, though in Germany a letter is sometimes sent with the evaluation to the

pharmacy following the visit. There is insufficient research measuring the impact of simulated-patient visits in relation to the performance of individuals. However, most of the organizations find it a useful tool for helping to improve and sustain effective performance by pharmacists and for ensuring high standards for the services available in pharmacies.

The Pharmaceutical Association of Belgium (Association Pharmaceutique Belge) has developed a work-based professional development course that consists of three parts: an education course, simulated-patient visit and feedback, and work-based education addressing the needs identified during the simulated-patient visit. The individual pharmacies cover the costs of this service. In Denmark, the Association of Danish Pharmacies (Danmarks Apotekerforening) conducts regular simulated-patient visits and assesses all of the Danish pharmacies. Reported results have varied depending on the individual pharmacies and the situations used for the assessment. In the Netherlands, a yearly competition is organized by the Royal Dutch Pharmaceutical Association (Koninklijke Nederlandse Maatschappij ter bevordering der Pharmacie) and the award for the “Best Pharmacy in Counselling” is decided according to the results obtained from simulated-patient visits.

3 What do we know about the effects of the different ways in which audit and feedback are used?

3.1 Alternative ways of using audit and feedback

On the basis of systematic reviews on audit and feedback and experiences of how audit and feedback have been used in clinical practice, we have identified the following four policy and procedural options.

1. Various types of audit and feedback mechanisms can be used, including:
 - different levels of responsibility and involvement (individual health professionals, team/group/unit/department, hospital/clinic, regional, national); mandatory or voluntary professional approaches (self-regulation);
 - those initiated and/or led by health professionals/professional organizations or by health authorities;
 - different ways of monitoring or auditing practice (audit based on routinely collected data from electronic patient records, paper-based forms filled in manually during specific consultations for shorter periods, patient surveys, peer audits through practice visits, etc.);

- different sources of feedback (supervisor, senior colleague, professional standards review organization, representative of the employer/purchaser, investigators);
 - different feedback formats (computer-generated or paper-based feedback reports, verbal or written electronically or by mail – reports, reports delivered individually or through academic detailing/outreach visits, peer-group review, etc.);
 - those performed with different frequencies, durations and content;
 - those using data that can be analysed and fed back on an individual and/or group level;
 - feedback of individual or group-level data that can be supplemented with information about where individuals are and/or specific recommendations for change in practice; and
 - those using a common “core clinical journal”, embedded in the electronic patient record, which can be used to facilitate audit and feedback mechanisms and monitor patient flow between primary and secondary care.
2. Audit and feedback can be linked to economic incentives or to reimbursement schemes, e.g. result-based financing or pay-for-performance schemes.
 3. Audit and feedback can be a governance or regulatory arrangement, used in accreditation or organizational assessments.
 4. Performance and outcome data can be made public (though one has to consider the types of data that should be made public, and the purposes of such data release).

3.2 Does providing health care professionals with data about their performance improve their practice?

A key policy question is how successful audit and feedback mechanisms are in prompting health professionals to modify their practice (where feedback has shown that their clinical practice is inconsistent with that of their peers or accepted guidelines). In this context, several systematic reviews have assessed the effectiveness of audit and feedback (2, 14, 30, 31, 32, 33, 34, 35). As these provide an inconsistent picture, however, the most important policy lessons from these reviews are their insights into what works in which circumstances (although even here the findings are inconsistent). Several of the higher quality reviews are profiled below.

Grimshaw and colleagues (14) undertook a comprehensive review of the effects of using different strategies for implementing guidelines. They found that audit and feedback alone or combined with educational meetings and materials may result in modest improvements in the implementation of guidelines when compared with no intervention at all.

Stone and colleagues (34) reviewed studies of the relative effectiveness of various interventions, including audit and feedback, vis-à-vis health care providers, in the improvement of adult immunization and cancer screening. Thirteen of the studies included involved the provision of feedback. Feedback was not found to improve immunization or screening for cervical or colorectal cancer and only moderately improved mammographic screening.

A systematic review was performed by van der Veer and colleagues (35) to determine whether feedback from medical registries to health care professionals has any effect on the quality of care, and what the barriers and facilitators are with regard to the effectiveness of feedback. Of the 50 different feedback initiatives found, 31 were undertaken in inpatient settings and 12 were related to cardiovascular care. The timeliness of the feedback varied greatly from real-time to more than three years from the occurrence of an event to the reporting of the same event. The majority of the feedback initiatives comprised multifaceted approaches. Common elements included clinical education, support with improving processes and discussion- and educational meetings on the interpretation of the feedback. Of 22 analytic studies, 4 found a positive effect on all outcome measures, 8 found a mix of positive effects and no effects, and 10 did not find any effects. Process-of-care measures were more often positively affected by feedback than were outcome-of-care measures. The most frequently mentioned factors influencing the effectiveness of the feedback were as follows: (trust in) the quality of the data; the motivation of the recipients; organizational factors; and the outcome expectations of the feedback recipients.

Jamtvedt and colleagues (2) assessed the effects of audit and feedback on the practice of health care professionals and on patient outcomes. This Cochrane review included 118 studies: most had been done in North America (67 studies) and Western Europe (30 studies). The interventions used were very different with respect to their content, format, timing and source. In most of the trials, the health professionals involved were physicians. One study involved dentists, three involved nurses, two involved pharmacists and fourteen involved a combination of health professionals. Information about this systematic review is summarized in Table 1.

Table 1. The main systematic review (underlying this Policy Summary) conducted on the effects of audit and feedback and designed to assess the effects of this approach on patient outcomes and the practice of health care professionals

	Area of study	Findings of review authors
Interventions	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.	118 studies were included. The interventions used were highly heterogeneous with respect to their content, format, timing and source. Targeted behaviours: preventive care (21 trials), test ordering (14), prescribing (20), length of stay in hospitals (1) and general management of a variety of problems.
Participants	Health care professionals responsible for patient care.	In most trials the health care professionals were physicians. One study involved dentists, three involved nurses, two involved pharmacists and fourteen involved mixed providers.
Settings	Health care setting.	The studies were from the United States (58), Canada (9), Western Europe (30), Australia (9), Thailand (2), Uganda (1) and Laos (1).
Outcomes	Objectively measured provider performance or health care outcomes.	There was large variation in outcome measures, and many studies reported multiple outcomes.

Date of most recent search: January 2004. Limitations: this is a good-quality systematic review with only minor limitations.

Source: Jamtvedt et al. (2).

In 50 of the studies, one or more group(s) received a multifaceted intervention that included audit and feedback as one component. Multifaceted intervention was defined as an intervention with two or more components. Many studies reported multiple outcomes, although most were measures of process, such as prescribing or use of laboratory tests. Most of the studies were graded as being of moderate quality. In the analysis, the intensity of the audit and feedback, the complexity of the targeted behaviour, the seriousness of the outcome and the level of baseline compliance were categorized, since these factors might possibly serve to explain variations in the effects of audit and feedback across different studies. Eight different comparisons were analysed, and the main findings are summarized in Table 2 (a more complete breakdown of the findings by each comparison, see Annex 1).

Table 2. The main findings in the systematic review (underlying this Policy Summary) on the effects of audit and feedback; eight different comparisons analysed

Number of trials	Effect on outcome (compliance with the desired practice)	Main conclusions	Quality of evidence
<i>Any intervention within which audit and feedback is a component, compared with no intervention</i>			
72	Adjusted risk difference of compliance with the desired practice varied from a 16% absolute decrease in compliance to a 70% absolute increase in compliance. Median improvement was 5% across all studies (inter-quartile range, 3–11%). The adjusted risk ratio varied from 0.71 to 18.3 across studies (median, 1.08; inter-quartile range, 0.99–1.30).	Interventions that include audit and feedback as a component may improve compliance with desired practice in comparison with no intervention. The effects are generally small to moderate. Low baseline compliance and high intensity of audit and feedback are factors that may increase the effect of audit and feedback.	●●○○ Low
<i>Audit and feedback alone versus no intervention</i>			
44	Adjusted risk difference of compliance with desired practice varied from a 16% absolute decrease in compliance to a 32% absolute increase in compliance. Median improvement was 4% across all studies (inter-quartile range, 8–9%).	Audit and feedback alone may improve compliance with desired practice, in comparison with no intervention.	●●○○ Low

Table 2. The main findings in the systematic review (underlying this Policy Summary) on the effects of audit and feedback; eight different comparisons analysed (continued)

Number of trials	Effect on outcome (compliance with the desired practice)	Main conclusions	Quality of evidence
<i>Audit and feedback plus educational meeting versus no intervention</i>			
13	Adjusted risk difference of compliance with the desired practice varied from a 1% absolute decrease in compliance to a 24% absolute increase in compliance. Median improvement was 1.5% across all studies (inter-quartile range, 1–5.5%).	Audit and feedback coupled with educational meetings may improve compliance with desired practice, in comparison with no intervention.	●●○○ Low
<i>Multifaceted intervention with audit and feedback versus no intervention</i>			
40	Adjusted risk difference of compliance with the desired practice varied from a 9% absolute decrease in compliance to a 70% absolute increase in compliance. Median improvement was 5.7% across all studies (inter-quartile range, 8–13.6%).	Audit and feedback as part of a multifaceted intervention may improve compliance with desired practice, in comparison with no intervention.	●●○○ Low
<i>Short-term effects compared with longer-term effects after feedback stops (follow-up period varied from 3 weeks to 14 months)</i>			
8	No pooling of data.	Results are mixed regarding the comparison of short-term effects with longer-term effects of audit and feedback after feedback stops.	●●○○ Low
<i>Audit and feedback alone compared with audit and feedback combined with complementary intervention (e.g. reminders, economic incentives, outreach visits, opinion leaders, patient education material and quality improvement tools)</i>			
21	No pooling of data.	Some studies found an effect from adding other interventions to the audit and feedback, but most did not.	●●○○ Low

Table 2. The main findings in the systematic review (underlying this Policy Summary) on the effects of audit and feedback; eight different comparisons analysed (continued)

Number of trials	Effect on outcome (compliance with the desired practice)	Main conclusions	Quality of evidence
<i>Audit and feedback compared with other interventions (e.g. reminders, patient education, local opinion leaders, economic incentives, self-study and practice-based education)</i>			
7	No pooling of data.	<p>Reminders and the use of local opinion leaders may be more effective than audit and feedback.</p> <p>Audit and feedback reduced test ordering more than economic incentives did (one study).</p> <p>Studies comparing audit and feedback with patient education, self-study and practice-based education found no difference in effects.</p>	
<i>Different ways of doing audit and feedback compared: feedback with peer comparison versus feedback without peer comparison; group feedback versus individual feedback; feedback by peers versus feedback from non-physician observer</i>			
7	No pooling of data.	<p>No differences in performance were found between audit and feedback with peer comparison and that carried out without peer comparison. No differences in performance were found between group feedback versus group and individual feedback.</p> <p>Improvement might be more noticeable after mutual practice visits than after a visit by a non-physician observer.</p>	<p>●●○○ Low</p>

The Cochrane review on audit and feedback is now being updated. Some studies comparing different types of audit and feedback have been identified, and are being analysed.

The quality of the evidence is a judgement about the extent to which we can be confident that the estimates of effect are correct. These judgements are made using the GRADE system (Annex 2), and are provided for each outcome. The judgements are based on the type of study design (randomized trials versus observational studies), the risk of bias, the consistency of the results across studies and the precision of the overall estimate across studies. For each outcome, the quality of the evidence is rated as high, moderate, low or very low.

In addition to the main findings profiled in Table 2, the following elements are pertinent to an understanding of the (potential) impact of feedback on health professionals: the content of the feedback; the source of the feedback; the recipient of the feedback; and peer comparison.

Content of the feedback

As part of a study designed to improve five measures of quality of care, Kiefe and colleagues (36) compared audit and physician-specific feedback with an identical intervention plus feedback on progress towards achievable benchmarks. Uptake of influenza vaccination improved significantly in the group that was benchmarked, but there was no significant difference in overall outcomes. Two studies compared audit and feedback with and without peer comparison (37,38). No differences in performance were found between groups in either of the studies. One study that compared feedback on medication with feedback on performance found no differences in control of blood pressure (39).

Source of feedback

In one study, a system of mutual visits with feedback by peers was compared with a method involving visits plus feedback by a non-physician observer, and performance was measured using 208 indicators of practice management (40). Both methods were associated with improvements after a year, but each affected different things. Overall, the improvement was greater after visits by a peer than after a visit by a non-physician observer. As a means of improving the management of diabetes, Ward and colleagues (41) compared audit and feedback plus outreach by a physician with audit and feedback plus outreach by a nurse, but found no difference.

Recipient of the feedback

In one study focusing on the management of venous thromboembolism, there was no difference between a group-based audit and feedback system and a group-based audit plus individual feedback system (42).

Peer comparison

Forty-five of the trials in this review included peer-comparison feedback. The effects observed in these trials were similar to those of audit and feedback generally. There were no differences in the three studies that compared peer-comparison feedback with feedback without peer comparison (36,37,38). Thus, there is currently no basis for concluding that feedback involving peer comparison is either more or less effective than audit and feedback generally. In contrast to the conflicting conclusions of previous reviews on audit and feedback (30,31), the results from this review suggest that audit and feedback may be a useful intervention, although the effects are generally small, with or without peer comparison.

3.3 Performance measurement, data disclosure and quality improvement

It is outside the scope of this Policy Summary to give a detailed overview of other quality-improvement efforts linked to audit and feedback. In most health care systems, there is an increasing demand to measure the performance of health care providers. There is a vast literature on the opportunities and challenges associated with performance measurement. A recent book edited by Smith and colleagues (43) examines the various levels at which assessment of health-system performance is undertaken, the technical instruments and tools available and the implications using these may have for those charged with the governance of the health system.

The following section provides a brief look at (the lack of evidence around) the three key issues associated with audit and feedback from a policy perspective: pay-for-performance programmes; public disclosure of performance data; and the use of audit and feedback in accreditation or organizational assessments.

Do pay-for-performance programmes in health care improve quality of care?

Pay-for-performance programmes, or value-based purchasing, have been important in American health care, as well as in primary care in the United Kingdom and health care in other European countries. Arguments for the adoption of pay-for-performance programmes include the following: continued increases in medical costs beyond overall economic growth; a body of evidence indicating that the quality of health care provided to patients is not directly

related to the volume of services received; and the accumulation of data that can be used as a basis for the development of criteria for the measurement of clinical performance (44). Employers, government payers and health policy-makers have established a wide variety of pay-for-performance programmes, especially in the United States. So while the idea of paying health professionals for the quality (rather than the volume) of the health care appears attractive, does the pay-for-performance approach improve quality of care, and is there a risk of unintended consequences?

Rosenthal and Frank (45) reviewed empirical studies on paying for quality in 2003. They found only seven studies and little evidence to support the effectiveness of this measure. The studies included did not report unintended consequences. They also reviewed non-health settings and found that this literature was also mixed. Empirical evidence for the existence of unintended consequences of pay-for-performance programmes outside health care was, by contrast, relatively well established.

Petersen and colleagues (46) performed another systematic review of the effect of explicit financial incentives for performance on measures of health care quality. Of the 17 eligible studies, 13 examined process-of-care measures, mostly for preventive services. The majority found partial or positive effects on measures of quality, although the effect sizes were generally small. In two randomized trials, there was no difference relative to controls. The authors concluded that it is difficult to generalize from existing studies, but they suggested that incentives require very careful design (because they may have unintended consequences such as gaming behaviour or adverse selection) and that reporting, rather than actual practice, may improve. Those with the lowest baseline performance may improve the most yet garner the smallest amount of performance pay if threshold targets are used. This highlights the need to consider combined incentives for both overall improvement and achievement of a threshold. Policy-makers should consider whether the goal is to improve performance at the lower end of the spectrum, to maintain best performance, or to do both.

In the United Kingdom, Campbell and colleagues (47) used an interrupted time-series analysis of the quality of care for asthma, diabetes and heart disease in 42 representative primary care practices in England. Data were collected at two time points (1998 and 2003) before the implementation of the Quality and Outcomes Framework (see Box 1) and at two time points (2005 and 2007) after its implementation. There had been rapid improvement in the quality of care for all three conditions before the introduction of pay-for-performance programmes.

Box 1. The United Kingdom Quality and Outcomes Framework

The Quality and Outcomes Framework was introduced in the United Kingdom in 2003 as part of the general medical services contract between the National Health Service and general practitioners. It establishes standards (indicators) in five major domains for general practitioners: clinical; patient experience; additional services; holistic care; and organizational. The Quality and Outcomes Framework is used to determine 25% of general practitioners' payment each year. In a review of the current approaches to developing and disseminating standards in the National Health Service (48), the authors found several aspects of the Quality and Outcomes Framework standards notable.

- The standards were developed by a negotiating team composed of the National Health Service Confederation and the General Practitioners Committee of the British Medical Association. The negotiating team is advised by an academic consortium.
- The Quality and Outcomes Framework represents a fundamental change in the standards for evaluating physicians, from a reliance on training and licensing to a requirement for evidence of performance in practice.
- About two-thirds of the standards relate to clinical care delivery and the majority are based on national guidelines.
- The Quality and Outcomes Framework represents an alignment between financial incentives and the standards of good medical care.
- The Quality and Outcomes Framework encouraged the adoption of electronic medical records in general practitioner practices because the information necessary to determine performance against standards could be routinely extracted from these records.
- Practice consistent with these standards requires proactive management of patients and involvement by the entire practice team.
- The Quality and Outcomes Framework has been updated to change thresholds and add new conditions and indicators.

Under the scheme, and between 2003 and 2005, the rate of improvement in the quality of care increased for asthma and diabetes, but not for heart disease. By 2007, the rate of improvement had slowed for all three conditions, and the quality of those aspects of care that were not associated with an incentive had declined for patients with asthma or heart disease. No significant changes were seen in patients' reports on access to care or on interpersonal aspects of care. The level of continuity of care, which had been constant, was reduced immediately after the introduction of the pay-for-performance scheme, and then continued at that reduced level. The authors state that the data suggest that the Quality and Outcomes Framework in England attained its quality-

improvement goals but that the pace of improvement had not been sustained once these goals had been reached. Contrary to what critics had warned, the scheme in England has apparently led to a reduction in sociodemographic inequalities in the delivery of primary clinical care (49). A recent study provides a more equivocal view, suggesting that inequalities in chronic disease management have persisted after the introduction of the Quality and Outcomes Framework (50).

Does public disclosure of performance data improve quality of care?

Recognizing the sensitivities associated with the public release of performance data as means of helping patients to make better decisions about the providers they use, nonetheless this is an issue widely discussed in policy circles.

Berwick, James and Coye (29) propose two pathways by which public reporting might improve performance: selection or change (Fig. 1, p. 8). These pathways are interconnected by a provider's motivation to maintain or increase market share. In the "selection pathway", a consumer (patient, purchaser, regulator, contractor or referring clinician) obtains, compares and contrasts publicly released performance data to try to obtain the best quality for the best price (value-based purchasing). The consumer then selects (or rewards, recognizes, punishes or pays) a member of the group (e.g. a family physician, a surgeon or a hospital). In the "change pathway", performance results help organizations understand and improve their care processes to improve their performance. Change may occur through pressure to avoid being identified as a poor-quality provider, or, in some cases, by prompting poor-quality providers to cease practising. The change pathway also includes external incentives such as government interventions rewarding highly performing providers or sanctioning poorly performing ones.

Systematic reviews on publicly reported performance data on quality of care have shown inconsistent results (51,52). Fung and colleagues (51) included 45 articles in their review, but found it difficult to make comparisons across studies because of heterogeneity.

Indeed, there is scant evidence regarding public disclosure of performance data, particularly about individual providers and practices. Many major public reporting systems have not been rigorously evaluated (51). Evidence suggests that public release of performance data stimulates quality-improvement activity at hospital level. However, the effect public disclosure of performance data has on effectiveness, safety and patient-centredness remains uncertain.

Does audit and feedback as a governance or regulatory arrangement, used in accreditation or organizational assessments, improve quality of care?

Since the 1970s, health care accreditation programmes and accrediting organizations have emerged and developed internationally. There are now many national accreditation organizations and an international body, the International Society for Quality in Health Care, which now has members in over 70 countries. Involvement in accreditation is variable, but in many parts of the world accreditation is now an important and accepted part of quality-improvement activities.

Greenfield and Braithwaite (53) have reviewed and analysed the research on accreditation and accreditation processes. They included empirical work that systematically examined accreditation or the accreditation process, and identified 66 documents meeting their criteria. The impact of accreditation has been researched with a variety of foci and to differing degrees. The picture was complex, with improvements having been reported in some fields but not in others. The review did not report on the design or the quality of the included studies, and did not give quantitative estimates of the effects of accreditation.

We have not identified high-quality systematic reviews assessing the effects of accreditation or organizational assessments, so it is not possible to draw firm conclusions based on rigorous evidence.

4 How to decide if – and how – audit and feedback should be implemented

4.1 Factors that might explain variations in the effectiveness of audit and feedback

On the basis of evidence from systematic reviews of randomized controlled studies, we know that audit and feedback may improve performance to a small to moderate degree, and that some studies showed larger effect sizes. In view of this, it would be potentially very useful to know how to use audit and feedback in the most efficient way, but what do we know about the factors that might explain variations in the effectiveness of this technique?

On the basis of the systematic review underlying this Policy Summary, we know that the effects of audit and feedback are greater where existing practice is further away from what is desired (2). A greater intensity of audit and feedback is also more effective (2). Intensity can be categorized according to characteristics that are important in explaining differences in the effectiveness of audit and feedback, and then can be ranked from 'more' to 'less'. The characteristics are:

- the recipient (individual or group);
- the format (verbal, written, or both);
- the source (a supervisor or senior colleague, or a professional standards review organization or a representative of the employer or purchaser, or the investigators);
- the frequency of the feedback, categorized as frequent (up to weekly), moderate (up to monthly) and infrequent (less than monthly);
- the duration of feedback, categorized as prolonged (one year or more), moderate (between one month and one year) and brief (less than one month); and
- the content of the feedback (patient information, such as blood pressure or test results, compliance with a standard or guideline, or peer comparison, or information about costs or numbers of tests ordered or prescriptions).

Thus a more intensive feedback would include both verbal and written feedback given frequently with prolonged duration to an individual health professional by a supervisor or senior colleague. The content of the feedback should be information directly related to patients.

Factors such as the type of intervention (audit and feedback alone, or coupled with educational activities or multifaceted interventions), the complexity of the behaviour being targeted, the study quality or the seriousness of the outcome did not serve to explain the variation in relative effects across studies, however (2).

No empirical evidence comparing the effectiveness of compulsory versus voluntary audit and feedback has been found. Nor is any robust evidence available to clarify whether audit and feedback organized internally (by health professionals themselves) or externally (by professional organizations or health authorities) differ in effectiveness. Similarly, on the basis of the systematic reviews, there is no information on the costs, or cost-effectiveness, of implementing audit and feedback.

Foy and colleagues (54) examined whether guidelines and evidence from systematic reviews on audit and feedback help to inform practical decisions about their use in practice. They selected diabetes mellitus as a topic, and used evidence from an earlier version of the Jamtvedt et al. review (2) along with "Principles for Best Practice in Clinical Audit" from the National Institute for Clinical Excellence (1). They concluded that the evidence was of limited use in informing the operational implementation of evidence-based audit and feedback. This was mainly because of the heterogeneity of the studies, the problems of interpreting subgroups of studies, and the lack of head-to-head

comparisons to allow important questions to be answered. They suggested that conceptualizing audit and feedback within a theoretical framework might offer a way forward.

4.2 Theories on how to improve the effectiveness of audit and feedback

A further question to be considered is whether, and to what extent, behaviours might help to explain the observed variations in the effects of audit and feedback mechanisms. In this regard, we have identified two systematic reviews that have sought to apply different theories of behaviour change to assess the differential impacts.

Hysong (55) considered the explanatory potential of Feedback Intervention Theory (56), a theory derived from industrial/organizational psychology vis-à-vis the observed variability in audit and feedback. The theory predicts that audit and feedback will be more effective where feedback emphasizes features of the clinical task to be performed (e.g. specifies a target performance, presents information on how target performance can be attained, and provides a commentary on the degree of change in performance observed since previous feedback). It also predicts that audit and feedback will be less effective where it focuses on the feedback recipient (e.g. discouragement or praise of performance). The review included only studies of audit and feedback alone versus no intervention, and identified 19 such studies. Audit and feedback had a modest, though statistically significant, effect on performance. Four moderators significantly impacted on the effect of audit and feedback: (1) correct solution information (providing specific suggestions for improvement) and (2) written feedback delivery increased the effect of feedback, whereas (3) verbal feedback delivery and (4) graphic feedback delivery reduced the effect. In addition, it was found that more frequent feedback significantly increased the effect. Normative information and public delivery of feedback did not seem to have any impact on the outcomes.

Meanwhile, another review (57) that involved a wider search of the literature on theories of behaviour change found that the self-regulatory techniques of change underpinning audit and feedback map most closely onto Control Theory. According to Control Theory (58), people are most likely to change their behaviour if feedback of performance is accompanied by comparison with a behavioural target and action plans. Eighty-five comparisons from 61 studies were examined in the review. Despite this wealth of information from randomized trials, few interventions explicitly incorporated targets or action plans. Because of the paucity of available evidence regarding theory-derived components, the authors were not able to test the theoretical hypotheses.

4.3 Qualitative studies suggesting how audit and feedback can be used more efficiently

We have not identified any systematic review of qualitative studies examining how the experience of receiving feedback might explain variations in effects, but we have identified some qualitative studies proposing hypotheses as to how audit and feedback could be used more efficiently.

Hysong and colleagues (59) used a qualitative approach to study differences in how high- and low-performing medical organizations dealt with clinical audit data as a source of feedback. The high-performing facilities delivered feedback in a timely (monthly or more frequently), individualized way, and the tone of the feedback was non-punitive in style. The low-performing facilities were more variable in their timeliness and relied on more standardized facility-level reports as a source of feedback (with one facility reporting a punitive atmosphere). On the basis of 102 interviews with employees from the six facilities studied, the concept of actionable feedback emerged as a core category of the data. The model of actionable feedback includes, in hierarchical order: timeliness, individualization, non-punitiveness and customizability. The authors claim that this model is consistent with existing individual feedback theories and research, as laid out in the Feedback Intervention Theory (56).

The performance of health professionals comprises several domains of professional competence. Multisource feedback or 360-degree feedback is an approach used to assess these areas, particularly the humanistic and relational competencies. This method has been used in the United States, the United Kingdom, Canada and the Netherlands. Qualitative studies exploring incentives or disincentives for health professionals to implement suggestions for improvement from 360-degree feedback may also be relevant for other types of feedback.

Sargeant and colleagues (60) held focus groups with family physicians participating in a pilot study in Canada. The exploration of physicians' reactions to 360-degree feedback suggested that perceptions of the credibility, accuracy and usefulness of the feedback influenced how, and if, the physicians used their feedback for practice improvement and continued learning. In 2007, 109 consultants in the Netherlands were assessed using 360-degree feedback and portfolio learning. Overeem and colleagues (61) carried out semi-structured interviews with 23 of these consultants and identified four groups of factors that can influence improvement after 360-degree feedback: (1) contextual factors related to workload, lack of openness and social support, lack of commitment from hospital management, free-market principles and public distrust; (2) factors related to feedback (negative feedback was generally difficult to accept, especially when it did not resonate with their self-perceived performance); (3) characteristics of the assessment system, such as facilitators

and a portfolio to encourage reflection, concrete improvement goals and annual follow-up interviews; and (4) individual factors, such as self-efficacy and motivation.

5 Closing observations

Current standards of clinical care are increasingly founded on solid evidence derived from high-quality studies. Modern communication methods are making these standards available more rapidly to the clinical community than ever before. Nevertheless, wide variation in quality of care can be observed throughout all Member States of the WHO European Region, and this is due to a multitude of factors. To ensure the appropriate use of knowledge and, consequently, of resources, quality assurance frameworks are in place to a variable extent in many Member States. Within these frameworks, the audit and feedback system has gained significant importance because of its pragmatic approach in linking performance and outcome data either to organizations (such as hospitals) or to individual health care providers. Presenting health care providers with their own performance data in comparison with aggregated data from other institutions has been thought to improve standards of care.

This Policy Summary has shown that the audit and feedback system has the potential to influence the behaviour of providers in a positive way. The system comprises a wide range of measures and, as the analysis has shown, no gold standard exists with regard to how best to implement these activities. The variation in effects across different studies is not explicable on the basis of any of the following factors: type of intervention (audit and feedback alone or coupled with educational activities or multifaceted interventions); the complexity of the behaviour being targeted; the study quality; or the seriousness of the outcome (2). On the basis of an extensive overview of the relevant literature, it appears that the overall effect of audit and feedback on behavioural change among providers has been modest. Furthermore, the quality of the evidence (as so often in the field of quality-improvement measures) is poor. This is also the case regarding the use of peer comparison to enhance the outcomes of audit and feedback. There is currently no basis for concluding that feedback involving peer comparison is either more or less effective than audit and feedback generally. Importantly, the scope for improvement is greatest in those areas where existing practice is furthest away from what is desired. Audit and feedback should be seen as a component of a multifaceted strategy to improve health care quality.

The studies presented in this Policy Summary show that the audit and feedback approach can be used in almost all health care settings. Its implementation requires clear goals and a thorough analysis of the health care environment

in question, particularly when this approach is combined with incentives and penalties, or is made mandatory. Again, no strong evidence has been identified indicating that these combinations significantly improve the outcomes of audit and feedback and, consequently, of the health care delivered. Nonetheless, experience of some major initiatives in certain European countries promises to provide some of the necessary evidence.

Although the evidence is not overwhelming with respect to the effects of audit and feedback, its future usage will probably not remain limited to the traditional performance-related focus of health care quality (e.g. the rate of eye examinations in diabetic patients). Data regarding patient safety and health workforce indicators (such as absenteeism) may have the potential to improve the performance of health care providers. To date, however, information regarding the usage of audit and feedback in these fields is sparse. Given the importance of both topics, audit and feedback mechanisms will probably find further applications.

Unfortunately, despite having evidence from systematic reviews of more than 100 studies on audit and feedback, we still have limited information with which to support decisions on how best to use audit and feedback in routine health care. Nonetheless, the provision of adequate support for audit and feedback programmes is likely to be vital in ensuring effectiveness when scaling up.

Nonetheless, decisions about if, and how, audit and feedback can be used to improve professional practice must be guided by pragmatism and local circumstances, including whether:

- the known or anticipated baseline compliance to guidelines or the desired practice is low;
- conducting an audit is feasible and the costs of collecting data are low;
- routinely collected data are reliable and could be used for the audit; and
- small to moderate improvements would be worthwhile.

The impact of audit and feedback, with or without additional interventions, should be monitored routinely by auditing practice after the intervention.

References

1. National Institute for Clinical Excellence. *Principles for best practice in clinical audit*. Abingdon, Radcliffe Medical Press, 2002.
2. Jamtvedt G et al. Audit and feedback: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, 2006, no. 2, CD000259.

3. Asch SM et al. Who is at greatest risk for receiving poor-quality health care? *New England Journal of Medicine*, 2006, 354(11):1147–1156.
4. Chassin MR, Galvin RW. The urgent need to improve health care quality. Institute of Medicine National Roundtable on Health Care Quality. *JAMA*, 1998, 280(11):1000–1005.
5. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet*, 2003, 362(9391):1225–1230.
6. McGlynn EA et al. The quality of health care delivered to adults in the United States. *New England Journal of Medicine*, 2003, 348(26):2635–2645.
7. Andersen TF, Mooney G. *The challenges of medical practice variations*. London, Macmillan, 1990.
8. McPherson K et al. Small-area variations in the use of common surgical procedures: an international comparison of New England, England, and Norway. *New England Journal of Medicine*, 1982, 307(21):1310–1314.
9. Wennberg J, Gittelsohn A. Small area variations in health care delivery. *Science*, 1973, 182(117):1102–1108.
10. Garrido MV. *Health technology assessment and health policy-making in Europe. Current status, challenges and potential*. Copenhagen, WHO Regional Office for Europe, on behalf of the European Observatory on Health Systems and Policies, 2008.
11. Guyatt GH et al. Going from evidence to recommendations. *BMJ*, 2008, 336(7652):1049–1051.
12. Bero LA et al. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ*, 1998, 317(7156):465–468.
13. Grimshaw JM et al. Changing provider behavior: an overview of systematic reviews of interventions. *Medical Care*, 2001, 39(8 Suppl 2):2–45.
14. Grimshaw JM et al. Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technology Assessment*, 2004, 8(6):iii–iv, 1–72.
15. Grol R, Wensing M, Eccles M. *Improving patient care: the implementation of change in clinical practice*. Elsevier, Edinburgh, 2004.

16. Colthart I et al. The effectiveness of self-assessment on the identification of learner needs, learner activity, and impact on clinical practice: BEME guide no. 10. *Medical Teacher*, 2008, 30(2):124–145.
17. Davis DA et al. Accuracy of physician self-assessment compared with observed measures of competence: a systematic review. *JAMA*, 2006, 296(9):1094–1102.
18. Legido-Quigley H et al. *Assuring the quality of health care in the European Union*. Copenhagen, WHO Regional Office for Europe, on behalf of the European Observatory on Health Systems and Policies, 2008.
19. Council of Europe. *The development and implementation of quality improvement systems (QIS) in health care – recommendation no. R (97) 17 and explanatory memorandum*. Strasbourg, Council of Europe, 1998.
20. Institute of Medicine. *Medicare: a strategy for quality assurance*. Washington, DC, National Academy Press, 1990.
21. Braithwaite J, Healy J, Dwan K. *The governance of health safety and quality*. Canberra, Commonwealth of Australia, 2005.
22. Donabedian, A. The quality of care. How can it be assessed? *JAMA*, 1988, 260(12):1743–1748.
23. Brook RH, McGlynn EA, Cleary PD. Quality of health care. Part 2: measuring quality of care. *New England Journal of Medicine*, 1996, 335(13):966–970.
24. Lilford RJ, Brown CA, Nicholl J. Use of process measures to monitor the quality of clinical practice. *BMJ*, 2007, 335(7621):648–650.
25. Groene O, Skau JK, Frølich, A. An international review of projects on hospital performance assessment. *International Journal for Quality in Health Care*, 2008, 20(3):162–171.
26. Drife J. Fifty years of the confidential enquiry into maternal deaths. *British Journal of Hospital Medicine*, 2006, 67(3):121–125.
27. McGlynn EA. Measuring clinical quality and appropriateness. In: Smith PC et al., eds. *Performance measurement for health system improvement: experiences, challenges and prospects*. Cambridge, Cambridge University Press, 2009:87–113.
28. Akl EA et al. NorthStar, a support tool for the design and evaluation of quality improvement interventions in healthcare. *Implementation Science*, 2007, 2:19.
29. Berwick DM, James B, Coye MJ. Connections between quality measurement and improvement. *Medical Care*, 2003, 41(1 Suppl):I-30–I-38.

30. Axt-Adam P, van der Wouden JC, van der Does DE. Influencing behavior of physicians ordering laboratory tests: a literature study. *Medical Care*, 1993, 31(9):784–794.
31. Balas EA et al. Effect of physician profiling on utilization. Meta-analysis of randomized clinical trials. *Journal of General Internal Medicine*, 1996, 11(10):584–590.
32. Buntinx F et al. Influencing diagnostic and preventive performance in ambulatory care by feedback and reminders. A review. *Family Practice*, 1993, 10(2):219–228.
33. Mugford M, Banfield P, O'Hanlon M. Effects of feedback of information on clinical practice: a review. *BMJ*, 1991, 303(6799):398–402.
34. Stone EG et al. Interventions that increase use of adult immunization and cancer screening services: a meta-analysis. *Annals of Internal Medicine*, 2002, 136(9):641–651.
35. van der Veer SN et al. Improving quality of care. A systematic review on how medical registries provide information feedback to health care providers. *International Journal of Medical Informatics*, 2010, 79(5):305–323.
36. Kiefe CI et al. Improving quality improvement using achievable benchmarks for physician feedback: a randomized controlled trial. *JAMA*, 2001, 285(22):2871–2879.
37. Søndergaard J et al. Mailed prescriber feedback in addition to a clinical guideline has no impact: a randomised, controlled trial. *Scandinavian Journal of Primary Health Care*, 2003, 21(1):47–51.
38. Wones RG. Failure of low-cost audits with feedback to reduce laboratory test utilization. *Medical Care*, 1987, 25(1):78–82.
39. Gullion DS et al. Management of hypertension in private practice: a randomized controlled trial in continuing medical education. *Journal of Continuing Education in the Health Professions*, 1988, 8(4):239–255.
40. van den Hombergh P et al. Practice visits as a tool in quality improvement: mutual visits and feedback by peers compared with visits and feedback by non-physician observers. *Quality in Health Care*, 1999, 8(3):161–166.
41. Ward A et al. Educational feedback in management of diabetes in general practice. *Education for General Practice*, 1996, 7:142–150.
42. Anderson FA et al. Changing clinical practice. Prospective study of the impact of continuing medical education and quality assurance programs on use of prophylaxis for venous thromboembolism. *Archives of Internal Medicine*, 1994, 154(6):669–677.

43. Smith PC et al, eds. *Performance measurement for health system improvement: experiences, challenges and prospects*. Cambridge, Cambridge University Press, 2010.
44. Rowe JW. Pay-for-performance and accountability: related themes in improving health care. *Annals of Internal Medicine*, 2006, 145(9):695–699.
45. Rosenthal MB, Frank RG. What is the empirical basis for paying for quality in health care? *Medical Care Research and Review*, 2006, 63(2):135–157.
46. Petersen LA et al. Does pay-for-performance improve the quality of health care? *Annals of Internal Medicine*, 2006, 145(4):265–272.
47. Campbell SM et al. Effects of pay for performance on the quality of primary care in England. *New England Journal of Medicine*, 2009, 361(4):368–378.
48. McGlynn EA, Shekelle P, Hussey P. *Developing, disseminating and assessing standards in the National Health Service*. Cambridge, RAND Health, 2008.
49. Doran T et al. Effect of financial incentives on inequalities in the delivery of primary clinical care in England: analysis of clinical activity indicators for the quality and outcomes framework. *Lancet*, 2008, 372(9640):728–736.
50. Alshamsan R et al. Impact of pay for performance on inequalities in health care: systematic review. *Journal of Health Services Research and Policy*, 2010, 15(3):178–184.
51. Fung CH et al. Systematic review: the evidence that publishing patient care performance data improves quality of care. *Annals of Internal Medicine*, 2008, 148(2):111–123.
52. Marshall MN et al. The public release of performance data: what do we expect to gain? A review of the evidence. *JAMA*, 2000, 283(14):1866–1874.
53. Greenfield D, Braithwaite J. Health sector accreditation research: a systematic review. *International Journal for Quality in Health Care*, 2008, 20(3):172–183.
54. Foy R et al. What do we know about how to do audit and feedback? Pitfalls in applying evidence from a systematic review. *BMC Health Services Research*, 2005, 5:50.
55. Hysong SJ. Meta-analysis: audit and feedback features impact effectiveness on care quality. *Medical Care*, 2009, 47(3):356–363.
56. Kluger AN, DeNisi A. The effects of feedback interventions on performance: a historical review, a meta-analysis, and a preliminary feedback intervention theory. *Psychological Bulletin*, 1996, 119:254–284.

57. Gardner B et al. Using theory to synthesise evidence from behaviour change interventions: the example of audit and feedback. *Social Science and Medicine*, 2010, 70(10):1618–1625.

58. Carver CS, Scheier MF. Control theory: a useful conceptual framework for personality-social, clinical and health psychology. *Psychological Bulletin*, 1982, 92:111–135.

59. Hysong SJ, Best RG, Pugh JA. Audit and feedback and clinical practice guideline adherence: making feedback actionable. *Implementation Science*, 2006, 1:9.

60. Sargeant J, Mann K, Ferrier S. Exploring family physicians' reactions to multisource feedback: perceptions of credibility and usefulness. *Medical Education*, 2005, 39(5):497–504.

61. Overeem K et al. Doctors' perceptions of why 360-degree feedback does (not) work: a qualitative study. *Medical Education*, 2009, 43(9):874–882.

Annex 1. Summary of the main findings for eight comparisons on the use of audit and feedback

Any intervention in which the audit and feedback system is a component, compared with no intervention

The primary aim of the review was to compare any interventions that included audit and feedback with no intervention. The reviewers identified a total of 88 comparisons from 72 studies with more than 13 500 health professionals. There were 64 comparisons using dichotomous outcomes from 49 trials, and 24 comparisons of continuous outcomes from 23 trials. The dichotomous outcomes were generally adherence versus non-adherence to guidelines or the desired practice regarding, for instance, prescriptions, test use or other clinical tasks, whereas continuous outcomes related to different degrees of improvement, for instance reductions in the number of tests ordered. There was substantial variation in the results among the studies, with a few studies showing large improvements with audit and feedback and a few with negative results. Most studies showed small to moderate improvements, and the main conclusions were as follows.

- Interventions that include the audit and feedback system as one component may improve compliance with desired practice, in comparison with no intervention.

- The effects are generally small to moderate.
- A low level of baseline compliance and high-intensity audit and feedback are factors that may increase the effect of audit and feedback.

As summarized below, the audit and feedback approach has a larger relative effect on those health care professionals who start with low compliance with desired practice compared with those who start with high compliance.

Impact of audit and feedback on health care professionals starting with low and high compliance

Participants: health care professionals

Settings: different health care settings

Intervention: highly heterogeneous interventions that included audit and feedback

Comparison: no intervention aimed at improving practice

Outcome	Impact on health care professionals			Number of studies	Quality of the evidence (GRADE)
	Without audit and feedback	With audit and feedback	Relative change		
Starting with low compliance	40 per 100	54 per 100	35% relative increase	49	●●○○ Low
Starting with high compliance	70 per 100	83 per 100	19% relative increase		

Audit and feedback alone, compared with no intervention

The second comparison in the review was audit and feedback alone, compared with no intervention. Forty-four trials with 51 comparisons were identified, reporting 52 different outcomes. Audit and feedback alone was found to be able to improve compliance with the desired practice when compared with no intervention.

Audit and feedback alone, compared with no intervention

Participants: health care professionals

Settings: different health care settings

Intervention: audit and feedback alone

Comparison: no intervention aimed at improving practice

Outcomes	Absolute effect Median adjusted increase in compliance with desired practice (interquartile range)	Relative effect Median adjusted risk ratio (interquartile range)	Number of participants (studies)	Quality of the evidence (GRADE)*
Compliance with desired practice	4%† (-0.8–9.0%)	1.07 (0.98–1.18)	More than 8000 (44)‡	●●○○ Low

*GRADE: GRADE Working Group grades of evidence.

†Median (and interquartile range) for risk differences from 35 comparisons with dichotomous outcomes adjusted for baseline differences in compliance.

‡35 comparisons in the 45 studies reported dichotomous outcomes.

Audit and feedback with educational meetings, compared with no intervention

The audit and feedback approach is often combined with educational meetings. In the systematic review, a total of 24 comparisons from 13 trials made a comparison between audit and feedback plus educational meetings and no intervention. On the basis of evidence from the identified studies, the authors concluded that audit and feedback combined with educational meetings may improve compliance with desired practice in comparison with no intervention.

Audit and feedback plus educational meetings, compared with no intervention

Participants: health care professionals

Settings: different health care settings

Intervention: audit and feedback plus educational meetings

Comparison: no intervention aimed at improving practice

Outcomes	Absolute effect Median adjusted increase in compliance with desired practice (interquartile range)	Relative effect Median adjusted risk ratio (interquartile range)	Number of participants (studies)	Quality of the evidence (GRADE)*
Compliance with desired practice	1.5%† (1.0–5.5%)	1.06 (1.03–1.09)	(13)‡	●●○○ Low

*GRADE: GRADE Working Group grades of evidence.

†Median (and interquartile range) for risk differences from 35 comparisons with dichotomous outcomes adjusted for baseline differences in compliance.

‡5 comparisons in the 13 studies reported dichotomous outcomes.

Audit and feedback as part of a multifaceted intervention, compared with no intervention

The audit and feedback approach is often part of a combination of interventions. The review authors identified 50 comparisons from 40 trials comparing audit and feedback as part of a multifaceted intervention with no intervention, and concluded that audit and feedback as part of a multifaceted intervention may improve compliance with desired practice, in comparison with no intervention.

Audit and feedback as part of a multifaceted intervention, compared with no intervention

Participants: health care professionals

Settings: different health care settings

Intervention: audit and feedback as part of a multifaceted intervention

Comparison: no intervention aimed at improving practice

Outcomes	Absolute effect Median adjusted increase in compliance with desired practice (interquartile range)	Relative effect Median adjusted risk ratio (interquartile range)	Number of participants (studies)	Quality of the evidence (GRADE)*
Compliance with desired practice	24%† (5–49%)	1.10 (1.03–1.36)	(40)‡	●●○○ Low

*GRADE: GRADE Working Group grades of evidence.

†Median (and interquartile range) for risk differences from 35 comparisons with dichotomous outcomes adjusted for baseline differences in compliance.

‡41 comparisons in the 40 studies reported dichotomous outcomes.

Short- and long-term effects of audit and feedback

Eight trials with 11 comparisons of the short-term effects of audit and feedback with effects observed in the longer term (after feedback had stopped) were found. In these studies, the follow-up periods varied from 3 weeks to 14 months. The results were mixed: some studies showed persistence of effects and others did not.

Audit and feedback combined with complementary interventions, compared with audit and feedback alone

Twenty-one trials with 25 comparisons were included. In all trials, a multifaceted intervention with audit and feedback was compared with audit and feedback alone. The complementary interventions included reminders, economic incentives, outreach visits, opinion leaders, patient-education material and quality-improvement tools. Some studies found an effect from the addition of other interventions to audit and feedback, but most did not.

Four trials compared audit and feedback with audit and feedback plus reminders (1,2,3,4). The addition of reminders to audit and feedback gave a 47% reduction in X-ray referrals compared with audit and feedback alone (3). Tierney and colleagues (4) also found that an approach in which reminders were combined with audit and feedback was 36% more effective than feedback alone. The two other studies found no additive effect of combining reminders with audit and feedback.

Two studies compared audit and feedback with audit and feedback plus incentives (5,6). Fairbrother and colleagues (5) compared audit and feedback alone with audit and feedback plus a one-off financial bonus based on up-to-date coverage for four immunizations, and also with audit and feedback plus an "enhanced fee for service" (US\$ 5 for each vaccine administered within 30 days of its due date). Rates of immunization improved significantly from 29% to 54% coverage in the bonus group after eight months. However, the percentage of immunizations received outside the practice also increased significantly in this group. No change was seen in those groups receiving enhanced fee-for-service and audit and feedback alone. However, there were only 15 physicians in each comparison group and there were differences among them at the beginning of the study (although this was controlled for in the analysis). In a high-quality study (6), the addition of incentives to audit and feedback had no significant effect when guidelines for cancer screening were being implemented.

Three studies (7,8,9) compared audit and feedback with audit and feedback plus outreach visits. In one study, two out of seven outcomes improved, but the summary measure encompassing all outcomes showed no improvement (8). In a three-way comparison studying improvement of diabetes care, Ward and colleagues (9) compared feedback with feedback plus outreach by a nurse, or feedback plus outreach by a peer. Both groups receiving outreach demonstrated greater improvements than the group receiving feedback alone. Borgiel and colleagues (7) found no additional effect with outreach.

Three studies examined the effect of using opinion leaders in addition to audit and feedback. Guadagnoli and colleagues (10) found improved discussion of

surgical treatment options with patients suffering from breast cancer in both groups, but found that there was no difference between them. Sauaia and colleagues (11) compared on-site verbal feedback by an opinion leader (an expert cardiologist) with mailed feedback and found that feedback by cardiologist was mostly ineffective in improving care for heart attacks. In a high-quality study, Soumerai and colleagues (12) found that the involvement of an opinion leader had no additional effect on the proportion of patients with a heart attack receiving certain appropriate drugs.

One trial compared audit and feedback plus patient educational materials with audit and feedback alone (13) and found that the addition of patient education to audit and feedback had no influence on antibiotic prescribing for respiratory infections.

Hayes and colleagues (14) compared written feedback with feedback enhanced by the participation of a trained physician and quality-improvement tools for the improvement of care for patients presenting at hospital with venous thromboembolic disease. The multifaceted intervention was no better at delivering high-quality care.

One study compared audit and feedback alone with audit and feedback plus self-study (15), and another with a practice-based seminar (16). There was no difference between groups in terms of the proportion of patients with controlled blood pressure after the intervention (15), or in terms of compliance with guidelines limiting the use of magnetic resonance imaging in patients with symptoms relating to the lumbar spine or the knee (16).

In one high-quality study, audit and feedback plus assistance with the development of an office system designed to increase breast cancer screening rates was compared with feedback alone (17). The intervention increased the proportion of women who were recommended to undergo mammographic screening and clinical breast examination (adjusted risk ratio, 1.28) but had little impact on the numbers actually doing so.

In a three-way study, Moher and colleagues (18) compared mailed feedback with feedback plus a general practitioner recall system, and feedback plus a nurse recall system. Both general practitioner recall systems and nurse recall systems improved the proportion of patients with coronary heart disease receiving adequate assessment of their risk factors and drug therapy in comparison with feedback alone: the increase when general practitioners undertook the recall was 37%; and when it was done by nurses, it was 67%. The differences in processes were not, however, reflected in clinical outcomes, such as blood pressure or cholesterol levels.

One study added a telephone follow-up to audit and feedback to improve pneumococcal vaccine coverage (19). This intervention improved the proportion of physicians that achieved at least a 5% increase in vaccine coverage.

Audit and feedback, compared with other interventions

Eight comparisons from seven studies were included. The audit and feedback system was compared with reminders, patient education, the involvement of local opinion leaders, economic incentives, self-study and practice-based education. The conclusions were as follows.

- Reminders and the use of local opinion leaders may be more effective than audit and feedback.
- Audit and feedback reduced test ordering more than economic incentives did (one study).
- Studies comparing audit and feedback with patient education, self-study and practice-based education found no differences in the effects.

All comparisons of the different ways in which audit and feedback systems are performed

Seven studies provided direct, randomized comparisons of different ways of providing audit and feedback. Audit and feedback were undertaken using different formats, including variation in content (with or without peer comparisons or achievable benchmarks), source (feedback or outreach to physicians by peers versus non-physicians) and recipient (group feedback alone versus group plus individual feedback). On the basis of the evidence from these seven studies providing direct comparisons on different ways of providing audit and feedback, no firm conclusions can be drawn regarding how best to undertake audit and feedback.

References

1. Baker R et al. Randomised controlled trial of reminders to enhance the impact of audit in general practice on management of patients who use benzodiazepines. *Quality in Health Care*, 1997, 6(1):14–18.
2. Buffington J, Bell KM, LaForce FM. A target-based model for increasing influenza immunizations in private practice. Genesee Hospital Medical Staff. *Journal of General Internal Medicine*, 1991, 6(3):204–209.
3. Eccles M et al. Effect of audit and feedback, and reminder messages on primary-care radiology referrals: a randomised trial. *Lancet*, 2001, 357(9266):1406–1409.

4. Tierney WM, Hui SL, McDonald CJ. Delayed feedback of physician performance versus immediate reminders to perform preventive care. Effects on physician compliance. *Medical Care*, 1986, 24(8):659–666.
5. Fairbrother G et al. The impact of physician bonuses, enhanced fees, and feedback on childhood immunization coverage rates. *American Journal of Public Health*, 1999, 89(2):171–175.
6. Hillman AL et al. The use of physician financial incentives and feedback to improve pediatric preventive care in Medicaid managed care. *Pediatrics*, 1999, 104(4 Pt 1):931–935.
7. Borgiel AE et al. Evaluating the effectiveness of 2 educational interventions in family practice. *Canadian Medical Association Journal*, 1999, 161(8):965–970.
8. Siriwardena AN et al. Cluster randomised controlled trial of an educational outreach visit to improve influenza and pneumococcal immunisation rates in primary care. *British Journal of General Practice*, 2002, 52(482):735–740.
9. Ward A et al. Educational feedback in management of diabetes in general practice. *Education for General Practice*, 1996, 7:142–150.
10. Guadagnoli E et al. Improving discussion of surgical treatment options for patients with breast cancer: local medical opinion leaders versus audit and performance feedback. *Breast Cancer Research and Treatment*, 2000, 61(2):171–175.
11. Sauaia A et al. Influencing care in acute myocardial infarction: a randomized trial comparing 2 types of intervention. *American Journal of Medical Quality*, 2000, 15(5):197–206.
12. Soumerai SB et al. Effect of local medical opinion leaders on quality of care for acute myocardial infarction: a randomized controlled trial. *JAMA*, 1998, 279(17):1358–1363.
13. Mainous AG III et al. An evaluation of statewide strategies to reduce antibiotic overuse. *Family Medicine*, 2000, 32(1):22–29.
14. Hayes R et al. Comparison of an enhanced versus a written feedback model on the management of Medicare inpatients with venous thrombosis. *The Joint Commission Journal on Quality Improvement*, 2001, 27(3):155–168.
15. Dickinson JC et al. Improving hypertension control: impact of computer feedback and physician education. *Medical Care*, 1981, 19(8):843–854.
16. Robling MR et al. General practitioners' use of magnetic resonance imaging: an open randomized trial comparing telephone and written requests and an open randomized controlled trial of different methods of local guideline dissemination. *Clinical Radiology*, 2002, 57(5):402–407.

17. Kinsinger LS et al. Using an office system intervention to increase breast cancer screening. *Journal of General Internal Medicine*, 1998, 13(8):507–514.
18. Moher M et al. Cluster randomised controlled trial to compare three methods of promoting secondary prevention of coronary heart disease in primary care. *BMJ*, 2001, 322(7298):1338.
19. Quinley JC, Shih A. Improving physician coverage of pneumococcal vaccine: a randomized trial of a telephone intervention. *Journal of Community Health*, 2004, 29(2):103–115.

Annex 2. GRADE quality of evidence

●●●●	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.

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