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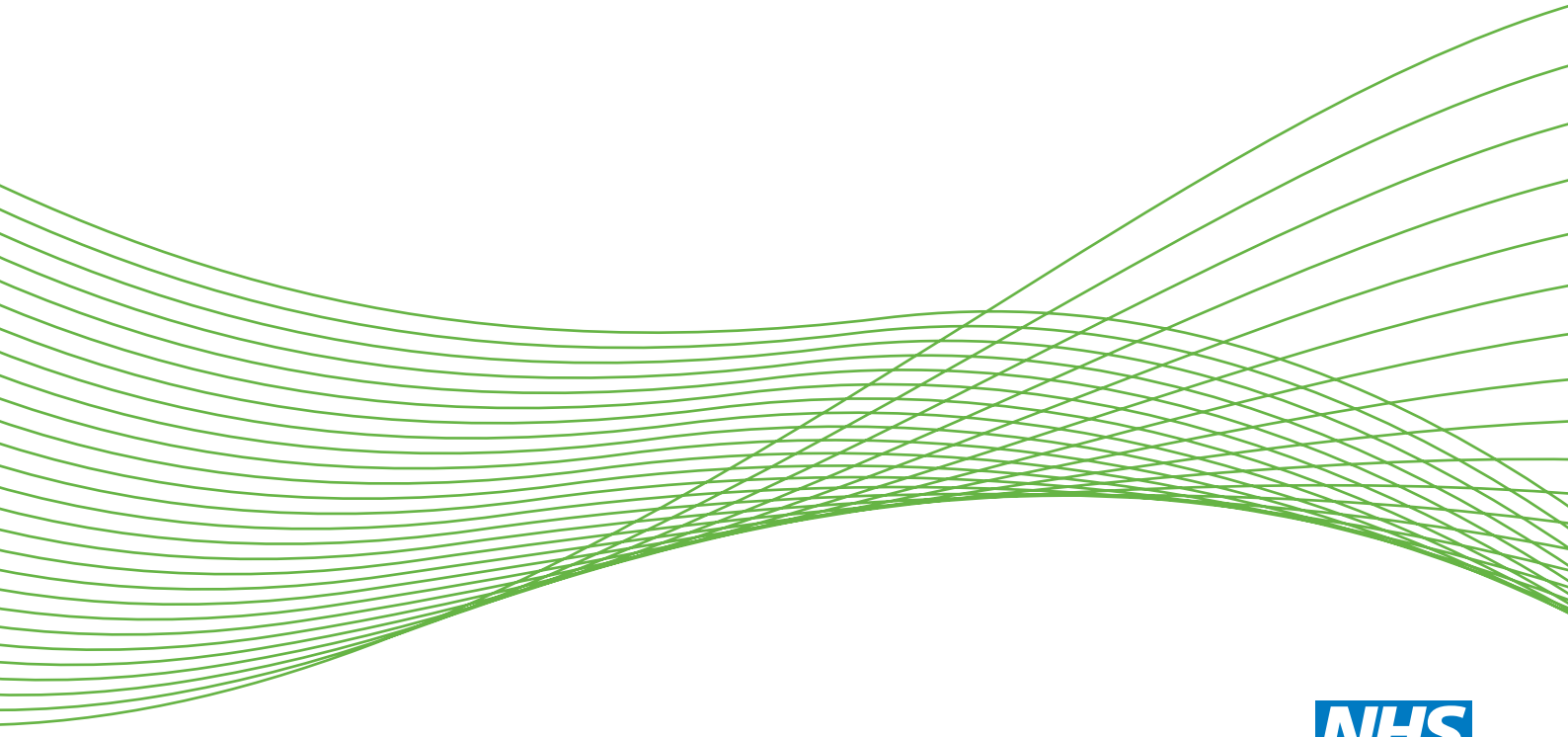

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The impact of Cochrane Reviews: a mixed-methods evaluation of outputs from Cochrane Review Groups supported by the National Institute for Health Research

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This report

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Abstract

The impact of Cochrane Reviews: a mixed-methods evaluation of outputs from Cochrane Review Groups supported by the National Institute for Health Research

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Background: The last few decades have seen a growing emphasis on evidence-informed decision-making in health care. Systematic reviews, such as those produced by Cochrane, have been a key component of this movement. The National Institute for Health Research (NIHR) Systematic Review Programme currently supports 20 Cochrane Review Groups (CRGs) in the UK and it is important that this funding represents value for money.

Aims and objectives: The overall aim was to identify the impacts and likely impacts on health care, patient outcomes and value for money of Cochrane Reviews published by 20 NIHR-funded CRGs during the years 2007–11.

Design: We sent questionnaires to CRGs and review authors, undertook interviews with guideline developers (GDs) and used bibliometrics and documentary review to get an overview of CRG impact and to evaluate the impact of a sample of 60 Cochrane Reviews. The evaluation was guided by a framework with four categories (knowledge production, research targeting, informing policy development and impact on practice/services).

Results: A total of 3187 new and updated reviews were published on the Cochrane Database of Systematic Reviews between 2007 and 2011, 1502 (47%) of which were produced by the 20 CRGs funded by the NIHR. We found 40 examples where reviews appeared to have influenced primary research and reviews had contributed to the creation of new knowledge and stimulated debate. Twenty-seven of the 60 reviews had 100 or more citations in Google Scholar™ (Google, CA, USA). Overall, 483 systematic reviews had been cited in 247 sets of guidance. This included 62 sets of international guidance, 175 sets of national guidance (87 from the UK) and 10 examples of local guidance. Evidence from the interviews suggested that Cochrane Reviews often play an instrumental role in informing guidance, although reviews being a poor fit with guideline scope or methods, reviews being out of date and a lack of communication between CRGs and GDs were barriers to their use. Cochrane Reviews appeared to have led to a number of benefits to the health service including safer or more appropriate use of medication or other health technologies or the identification of new effective drugs or treatments. However, whether or not these changes were directly as a result of the Cochrane Review and not the result of subsequent clinical guidance was difficult to judge. Potential benefits of Cochrane Reviews included economic benefits through budget savings or the release of funds, improvements in clinical quality, the reduction in the use of unproven or unnecessary procedures and improvements in patient and carer experiences.

Conclusions: This study identified a number of impacts and likely impacts of Cochrane Reviews. The clearest impacts of Cochrane Reviews are on research targeting and health-care policy, with less evidence of a direct impact on clinical practice and the organisation and delivery of NHS services. Although it is important for researchers to consider how they might increase the influence of their work, such impacts are difficult to measure. More work is required to develop suitable methods for defining and quantifying the impact of research.

Funding: The NIHR Health Technology Assessment programme.

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List of abbreviations

CRG	Cochrane Review Group
GD	guideline developer
GRADE	Grading of Recommendations Assessment, Development and Evaluation
HERG	Health Economics Research Group
ISI	Institute for Scientific Information
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health Research
PIRG	Public Involvement Research Group
QIPP	Quality, Innovation, Productivity and Prevention
RCT	randomised controlled trial
SIGN	Scottish Intercollegiate Guidelines Network
TRIP	Turning Research into Practice
UKCC	UK Cochrane Centre
WHO	World Health Organization
WoS	Web of Science
WP	work package

Plain English summary

Cochrane produces systematic reviews evaluating the effectiveness of health-care interventions. These reviews are produced by Cochrane Review Groups (CRGs) and published on The Cochrane Library. Twenty CRGs are based in the UK and receive funding from the National Institute for Health Research.

The aim of our study was to assess the value of Cochrane Reviews produced by those groups by looking at the way they have been used by health-service providers, policy-makers, researchers and service users. For example, have they been used in developing guidance, such as that produced by the National Institute for Health and Care Excellence, or have they identified gaps in the evidence and led to new research? We used a mixture of methods: we sent questionnaires to CRGs and review authors, interviewed guideline developers, reviewed existing documents and looked at the number of times the reviews had been cited in other research papers or guidelines.

We found evidence that policy-makers use Cochrane Reviews to inform clinical guidance both in the UK and around the world. However, policy-makers found reviews less helpful if they were out of date or if they had asked too narrow a question. There is evidence that Cochrane Reviews identify areas for new research and provide an important source of knowledge about the value of different treatments. Although there is some evidence that they influence the behaviour of health-care providers, and lead to benefits for the health service, these are more difficult to prove.

Scientific summary

Background

The last few decades have seen a growing emphasis on evidence-informed decision-making in health care. Systematic reviews, such as those produced by Cochrane, have been a key component of this movement. The National Institute for Health Research (NIHR) systematic review programme currently supports 20 Cochrane Review Groups (CRGs) in the UK and it is important that this funding represent value for money.

Aims and objectives

The overall aim was to identify the impacts and likely impacts on health care, patient outcomes and value for money, of Cochrane Reviews published by 20 NIHR-funded CRGs between the years 2007 and 2011.

Methods

We used a mixed-methods approach informed by theories about research use and guided by a framework for evaluating research impact. The framework included the following categories: knowledge production, research targeting, informing policy development and impact on practice/services.

Research plan

There were three work packages (WPs), with WPs 1 and 2 being conducted in parallel. In WP 1 we obtained a general overview of the impact of CRG outputs published between the years 2007 and 2011, and in WP 2 we undertook a more detailed exploration of the impact of a representative sample of Cochrane Reviews first published (or updated) between the years 2007 and 2011. In WP 3 we synthesised the findings from WPs 1 and 2. The WPs included the following:

Work package 1

We sent a questionnaire to CRG editorial bases, undertook secondary analysis of existing documents and resources relating to the impact of Cochrane Reviews and undertook semistructured interviews with a purposive sample of guideline developers (GDs).

Work package 2

We selected a representative sample of 60 Cochrane Reviews for further in-depth analysis. This included three reviews per CRG with one chosen randomly and two chosen from those likely to have had impact. We sent a questionnaire to the first authors of these 60 reviews and undertook bibliometric and documentary review.

Results

A total of 3187 new and updated reviews were published on the Cochrane Database of Systematic Reviews between 2007 and 2011, 1502 (47%) of which were produced by the 20 CRGs funded by the NIHR.

Knowledge production, identifying gaps in the evidence and stimulating research

We found reasonably good evidence to suggest that some Cochrane Reviews had played a role in identifying gaps in the evidence and stimulating new research. CRGs and authors provided 40 examples where they felt reviews had influenced primary research, and 13 of the sample of 60 reviews had been cited in a protocol or the background of a primary research study. Most of the examples of follow-on research were randomised controlled trials.

As well as influencing the conduct of new research, there was evidence that Cochrane Reviews had contributed to the creation of new knowledge and the stimulation of discussion and debate. Although there was considerable variation between the reviews, the data does suggest that many of the 60 reviews have been of interest to other researchers, health-care professionals and policy-makers. For example, 27 of the 60 reviews had had 100 or more citations in Google Scholar™ (Google, CA, USA) and five had received over 400 citations. Citation counts were much higher in Google Scholar than in Web of Science (WoS) or Scopus (Elsevier).

Informing policy development

Systematic reviews from all the 20 CRGs were cited in some form of clinical or practice guidance. Across the CRGs, 483 systematic reviews had been cited in 247 sets of guidance (or in the evidence reviews used to develop the guidance). This included 62 sets of international guidance, 175 sets of national guidance and 10 examples of local guidance. Of the national guidance, 87 were developed in the UK, with Cochrane Reviews cited in 30 sets of National Institute for Health and Care Excellence (NICE) guidance and 23 sets of Scottish Intercollegiate Guidelines Network guidance.

To explore the way in which Cochrane Reviews are used in the preparation of guidance (including that produced by NICE) we conducted semistructured interviews with GDs. The results of the thematic analysis suggest that searching for relevant Cochrane Reviews is part of the guideline development process and that Cochrane Reviews often play an instrumental role in informing guidance. Cochrane Reviews appeared to be used at a number of different stages of the guideline development process. For example, early in the process to scope review questions and assess the strength of the evidence and later in the process as part of the evidence review to develop the guidance. Even when the whole Cochrane Review was not used, GDs often drew on component parts of the review such as search strategies, lists of included and excluded studies, quality assessment data and analyses. However, there were a number of barriers to the use of Cochrane Reviews in guidance. Cochrane Reviews might not be available, they might not fit with the guideline scope, they might be out of date, or the methods used might not fit with those required for the guideline.

Impact on clinical practice and services

There was evidence to suggest that some Cochrane Reviews may have led (or contributed) to a number of benefits to the health service including safer or more appropriate use of medication or other health technologies and the identification of new effective drugs or treatments. However, whether these changes were directly as a result of the Cochrane Reviews or the result of subsequent clinical guidance was difficult to judge. Review authors who responded to the questionnaire were generally unsure if their work had changed the behaviour of practitioners, managers or members of the public or if their work had helped to reduce costs, increase quality, improve effectiveness or promote equity.

There is evidence to suggest that Cochrane Reviews contribute to creating knowledge about, and confidence in, the value of treatments. Many Cochrane Reviews have the potential to affect practice and policy and some produce findings that could potentially lead to costs savings and health-service benefits. Some of these potential benefits were highlighted in the Cochrane quality and productivity topics, 19 of which related to reviews produced by one of the 20 CRGs between the years 2007 and 2011. Potential benefits identified included economic benefits through budget savings or the release of funds, improvements in clinical quality, the reduction in the use of unproven or unnecessary procedures and improvements in patient and carer experiences.

Barriers and facilitators to review impact

Interviews with GDs identified a number of potential barriers to review impact. One of the themes that emerged from the interviews with GDs was the need for up-to-date evidence. Reviews that were considered to be out of date, that took too long to update or that had too narrow a scope were of less use to policy-makers. The interviews with GDs also suggested that a lack of collaboration and communication between GDs and CRGs acts as a barrier to the use of Cochrane Reviews in the development of guidance.

Conclusions

This study identified a number of impacts and likely impacts of Cochrane Reviews. The clearest impacts of Cochrane Reviews are on research targeting and health-care policy, with less evidence of a direct impact on clinical practice and the organisation and delivery of NHS services. Although it is important for researchers to consider how they might increase the influence of their work, such impacts are difficult to measure. Questions remain about how we define and measure impact and more work is needed to develop suitable methods for impact analysis.

Recommendations for practice and research

Areas for future research identified by the study include the following:

- Further work to develop methods to identify the impact of systematic reviews on health-care practice and the behaviour of clinicians, policy-makers and service users, in particular identifying ways of identifying impact on clinical practice.
- Qualitative research exploring how decision-makers interpret and understand systematic reviews and how this might be facilitated.
- Research into the impact on clinical practice, which may be more easily discernible if evaluations have a narrower focus (e.g. looking at more specific areas of health care); this would allow the use of methods targeted at specific groups of health-care providers.
- Further work on how to define and evaluate the value for money of specific reviews or groups of reviews.
- Further evaluation of the format of Cochrane Reviews including how to present complex scientific information in a format that is accessible for decision-makers.
- Further development and evaluation of knowledge transfer strategies designed to increase the use of Cochrane Reviews in evidence-informed decision-making.
- Further work to improve the completeness of citation data for Cochrane Reviews on WoS and Scopus and verify data accuracy on Google Scholar.

Areas for future practice identified by the study include the following:

- The development of formal networks for collaboration and communication between GDs and CRGs.
- The investigation of the ways Cochrane share data with GDs. However, this would need support across all the collaboration, not just the UK. It would need to be done in a way that recognises and rewards the contribution of Cochrane authors and CRGs and may need to be financially incentivised.
- The investigation of the ways Cochrane and CRGs identify and document impact on clinical decision-making and practice.
- The routine collection of examples of actual and potential impact by CRG editorial bases.

Funding

Funding for this study was provided by the Health Technology Assessment programme of the National Institute for Health Research.

Chapter 1 Background

In recent years there has been a growing emphasis on the use of evidence to inform decision-making in health care.[1–3] Improvements in the use of evidence have been seen as particularly relevant to commissioning in the English NHS because of the large financial commitments involved and because of the increasing complexity of health-care management decisions.[4] In addition, there has been a growing interest in the utilisation and impact of research. Researchers are increasingly expected to consider the contribution that their research might have made, not only to health-related outcomes but also to public policy, society, the economy, culture and quality of life.[5]

The role of systematic reviews in evidence-informed decision-making

The development of methods for the synthesis of research has been a key driver in the move towards evidence-informed policy and practice. Although a number of terms have been used for such syntheses, the most widely used and understood is systematic review. Systematic reviews have several advantages over other types of research that have led to them being regarded as particularly important tools for decision-makers. Systematic reviews take precedence over other types of research in many hierarchies of evidence, as it inherently makes sense for decisions to be based on the totality of evidence rather than a single study.[6,7] Moreover, they can generally be conducted more quickly than new primary research and, as a result, may be attractive to policy-makers required to make a rapid response to a new policy issue.[8] Despite such arguments in favour of using systematic reviews to inform decision-making, it has been suggested that they have not had an impact on policy and practice in the way one might expect. Indeed, there is evidence to suggest that the diffusion and use of evidence across the NHS is generally poor.[4]

Cochrane

One organisation involved in producing systematic reviews is Cochrane (www.cochrane.org/about-us). Established in the early 1990s, Cochrane is a global independent organisation that has the aim of promoting evidence-informed decision-making through the production of systematic reviews. Reviews are produced by Cochrane Review Groups (CRGs), which are made up of people who prepare, maintain and update the Cochrane Reviews and people who support them in this process. Each group has an editorial base, a small team of people that supports the production of Cochrane Reviews. Groups focus on a particular area of health, and review topics are identified by review authors or through prioritisation processes at editorial bases.

Cochrane is a not-for-profit organisation funded by a variety of sources including governments, universities, hospital trusts and charities. Cochrane systematic reviews should be well placed to influence policy-makers, practitioners and researchers, as they are generally acknowledged to be comprehensive and rigorous summaries of the best available evidence on a given topic. Moreover, they are periodically updated in the light of new evidence and there is increasing interest in the dissemination and impact of Cochrane Review findings.[9]

Evidence-informed decision-making

It has long been recognised that the relationship between research and policy or practice is a complex one[10] and that research may not always have the impact that researchers desire.[11] One reason for this is that research evidence is only one factor in shaping policy and practice. Decision-makers are subject to many different influences including political imperatives, the media, non-research evidence and powerful lobbying groups such as industry.[7,12] In addition, the usefulness of systematic reviews for aiding policy-makers in the decision-making process has come into question, with commentators suggesting a number of factors that might reduce their utility. These include a lack of good-quality primary research for synthesis, a tendency for reviewers to focus on randomised controlled trials (RCTs) and controlled evaluations at the expense of other types of research, and inadequate evaluation of complex interventions with little recognition of the importance of contextual factors.[8,13,14] Moreover, there are significant challenges associated with conceptualising impact and identifying the extent to which systematic reviews are used to inform decision-making.[15]

Defining research impact

A variety of terms have been used to describe the impact of research on policy and practice. These include research impact, influence, outcomes, benefit, payback, translation, transfer, uptake and utilisation.[16,17] Research can be used either directly in decision-making related to policy and practice or indirectly by contributing to the formulation of values, knowledge and debate. Commentators have pointed out that there is a key distinction to be made between conceptual use, which brings about changes in levels of understanding, knowledge and attitude, symbolic use which can lead to the mobilisation of support, and instrumental, or direct use, which results in changes in practice and policy making.[10,18–20] Indeed, 'research impact forms a continuum, from raising awareness of findings, through knowledge and understanding of their implications, to changes in behaviour'.[21]

Reason for conducting this study

The National Institute for Health Research (NIHR) systematic review programme currently supports 20 CRGs based in academic or health institutions in the UK. These groups cover a broad range of health-care areas and produce almost half of all Cochrane Reviews, publishing around 200 new reviews each year, as well as bringing a similar number of existing reviews up to date.[22] It is important that this funding represents value for money and that the reviews produced by these groups be useful for practitioners, policy-makers, service users and members of the public. One way in which their value might be judged is by the impact that the reviews produced by NIHR-funded CRGs have, or potentially have, on policy and practice, and on future research. However, although it is acknowledged that CRGs produce high-quality systematic reviews,[23–25] to date there is a lack of information about the impacts of Cochrane Reviews. Moreover, it is important to understand how reviews are currently used in order to develop appropriate strategies for knowledge transfer and exchange. This study aimed to enhance our understanding of how Cochrane Reviews impact on policy and practice and to inform the development of methods for evaluating the impact of systematic reviews and future strategies for dissemination and knowledge transfer.

Aims and objectives

The overall aim was to identify the impacts and likely impacts on health care, patient outcomes and value for money of Cochrane Reviews published by NIHR-funded CRGs between the years 2007 and 2011 (time period set by funders). The research objectives were to identify and describe the impacts of Cochrane Reviews in terms of evidence of direct effect on clinical practice; their inclusion in, or use for, the preparation of national or international clinical guidance, such as guidance published by the National Institute for Health and Care Excellence (NICE); their likely influence on clinical practice directly (i.e. without or before incorporation into national clinical guidance); and their identification of important gaps in knowledge and possible influence on the conduct of new primary research studies. The research questions are:

1. Have systematic reviews produced by NIHR-funded CRGs during 2007–11 had a direct effect on clinical practice?
2. Have systematic reviews produced by NIHR-funded CRGs during 2007–11 had a direct effect on NHS organisation and delivery?
3. To what extent have reviews produced by NIHR-funded CRGs during 2007–11 been included in clinical guidance, such as that produced by the NICE?
4. To what extent are reviews produced by NIHR-funded CRGs used in the preparation of NICE guidance?
5. What evidence is there that systematic reviews produced by NIHR-funded CRGs during 2007–11 are likely to change future clinical practice?
6. What influence have systematic reviews produced by NIHR-funded CRGs during 2007–11 had on the conduct of new primary research studies?
7. What are the barriers and facilitators to Cochrane systematic reviews impacting on policy, practice and future primary research?

Structure of the report

Chapter 1 describes the background and rationale for the study, *Chapter 2* describes the conceptual approach adopted and the framework used to structure the evaluation and *Chapter 3* details the methods used for the questionnaire surveys, bibliometrics and documentary review. The findings of the questionnaire surveys, bibliometrics and documentary review are presented in *Chapters 4* and *5*, with *Chapter 4* including details of the findings relating to the overall impact of NIHR-funded CRGs and *Chapter 5* focusing on the findings relating to the impacts of a representative sample of Cochrane Reviews produced by the NIHR-funded groups. *Chapter 6* reports the methods and findings of the qualitative interviews. *Chapter 7* summarises the study findings and looks at their implications. This includes a summary of the results of the impact evaluation, an analysis of how the results contribute to our knowledge of barriers and facilitators, a discussion of the strengths and limitations of the study and a consideration of the implications of the findings.

Chapter 2 Conceptual framework and approach

We undertook a mixed-methods approach which was informed by theories about research impact and guided by a framework for evaluating research impact that draws on previous work in this area.[26,27] There were two main work packages (WPs). The aim of the first WP (WP 1) was to obtain a general overview of the impact of the outputs produced by NIHR-funded CRGs between 2007 and 2011 and the aim of the second WP (WP 2) was to look in more detail at the impact of a sample of Cochrane Reviews. These WPs are described in more detail in *Chapter 3*. In this chapter we describe the approach we took to conceptualising and measuring research impact.

Many different terms have been used to define research impact. However, there is a consensus of opinion that several types of research impact exist,[10,18,21,28] including instrumental or direct impact, conceptual impact and symbolic impact. The definitions of each type of impact are as follows:

- Instrumental or direct impact – research findings drive practice decision- or policy-making.
- Conceptual impact – research influences the concepts and language of policy and practice deliberations.
- Symbolic impact – research is used to legitimate and sustain predetermined positions.

Although health benefits and broader economic benefits may be viewed as the real payback from health research, these are hard to measure, as it is difficult to attribute particular health gains to specific pieces of research.[29] Therefore, although we were able to make some inferences about health and economic benefits, these were largely beyond the remit of this evaluation. Instead we focused on impacts that are more easily assessed, such as clinical practice, service delivery, quality of patient care, policy and the targeting of future research. Our main focus was on instrumental or direct impact but we also considered examples of more indirect influence (e.g. conceptual or symbolic) and included both actual and potential impact. Examples of instrumental use of research might include direct impact on the behaviour of clinicians or the use of evidence to develop or update educational material, policy and guidelines. Likely, or potential, impact included examples where there was some evidence to suggest the review has had an impact but this is, at present, difficult to substantiate (e.g. when reviews might have impacted on policy and practice deliberations) or where the review is judged to have produced findings that clearly have the potential to impact on policy, service delivery or patient outcomes but there has been insufficient time since publication for impact to have occurred.

Framework

The use of a framework for structuring assessments of impact has been recommended, as it can help organise inquiry[30] and allow for easier comparison across reviews.[31] We structured our data collection and analysis using a framework that combined elements from two existing frameworks, the Health Economics Research Group (HERG) framework for assessing health research payback[26,32,33] and The Research Impact Framework developed by Kuruvilla *et al.*[27] The HERG framework consists of a multidimensional categorisation of the benefits, or payback, from health research[33] and includes five main categories: (1) knowledge production; (2) research targeting; (3) capacity building and absorption; (4) informing policy and product development; and (5) health benefits and broader economic benefits. The rationale for using this framework is that it is the most commonly used framework in the evaluation of health research impact,[34] it is well described in the literature and there are a number of publications detailing suggested methods for conducting evaluations. In addition, although it was not developed specifically for systematic reviews, it has been used to assess their impact.[35]

As previously stated, health benefits and broader economic benefits of research are hard to measure and are largely beyond the remit of this evaluation.[29] Therefore, we used a framework that combines elements of the HERG framework (knowledge production, research targeting, informing policy and product development) with elements (impact on practice/services) from The Research Impact Framework developed by Kuruvilla *et al.*[27] The latter is a conceptual framework that uses a standardised way of describing a wide range of potential areas of health research impact.[27,36] It was created by identifying potential areas of health research impact and draws on a number of other models including the payback model of health research benefits previously described[26] and Lavis's knowledge transfer approach to assessing the impact of research.[37] The framework we used for this evaluation, including main and subcategories, can be seen in *Table 1*.

TABLE 1 Evaluation framework

Main category	Subcategories	Further details
1. Knowledge production	Impact within research community	Number of times review is cited
		Stimulating debate in research community
		Methodological developments
	Other methods of dissemination	Press coverage
		Number of mentions in media
2. Research targeting	Influence on other research	Identification of gaps in knowledge
		Follow-on research
3. Informing policy development (includes actual and potential)	Impact on national or government policy	For example, NICE guidance
	Impact on international policy	For example, WHO guidance or international professional bodies
	Policies agreed at national or local level in the form of clinical or local guidelines	For example, guidance produced by local trusts
	Policies developed by those responsible for training and education	Local or national
4. Impact on practice/services (includes actual and potential)	Evidence-based practice	The use of research evidence by different groups involved in clinical decision-making
		Adoption of research findings and health technologies by health-service providers
		Adherence to research-informed policies and guidelines
		Addressing barriers to evidence-based practice (e.g. training)
	Quality of care	Efficacy of health services
		Availability, accessibility and acceptability of services
		Utilisation and coverage
	Cost containment and cost-effectiveness	Research-related changes in health systems in terms of expenditure or health outcomes
	Services management and organisation	Management of health-service procurement and provisioning (public and private)

WHO, World Health Organization.
This table has been adapted from table 1 ©Bunn *et al*. The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/. Adaptations: 'Number of mentions in media' moved from category 4 to 1 and further details have been added to the group 'Cost containment and cost-effectiveness'.

Measuring research impact

There is no single standard approach to measuring impact, and a variety of evaluative methods exist including bibliometrics, documentary analysis, semistructured interviews, case studies, panel review, surveys and network analysis.[17,34] The methods most frequently suggested for analysing the impact of research are bibliometrics, documentary review and interviews.[17,39] There are advantages and disadvantages of each method and it is generally recommended that a variety of sources be used in evaluations of research impact.[29,37] In the light of these considerations we used a mixture of bibliometrics, documentary analysis, questionnaire surveys and interviews. These methods are chosen because they were considered appropriate for determining and comparing the impact of reviews published by 20 CRGs on a variety of topics and over a 5-year period. They also enabled richer data to be gathered and allowed for triangulation. Moreover, these methods enabled us to track backwards from policy documents (WP 1) and track forward from specific systematic reviews (WP 2). These methods are discussed in greater detail in the sections following.

Questionnaires and interviews

We sent questionnaires to CRG editorial staff (WP 1) and review authors (WP 2) in order to obtain their views on the impacts, and likely impacts, of Cochrane Reviews included in our analyses. This enabled us to get the views of those people most closely associated with the reviews, otherwise known as the insider account.[34] The questionnaires were based on previous questionnaires for evaluating research impact[40–43] and draw on our framework. In addition to the questionnaires, we undertook semistructured interviews with guideline developers (GDs) to gain further insight into how Cochrane Reviews have contributed to the development and preparation of guidance.

Documentary analysis

Documentary analysis allows for the 'exploration and interpretation of existing documents and can elicit quantitative or qualitative findings'.[17] This might include identifying key citing papers and relevant clinical guidelines,[39] or policy statements, articles in professional journals or website resources. Benefits of this technique are that it can be applied to a range of sources, provides contextual understanding and is cost-effective.[17]

Bibliometrics

A common method for analysing research impact is to employ bibliometric methods which employ quantitative analyses to measure patterns of scientific publication and citation. One of the most important of these is citation analysis. This technique, which essentially involves counting the number of times a research paper is cited, works on the assumption that influential researchers and important works will be cited more frequently than others.[44] Advantages of using this technique are that citation rates are seen as an objective quantitative indicator for scientific success,[45] they are robust and transparent and they are relatively simple and cost-effective to perform. However, citation analyses have been criticised, as they measure the number of research outputs rather than research outcomes.[17] In order to overcome this criticism we used the citation analyses in WP 2 to trace the flow of knowledge and look for any evidence that the reviews have had an impact on the research, practice and policy communities. For example, in line with objective 2, we checked citations in Web of Science (WoS) and Google Scholar™ (Google, CA, USA) to see if reviews had been cited in guidelines or policy documents.

We undertook citation analyses in WoS, Scopus (Elsevier) and Google Scholar, as, owing to the strengths and weaknesses of the different databases, the use of multiple sources is generally recommended.[44,46] Traditionally the Thomson Scientific Institute for Scientific Information (ISI) citation databases have been the main tool for citation analyses. However, in 2004, Scopus from Elsevier and Google Scholar from Google emerged to challenge the monopoly of the ISI citation index.[44,46] These bibliographic databases include additional document types such as books, chapters in books and conference proceedings that are not indexed in the ISI citation databases. Google Scholar may be of particular importance to citation analyses for Cochrane Reviews, as previous work[47,48] suggests that citation counts for Cochrane Reviews are

artificially low in ISI databases and Scopus because citing authors have incorrectly referenced Cochrane Reviews. Google Scholar is a research-orientated search engine that accesses conventional print material and web-based material. It also extracts citation information and can be used as a citation index as well as a search engine. However, Google Scholar needs to be used with some caution, as there is a lack of transparency about the sources and selection criteria[49,50] and the citation information can be flawed or inadequate.[51]

Chapter 3 Research plan and methods

Introduction

There were three WPs, with WPs 1 and 2 being conducted in parallel. The aim of WP 1 was to obtain a general overview of the impact of CRG outputs and the aim of WP 2 was to undertake a more detailed exploration of the impacts of a representative sample of Cochrane Reviews published by the NIHR-funded CRGs. In WP 3 we synthesised the findings from WPs 1 and 2.

There are currently 20 CRGs that receive support from the NIHR Health Technology Assessment programme. They are the following: Airways; Bone Joint and Muscle Trauma; Cystic Fibrosis and Genetic Disorders; Dementia and Cognitive Improvement; Depression, Anxiety and Neurosis; Ear, Nose and Throat; Epilepsy; Eyes and Vision; Gynaecological Cancer; Heart; Incontinence; Injuries; Neuromuscular; Oral Health; Pain, Palliative and Supportive Care; Pregnancy and Childbirth; Schizophrenia; Skin; Tobacco Addiction; and Wounds. The evaluation focused on outputs, in the form of systematic reviews, published by the CRGs between 2007 and 2011. This time frame was stipulated by NIHR in the original project brief. We included reviews that had either been first published or updated during 2007–11. To ensure that the analyses focused on outputs published during the specified years, review titles were crosschecked against details in The Cochrane Library and a master list of reviews provided by Wiley, the publisher of The Cochrane Library. These data from Wiley included details of the year and issue of The Cochrane Library when reviews were first published and any subsequent updates.

Overview of the research plan

The methods are outlined here and then described in more detail later in the chapter. For details of the methods used for the semistructured interviews, see *Chapter 6*. A diagrammatic summary of the study can be seen in *Figure 1*.

Work package 1 (general overview)

We undertook the following:

- sent a questionnaire survey to key staff at the 20 NIHR-funded CRG editorial bases to identify examples of impact and to help prioritise reviews for further analysis
- analysed data on outputs and impact of reviews compiled by CRGs as part of the annual reports they submit to NIHR
- analysed existing sources relating to Cochrane Review impact, for example data compiled by the UK Cochrane Centre (UKCC) on the use of Cochrane Reviews in NICE and Scottish Intercollegiate Guidelines Network (SIGN) guidelines
- performed general internet searches using keywords on the following websites:
  - World Health Organization (WHO) (www.who.int/rhl)
  - NHS evidence (www.evidence.nhs.uk/)
  - Quality, Innovation, Productivity and Prevention (QIPP) (www.evidence.nhs.uk/qipp) – NICE quality and productivity Cochrane topics
- conducted semistructured interviews with key personnel at NICE, SIGN and WHO involved in the development of guidelines (see *Chapter 6*).

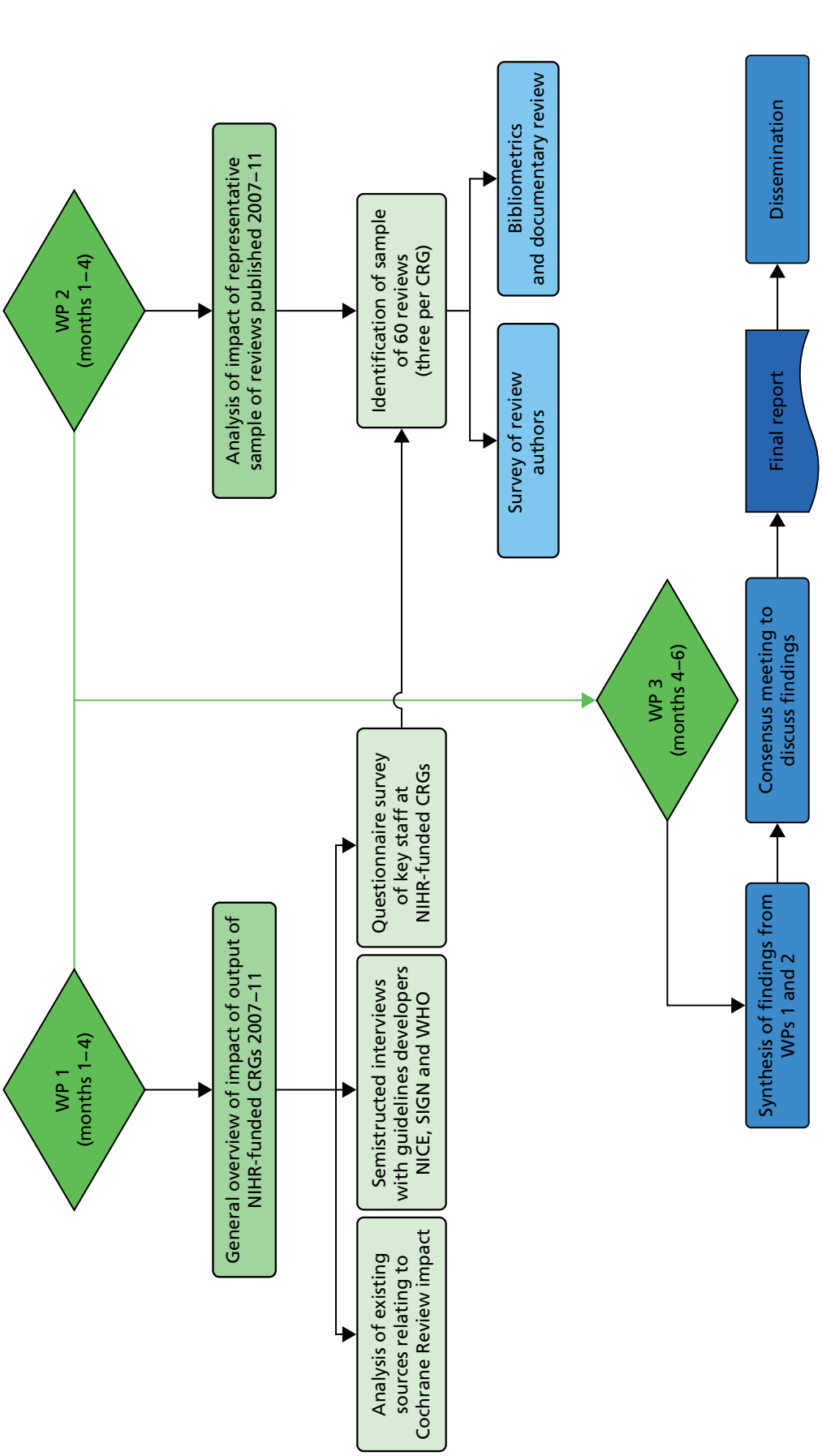

FIGURE 1 Diagrammatic summary of methods. SIGN, Scottish Intercollegiate Guidelines Network; WHO, World Health Organization.

Work package 2 (explore impact of sample of Cochrane Reviews)

We undertook the following:

- identified a representative sample of 60 reviews (three per CRG)
- sent a questionnaire survey to the first authors of the 60 reviews
- performed citation analysis in WoS, Scopus and Google Scholar
- conducted documentary analysis of existing sources to identify impact or likely impact, for example data compiled by the publisher of The Cochrane Library (Wiley) on the impact of Cochrane Reviews (e.g. downloads, media mentions)
- performed internet searches of NHS Evidence, Turning Research into Practice (TRIP) and Google.

Work package 3 (synthesis and interpretation of findings)

In WP 3 we:

- synthesised the findings from WPs 1 and 2
- held a consensus meeting to discuss findings.

Methods for overview of impact of Cochrane Review Group outputs (2007–11)

Questionnaire survey of Cochrane Review Group editorial bases

Cochrane Review Groups currently compile data on outputs and review impacts as part of the annual reports that they submit to NIHR. However, although data on outputs are available for the whole 5-year period, data on review impacts are available only for 2009 onwards and in some instances these data are limited to citation in guidelines. Therefore, we supplemented data from the annual reports with a questionnaire survey to CRG editorial bases. The aim of this was to get an idea of the range and type of likely impact and to prioritise reviews for further analysis.

Sample and data collection

We sent a questionnaire survey to the managing editor ($n = 20$) at each NIHR-funded CRG, copied to co-ordinating editors. The questionnaires were sent via e-mail with a personalised covering letter explaining that the evaluation had been commissioned by the NIHR Health Technology Assessment systematic reviews programme and would inform the quinquennial review. Respondents were given the choice to fill out a Microsoft Word (Microsoft Corporation, Redmond, WA, USA) version of the questionnaire or an electronic version through Bristol Online Survey.[52] Questionnaires were sent out in April 2013. The questionnaire sent to CRGs can be seen in *Appendix 1*.

The survey included questions about general impact of the CRG output between 2007 and 2011 and the responses were mainly qualitative in nature. CRGs were informed that they did not need to provide information already included in the annual reports they had previously submitted to NIHR. Questions were guided by our evaluation framework and covered areas such as knowledge production, contribution to research training and further research and possible impact of the review on health policy and practice. Respondents were asked to focus on reviews first published, or updated, in the 5-year period between 2007 and 2011 and were asked, where possible, to provide supporting evidence of impact. Evidence of impact might include inclusion in clinical guidelines, impact on clinical practice, such as changes to clinicians' behaviour or changes to service organisation and delivery, or influence on future primary research. CRGs were asked to identify reviews published (or updated) between 2007 and 2011 that they considered to have had the most influence on policy and practice. Where provided, this information was used to inform the selection process in WP 2. Non-responders were followed up by repeat e-mails and telephone.

Analysis

All data from the questionnaires were imported into Microsoft Excel 2010 (Microsoft Corporation, Redmond, WA) for analysis. Researchers scrutinised the responses and extracted any examples of actual or potential impact from the information provided by the CRGs. Data were recorded on a specially designed form that included the categories from our framework. As there was a danger that CRGs might have inflated the impact of their work the research team critically assessed information provided and, where possible, sought evidence to verify it. For instance, when respondents said that a review had led to further research studies, we searched for a study protocol or final report to check whether or not the review had been cited (e.g. in the background as justification for the research). Where guidelines were said to have been informed by a Cochrane Review, we downloaded a copy and searched it using the word 'Cochrane'. This enabled us to verify which reviews were cited and whether or not they had been published between 2007 and 2011. We excluded examples for which no supporting evidence was available.

Documentary review and analysis of existing sources

We undertook analysis of existing material relating to the impact of Cochrane Reviews that had been published (or updated) by the 20 NIHR-funded CRGs during the period of 2007–11. We began by hand searching the annual reports that CRGs had provided to the NIHR for the years 2007–12. These reports include information on outputs, training activities, prioritisation processes for review topics, dissemination and inclusion of reviews in guidelines. We also reviewed data on the use of Cochrane Reviews in NICE and SIGN guidance compiled by the UKCC. In addition to this documentary analysis we undertook keyword searches on a number of electronic databases and websites including Google, NHS Evidence, the WHO and QIPP (Cochrane quality and productivity topics). We searched the QIPP database via NHS Evidence in July 2013.

Data extraction and analysis

Data relating to impact were extracted from the annual reports and recorded on a specially designed form that was structured to reflect the domains on our framework. This includes knowledge production (citations and other outputs such as media mentions), research targeting (such as any follow-on studies), policy impact (e.g. inclusion in guidelines or use for the development of guidelines) and impact on practice/services (e.g. impact on clinical behaviour). Data relating to guidelines were collated in a separate Microsoft Excel spreadsheet which we stratified by CRG; this included the guideline title, details of the Cochrane Reviews cited in the guidance and the level of the guidance (e.g. local, national, international). Verification processes were the same as those previously described. Results are presented narratively and as tabular and graphical summaries structured to reflect the domains of the framework.

Methods for evaluation of impact of representative sample of Cochrane Reviews (2007–11)

In WP 2 we undertook further analysis on a representative sample of Cochrane Reviews published in the last 5 years.

Selection criteria

We had initially proposed to select a sample of 40 reviews. The rationale for choosing 40 reviews was that it allowed us to choose two reviews per group and was considered feasible in the time available. However, concerns about a potentially low response rate from authors meant that we increased the sample to 60 reviews, three from each CRG. As our intention was to select a representative sample of reviews, one review per CRG was chosen randomly and two were chosen from those identified as likely to have had an impact.

A master list of published outputs (2007–11) was provided by Wiley. Outputs for the 20 CRGs were entered into a Microsoft Access 2010 database (Microsoft Corporation, Redmond, WA, USA) and one review was randomly selected for each CRG. As there generally needs to be sufficient time after the

research was completed for change to have occurred, we weighted our sample towards those reviews published between 2007 and 2010. In the questionnaires, CRGs were asked to give examples of reviews and updates (published between 2007 and 2011) that they thought had had an impact in some way. Where provided, the research team used this information to select two reviews for further analysis. Decisions on which of the reviews were chosen were based on year of publication and strength of the evidence of impact provided. However, in some cases CRGs did not provide this information, or provided this information too late, and we used data from our bibliometric and documentary analyses (e.g. citation counts or data on downloads) to guide our selection. In order to avoid a conflict of interest or bias the researchers excluded any reviews on which they are an author. A flow chart of the selection process can be seen in *Appendix 2*.

Questionnaire survey with systematic review authors

Sample, data collection and analysis

We sent a questionnaire survey to the first authors of all 60 reviews. Contact details for lead authors were taken from The Cochrane Library and checked for accuracy using Google. Questionnaires were sent out between May and June 2013 and were accompanied by a personalised covering letter specifying which review the questionnaire concerned. The questionnaire can be seen in *Appendix 3*. Where possible, the research team sought supporting evidence to substantiate claims of impact. Non-responders were followed up by a second mailing from the researchers. For those that did not respond to the second e-mail we contacted the managing editors at CRG editorial bases to ask them if they would be willing to contact the authors on our behalf. A number of CRGs agreed to do this and this resulted in several more questionnaires being returned. Data were imported into Microsoft Excel for analysis. For qualitative data, researchers scrutinised the responses and extracted examples of impact onto a specially designed form. We stratified data by CRG and by review.

Documentary and bibliometric analysis

We also undertook a range of bibliometric and documentary analyses to look for evidence of impact. We undertook citation analysis in WoS, Scopus and Google Scholar to see how many times the reviews had been cited; searches were undertaken in May and June 2013. As Cochrane Reviews are regularly updated there was often more than one published version of a review, each with a number of citations attached to it. In such instances we combined citation counts for each version as long as the publication date was between 2007 and 2011. For updated reviews we counted citations for only versions of the review published after 2007. In order to trace the flow of knowledge we screened the first five pages of results of the citation analysis in Google Scholar to see whether or not the citations related to policy documents such as guidelines. Previous studies[15,48] suggest that the most relevant records in searches of Google and Google Scholar will be in the first five pages. Results of the citation analysis in WoS were imported into EndNote X7 (Thomson Reuters, CA, USA), at which point we performed keyword searches using the words ‘guidance’ and ‘guidelines’.

It may, however, take several months or even years for a work to be first cited. Moreover, the dissemination channels for research have broadened to include a variety of social media. Therefore, in addition to the citation counts previously described we used an alternative metric measure to calculate an alternative metric score for each of the 60 reviews (the score measures the quantity and quality of the attention an article has received). The Altmetric Bookmarklet (Altmetric LLP, London; www.altmetric.com) provides article-level metrics which give an indication of the impact of a publication by looking at activity surrounding the publication on social media sites (e.g. Twitter, Facebook), newspapers and policy documents. Articles for which no mentions have been recorded score 0. The searches were conducted in July 2013.

In addition, we undertook searches on Google, NHS Evidence and TRIP using review author and title keywords. Searches were undertaken between May and July 2013. We also drew on data from the publishers of The Cochrane Library (Wiley) on the impact of Cochrane Reviews. This included data on the number of downloads of reviews (abstract only or full text) and the number of media mentions for

Cochrane Reviews that had been press released. Reviews that are published in conjunction with a podcast are accompanied by a press release and Wiley collects press data for these reviews. Data are collected by Wiley through advanced keyword searches of Vocus (a paid-for clipping service; Cision, Beltsville, MD, USA) and searches on Google.

Analysis

Results were entered into a Microsoft Access database by one researcher (AM) and checked by a second (FB).

Methods for synthesis of work packages 1 and 2 and consensus meeting (work package 3)

In WP 3 we synthesised findings from WPs 1 and 2. Synthesis was guided by our overarching framework and took into consideration ideas relating to types of impact (e.g. instrumental/conceptual/symbolic). Preliminary findings were discussed at a consensus meeting involving the research team, a representative from the National Clinical Guideline Centre at the Royal College Physicians and members of the University of Hertfordshire Public Involvement in Research Group (PIRG). The purpose of this meeting was to assist in the process of conceptualising and identifying impact and to help make judgements about impacts. Examples of impact, including a review synopsis and any evidence relating to impact, were used as a basis for discussion. This process was considered important in order that we made appropriate judgements about potential or likely impacts and to ensure that impact was not overstated.

Chapter 4 Overview of impact of Cochrane Review Group outputs (2007–11)

Between 2007 and 2011, 3187 new and updated reviews were published on the Cochrane Database of Systematic Reviews. Of those, 1502 (47%) were produced by the 20 CRGs funded by the NIHR (*Figure 2*).

Results of Cochrane Review Group questionnaires

In total, 17 of the 20 CRGs returned the questionnaire, although not all had completed all sections. Reasons for not completing all sections of the questionnaire were because the CRG did not have any examples for that section, because it did not have any additional information to that already provided in their annual reports and because it did not have time to fill out all sections. Three declined to fill out the questionnaire. Reasons for not returning the questionnaire included the following: the group felt that the evaluation should be done externally without input from them, the group did not have time to fill out the questionnaire and the group felt there was no additional information to add to that already provided to NIHR in their annual reports. More details can be seen in *Table 2*.

Research targeting

Cochrane Review Groups were asked if they were aware of any reviews first published by their group between 2007 and 2011 that had generated subsequent research (e.g. contributed to successful grant applications for future primary research). Of the 13 groups that responded to this question, 12 (92%) said

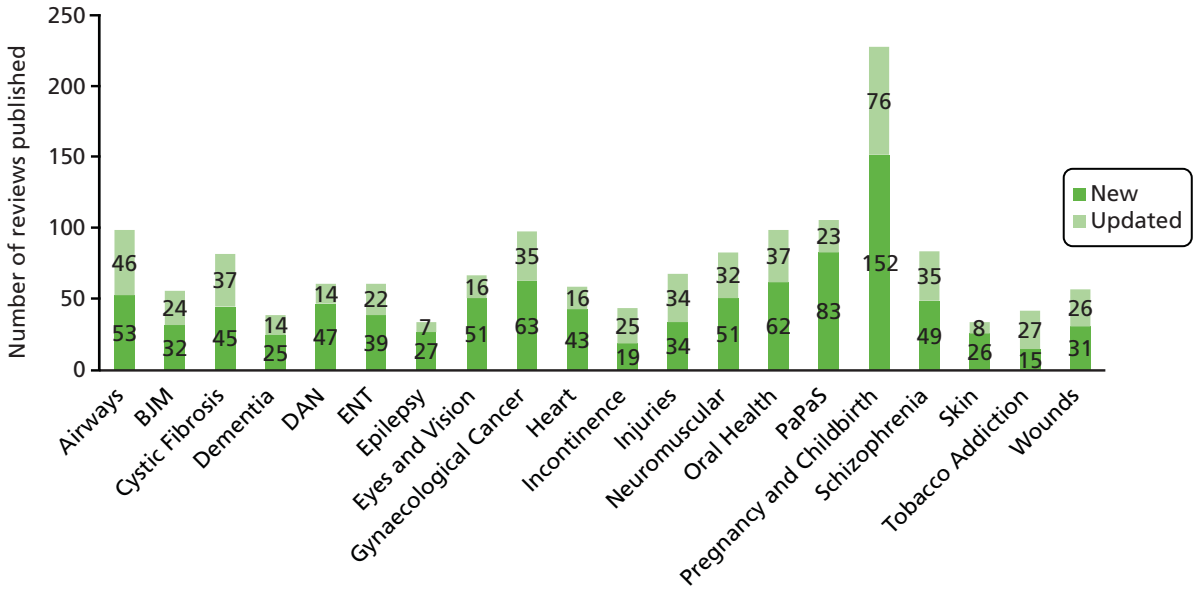

FIGURE 2 New and updated reviews published by each CRG between 2007 and 2011. BJM, Bone, Joint and Muscle trauma; DAN, Depression, Anxiety and Neurosis; ENT, Ear, Nose and Throat; PaPaS, Pain, Palliative and Supportive Care. This figure has been reproduced from figure 2 © Bunn *et al.* The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/.

TABLE 2 Questionnaires returned by CRGs

Questionnaire status	Number	Name of CRG
Returned questionnaire and information provided	13	Airways; BJM; Cystic Fibrosis and Genetic Disorders; Depression Anxiety and Neurosis; ENT; Incontinence; Injuries; Neuromuscular; Oral Health; Pregnancy and Childbirth; Skin; Tobacco Addiction; and Wounds
Returned questionnaire but not all sections completed	4	Epilepsy; PaPaS; Gynaecological Cancer; Heart
Did not fill out questionnaire but provided some information by telephone (e.g. some info on which reviews might have had impact)	3	Eyes and Vision; Dementia and Cognitive Improvement; Schizophrenia

BJM, Bone, Joint and Muscle Trauma; ENT, Ear, Nose and Throat; PaPaS, Pain, Palliative and Supportive Care.

yes and one (8%) said no. Of the groups that said yes, 12 provided some form of supporting evidence (some of them providing several examples) and 11 gave details of who had funded the research. All of the 11 groups that gave details of the funding body cited at least one primary study funded by NIHR. Other funders included government organisations in other countries, local funders and charities. A summary of all data on the impact on primary research can be seen in *Table 3*. Data in *Table 3* are collated from CRG and author questionnaires and documentary review.

TABLE 3 Number of reviews informing primary research

CRG	Number of reviews	Type and number follow-on research	Review is cited[a]	Type of funder
Airways	1	RCT	Yes	Not known
BJM	2	2 RCTs	Yes	2 government (1 UK, 1 Australia)
Cystic Fibrosis and Genetic Disorders	5	5 RCTs	Yes	3 government (UK), 2 not known
DAN	2	1 RCT, 1 not known	1 yes, 1 not known	1 government (UK), 1 not known
Eyes and Vision	1	1 not known	Yes	1 charity
Incontinence	3	3 RCTs	2 yes, 1 not known	3 government (UK)
Injuries	7	9 RCTs	7 yes, 2 not known	7 government (3 Australia, 3 UK, 1 Denmark), 1 industry, 1 charity
Neuromuscular	4	3 RCTs, 1 not known	2 yes, 2 not known	2 government (1 USA, 1 France), 1 charity, 1 not known
Oral Health	1	RCT	Yes	1 government (UK)
Pregnancy and Childbirth	1	Qualitative	Yes	Not known
Schizophrenia	1	1 RCT, 2 not known	Not known	Not known
Skin	5	5 RCTs, 1 not known	4 yes, 2 not known	3 government (UK), 2 charity (1 UK, 1 USA)
Tobacco Addiction	2	3 RCTs	Yes (all)	2 government (UK), 1 not known

BJM, Bone, Joint and Muscle Trauma; DAN, Depression, Anxiety and Neurosis; ENT, Ear, Nose and Throat; PaPaS, Pain, Palliative and Supportive Care.
This table has been adapted from table 2 © Bunn *et al.* The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/. Adaptations: abbreviations used, 'Cystic Fibrosis' changed to 'Cystic Fibrosis and Genetic Disorders', 'Pregnancy' changed to 'Pregnancy and Childbirth', and 'Type of funder' for 'Skin' changed from '2 UK' to '1 UK'.

Informing policy development

Seventeen groups provided us with information about potential impacts on policy, mostly in the form of guidelines which cited a review produced by their CRG. Additional information on inclusion in guidelines was collated from the CRG annual reports, from data compiled by the UKCC, and from documentary review and database searches. All of the CRGs had produced reviews which had affected policy-making in the form of guidelines or guidance. Across the 20 CRGs there were 722 citations in 248 guidelines, with 481 systematic reviews being cited at least once. Cochrane Reviews produced by 13 CRGs had been cited in 30 different NICE guidelines, and reviews from 12 CRGs had been cited in 23 sets of guidance developed by SIGN. Information on inclusion in guidelines (by CRG) is summarised in *Table 4*. This shows the total number of reviews cited in guidance, the number of guidelines and the level of the policy. The level of policy is categorised as international, national and local, with national meaning guidance produced by a national body in any country (not just the UK) (*Table 5* has further details). A full list of guidelines and a list by CRG is available on request.

TABLE 4 Summary of information relating to inclusion of reviews in guidelines (stratified by CRG)

CRG	Total number of citations	Number of reviews cited in guidelines/ guidance	Total number of guidelines	Level of guideline		
				International	National	Local
Airways	54	45	16	3	13	0
BJM	18	12	9	0	8	1
Cystic Fibrosis and Genetic Disorders	16	15	13	3	9	1
DAN	84	52	26	10	16	0
Dementia and Cognitive Improvement	14	14	5	1	4	0
ENT	33	21	17	3	14	0
Epilepsy	8	7	3	1	2	0
Eyes and Vision	8	6	6	0	3	3
Gynaecological Cancer	7	7	3	0	3	0
Heart	37	19	26	5	21	0
Incontinence	29	22	9	1	8	0
Injuries	42	29	18	8	10	0
Neuromuscular	8	6	7	5	2	0
Oral Health	47	17	25	1	20	4
PaPaS	48	33	20	4	15	1
Pregnancy and Childbirth	129	85	33	15	18	0
Schizophrenia	57	43	8	2	6	0
Skin	20	14	14	3	11	0
Tobacco Addiction	22	18	7	0	7	0
Wounds	41	25	11	1	10	0

BJM, Bone, Joint and Muscle Trauma; DAN, Depression, Anxiety and Neurosis; ENT, Ear, Nose and Throat; PaPaS, Pain, Palliative and Supportive Care.

TABLE 5 Total number of guidelines by level (international, national, local)

Level	Number	Further details
International	62	Global 35, Europe 21, Australasia 4, Scandinavia 1, USA/Canada 1
National	176	USA 48, UK 87, Australia 13, Canada 12, Netherlands 2, Ireland 2, Germany 4; Taiwan, Sweden, Singapore, Saudi Arabia, Norway, South Korea, France and Belgium 1
Local	10	North East NHS, UK 3; North East London, UK 1; North England, UK 1; Berkshire, UK 1; Ontario, Canada 1; New South Wales, Australia 1; Melbourne, Australia 1; private health-care provider, USA 1

Nature of policy impact

The conceptual approach adopted for this evaluation includes an assessment of the nature of the policy impact based on the categories devised by Weiss.[53] This attempts to distinguish between instrumental or direct impact and conceptual or symbolic use. In this case there was evidence that a number of Cochrane Reviews had some direct or instrumental impact in that they were used to inform practice guidelines. However, in this part of the evaluation we assessed only whether or not the reviews were cited by guidelines and did not look in detail at how reviews were used or if guidelines included recommendations that were in agreement with the Cochrane Review conclusions. In addition, most guidelines are based on a number of different publications and it is not easy to determine the contribution of individual reviews. For a further exploration of how GDs use Cochrane Reviews, see *Chapter 6*.

Impact on practice and services

In the questionnaire we asked CRGs if they were able to give us examples of ways in which reviews produced by their CRGs had influenced practice and services. Eight groups provided examples of changes to behaviour and six gave examples of how their reviews had led to health, health-service or economic benefits. Impacts on behaviour included changes through the use of evidence-based guidance and impacts on prescribing behaviour or the use of new technologies. Benefits to the health service included safer prescribing, a reduction in inappropriate prescribing and the identification of new effective drugs or treatments. We discounted some of the examples we were given, either because the impact was judged to be outside the time frame for this evaluation or because no supporting evidence was provided and we were unable to verify the impact in any way.

Examples of impact judged to relate to reviews first published or updated between the years 2007 and 2011 include the following:

- A review on support surfaces for pressure ulcer prevention[54] was used to inform guidance on purchasing within the NHS.[55]
- Reviews on long-acting beta-antagonists in asthma[56–58] may have led to safer prescribing of these drugs for people with asthma (www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm200776.htm).
- A review on colloids versus crystalloids for fluid resuscitation[59,60] may have influenced calls to stop starch use within the NHS, a decision that has the potential to save both lives and money.[61]
- An updated review on antiviral treatment for Bell's palsy[62] may have contributed to changes in practice and a reduction of prescriptions of antiviral drugs for Bell's palsy (http://cks.nice.org.uk/bells-palsy).
- A review on antifibrinolytic drugs for trauma patients[63,64] led to follow-on research which influenced the decision by the Medicines Innovation Scheme to fast-track tranexamic acid for use in the NHS. Ambulance crews throughout the NHS now administer tranexamic acid to bleeding trauma patients (www.swast.nhs.uk/txa.htm).

In many instances there was a lack of specific evidence to support the claims made in the CRG questionnaires. Even with the additional searches carried out by the research team it was often difficult to verify these claims and find a clear link between a review and an outcome. Moreover, attributing particular behaviour changes, health benefits or costs saving to a particular systematic review (or reviews) is difficult. Generally, new research adds to an existing pool of knowledge[65] and many research projects may lie behind a specific advance in health care.[66] Therefore, many of the examples we were given by CRGs have to be considered likely or potential impacts rather than proven impacts.

Despite difficulties verifiying impacts, it is apparent that many Cochrane Reviews have the potential to affect practice and policy and that some produce findings that could potentially lead to cost savings and health-service benefits. Some of these potential benefits are highlighted in the Cochrane quality and productivity topics. These documents are developed as part of the NICE QIPP. They are based on the 'implications for practice' section in Cochrane systematic reviews and focus on interventions that lack evidence of change, those with strong evidence for ineffectiveness and those in which risks outweigh benefits. Topics are evaluated only if they reflect a current gap in NICE guidance.[67] We found 19 relevant quality and productivity reports based on reviews from nine different CRGs. Potential benefits identified by NICE included economic benefits through cash savings or the release of cash, improvements in clinical quality, reduction in the use of unproven or unnecessary procedures, and improvements in patient and carer experiences. *Table 6* has details of the reviews on which these are based and the potential cost savings and health-service benefits.

TABLE 6 Details of Cochrane Reviews used to develop Cochrane quality and productivity topics

Review title	CRG	Year of Cochrane Review used	Potential savings	Other potential impacts
Tailored interventions based on exhaled nitric oxide versus clinical symptoms for asthma in children and adults	Airways	2009	Real cash savings	Increase in patient safety in children
Inhaled corticosteroids for cystic fibrosis	Cystic Fibrosis and Genetic Disorders	2009	Cash savings through reduced expenditure on drug budgets and fewer adverse events	Better outcome for patients by avoiding side effects of Inhaled corticosteroids
Statins for the treatment of dementia	Dementia and Cognitive Improvement	2010	Cash releasing, although may be limited as patients may continue to take statins for other reasons	
Antigen-specific active immunotherapy for ovarian cancer	Gynaecological Cancer	2010	Mixture of cash savings and improved productivity	Improved clinical quality due to reduction in use of unproven therapies Improved patient safety due to decreased risk of adverse events
High-dose rate versus low-dose rate intracavity brachytherapy for locally advanced uterine cervix cancer	Gynaecological Cancer	2010	Cash savings	Improved clinical quality, better outcomes for patients
Neoadjuvant chemotherapy plus surgery versus surgery for cervical cancer	Gynaecological Cancer	2010	Cash savings	Improved clinical quality due to reduction in use of unproven therapies Improved patient safety due to decreased risk of adverse events

continued

TABLE 6 Details of Cochrane Reviews used to develop Cochrane quality and productivity topics (*continued*)

Review title	CRG	Year of Cochrane Review used	Potential savings	Other potential impacts
Behavioural and cognitive interventions with or without other treatments for the management of faecal incontinence in children	Incontinence	2011	Cash releasing	Better clinical outcomes for patients, improved patient safety and experience
Colloids versus crystalloids for fluid resuscitation in critically ill patients (also a proven case study but it cites the 2012 update)	Injuries	2011	Cash releasing	Improved patient safety due to decreased risk of adverse events
Pharmacological interventions for the prevention of allergic and febrile non-haemolytic transfusion reactions	Injuries	2010	Real cash savings	Improved clinical quality due to reduction in use of unproven therapies
Non-pharmacological interventions for breathlessness in advanced stages of malignant and non-malignant diseases	Pain, Palliative and Supportive Care	2008	Cash releasing	Concentrating resources in providing services supported by evidence likely to have beneficial impact on patient and carer experience
Single-dose oral codeine, as a single agent, for acute postoperative pain in adults	Pain, Palliative and Supportive Care	2010	Possible real cash savings	Improved clinical quality
Single-dose oral gabapentin for established acute postoperative pain in adults	Pain, Palliative and Supportive Care	2010	Real cash savings	Likely to improve quality of patient care
Antenatal interventions for fetomaternal alloimmune thrombocytopenia	Pregnancy and Childbirth	2011	Real cash savings	Improved clinical quality due to reduction in use of unproven therapies
Enemas during labour	Pregnancy and Childbirth	2007	Cash releasing	Improved patient and carer experience
Fetal and umbilical Doppler ultrasound in normal pregnancy	Pregnancy and Childbirth	2010	Cash releasing	Improved patient and carer experience
Intra-amniotic surfactant for women at risk of preterm birth for preventing respiratory distress in newborns	Pregnancy and Childbirth	2010	Real cash savings and improved productivity	Improved clinical quality due to reduction in use of unproven therapies and unnecessary procedures
Repeat digital cervical assessment in pregnancy for identifying women at risk of preterm labour	Pregnancy and Childbirth	2010	Minimal impact on cash but improved productivity	Improved clinical quality, patient safety and patient experience
Restricting oral fluid and food intake during labour	Pregnancy and Childbirth	2010	No impact on cash	Improved clinical quality and patient experience by reducing unnecessary practice
Relapse prevention interventions for smoking cessation	Tobacco Addiction	2009	Cash releasing	Improved clinical quality, better patient outcomes, improved patient experience

Chapter 5 Impact of a representative sample of Cochrane Systematic Reviews

Results of author questionnaire

Three reviews per CRG were selected for further evaluation. One review per group was chosen randomly ($n = 20$) and two on the basis that they were more likely to have had an impact ($n = 40$). Where possible, the latter were selected from examples provided by the CRGs. Four CRGs did not provide information on impact and reviews for these CRGs were selected by the researchers. Nine reviews were updates and the rest were new reviews. Thirteen were published in 2007, 23 in 2008, 12 in 2009 and six each in 2010 and 2011. Details of these reviews, including citation, country of first author and whether they were a new review or an updated review, can be seen in *Appendix 4*. In a couple of instances the review initially selected had to be changed for a different review. This was either because the review had subsequently been allocated to a different CRG[68] or because the review had been withdrawn from The Cochrane Library.[69]

In total, 29 out of 60 authors (48%) returned their questionnaire; 16 were returned after the initial mailing, five after a reminder from the research team and a further eight after they were contacted by the managing editor of the CRG concerned. Thirteen questionnaires were returned by authors based in the UK (out of a possible 34) and 16 (out of a possible 26) from authors outside the UK. The numbers of questionnaires returned for each CRG can be seen in *Table 7*.

Research targeting

Authors were asked if their review had informed the development of future research, either by any of the review authors themselves or by other researchers. The responses can be seen in *Table 8*. Supporting evidence included information such as a reference to the study, the name of the funding body or the name of the study. Where the funder was not provided, we undertook internet searches for further details. Research had been funded by a variety of organisations in the UK and elsewhere; this included governmental bodies such as NIHR, charities, universities and industry.

Informing policy development

Authors were asked if they thought their review had influenced health policy- or decision-making at any level of the health service, including international, national, regional, local trust or unit, professional, administrative or managerial. They were also asked if they were aware of any potential future impact, for example if the review was being used in guidelines currently under development. Results can be seen in *Table 9*. In general, the supporting evidence provided related to the review having been cited in or used to develop some form of clinical or practice guideline.

Impact on practice and health services

Authors were asked if they thought the findings from their review had already led to changes, either directly or through the application of research-informed policies in the behaviour of health-care professionals or providers, health-care managers, health-service users or the wider public. Responses can be seen in *Table 10*. More respondents gave examples of changes to the behaviour of health professionals (37.9%) than changes to the behaviour of health-care managers (20.7%).

TABLE 7 Number of questionnaires returned by CRG

CRG	Returned (out of three)	Country of first author returned questionnaires
Airways	1	1 USA
BJM	2	1 New Zealand, 1 Australia
Cystic Fibrosis and Genetic Disorders	2	2 UK
Dementia and Cognitive Improvement	0	NA
DAN	1	1 Brazil
ENT	2	2 UK
Epilepsy	0	NA
Eyes and Vision	3	1 Brazil, 1 UK, 1 Italy
Gynaecological Cancer	1	1 Lebanon
Heart	1	1 UK
Incontinence	0	NA
Injuries	3	2 UK, 1 Canada
Neuromuscular	1	1 Japan
Oral Health	0	NA
PaPaS	2	2 UK
Pregnancy and Childbirth	2	1 USA, 1 Ireland
Schizophrenia	2	1 Australia, 1 Canada
Skin	3	1 UK, 1 Australia, 1 Taiwan
Tobacco Addiction	1	1 UK
Wounds	2	1 UK, 1 Australia
Total	29 (48%)	–

BJM, Bone, Joint and Muscle Trauma; DAN, Depression, Anxiety and Neurosis; ENT, Ear, Nose and Throat; NA, not applicable; PaPaS, Pain, Palliative and Supportive Care.

TABLE 8 Impact on future research

Question	Yes (%)	No (%)	Don't know (%)	No response (%)	Supporting evidence provided
Has the review generated subsequent research by any of the review authors?	14 (48.25)	14 (48.25)	0 (0.00)	1 (3.50)	15[a]
Are you aware of any ways in which your review has contributed to further research conducted by others?	7 (24.10)	4 (13.80)	18 (62.10)	0 (0.00)	7

a One respondent said no but provided an example.

TABLE 9 Informing policy development

Question	Yes (%)	No (%)	Don't know (%)	No response	Supporting evidence provided
Have review findings impacted on policy-/decision-making?	23 (79.3)	1 (3.5)	5 (17.2)	0	20
Are there any reasons for expecting the findings to be used for future policy-/decision-making?	14 (48.3)	2 (6.9)	13 (44.8)	0	5

TABLE 10 Changes in behaviour (e.g. of health-care professionals, service providers or service users)

Question	Yes (%)	No (%)	Don't know (%)	No response (%)	Supporting evidence provided
Led to changes in the behaviour of medical/allied health professionals/other providers	11 (37.9)	1 (3.5)	17 (58.6)	0 (0.0)	8
Led to changes in the behaviour of health-care managers	6 (20.7)	3 (10.3)	19 (65.5)	1 (3.5)	4
Led to changes in the behaviour of health-service users or the wider public	3 (10.3)	1 (3.5)	24 (82.7)	1 (3.5)	2

Authors were also asked if they thought the findings from their review had led to any health, health-service or economic benefits. This included costs reductions in existing services, improvements in the process of service delivery, increased effectiveness of services (e.g. through increased health), greater equity (e.g. through the improved allocation of resources) or economic benefits arising from a healthier workforce. Responses can be seen in *Table 11*.

The majority of respondents reported that they did not know if the review had led to health-service or economic benefits. For those who said yes, the examples of impact related to changes to practice (e.g. a reduction in treatments or technologies not proven to be beneficial) or cost savings through the health service no longer having to pay for a treatment not proven to be beneficial. However, in most cases the supporting evidence provided was anecdotal or difficult to substantiate.

TABLE 11 Health, health-service or economic benefits

Question	Yes (%)	No (%)	Don't know (%)	Not applicable (%)
Led to cost reduction in the delivery of existing services	4 (13.8)	1 (3.5)	20 (68.9)	4 (13.8)
Led to qualitative improvements in the process of service delivery	4 (13.8)	1 (3.5)	22 (75.9)	2 (6.8)
Led to increased effectiveness of services, e.g. increased health	3 (10.3)	1 (3.5)	22 (75.9)	3 (10.3)
Led to greater equity, e.g. improved allocation of resources at district/hospital level, better targeting and accessibility	1 (3.5)	1 (3.5)	23 (79.2)	4 (13.8)
Led to economic benefits from a healthier workforce and reduction in working-days lost	1 (3.5)	1 (3.5)	20 (68.9)	7 (24.1)

Results of bibliometric analysis

Citation analysis

In order to obtain some understanding of the likely influence the reviews have had on the research and practice community, we undertook citation analyses in WoS, Scopus and Google Scholar. The numbers of citations ranged from 0 to 348 in WoS, from 0 to 467 in Scopus and from 5 to 737 in Google Scholar. Mean citations were higher for selected reviews than for random reviews. A summary of the citation analysis data, showing the total number, median and range of citations across the three different databases, can be seen in *Table 12*. This shows the difference in the number of citations between the three databases, suggesting that citation analyses in WoS and Scopus may underestimate the impact of Cochrane Reviews in comparison with Google Scholar.

The average number of citations a paper receives may be affected by the type of specialty it represents and the length of time since publication. Therefore, it is not really appropriate to compare citation rates across the different CRGs; rather they should be considered against papers in a similar field. Moreover, we have looked at only three reviews for each CRG and this does not give us an idea of the impact of the total output of the groups.

Alternative metrics

According to the Altmetric website (www.altmetric.com/whatwedo.php#score), many articles currently score 0. The proportion varies but currently a mid-tier publication (definition not given) might expect 30–40% of the papers it publishes to be mentioned at least once (mentioned once would give a paper a score of 1). At the time we performed the searches, 36 (60%) of the reviews had a score of 1 or more, with 12 reviews having a score over 10 and four scoring over 50. This in itself is not perhaps very meaningful, as two-thirds of the reviews in our sample were chosen on the basis that they might have had an impact and, therefore, interest in these reviews might be expected to be higher than the average. Moreover, the score needs to be interpreted cautiously, as it may not accurately reflect interest in reviews published before 2011. Altmetric has been recording some activity (such as Twitter mentions) only for articles published since 2011. Mean Altmetric scores were higher for the selected reviews than the random reviews (2 vs. 25).

However, what the Altmetric scores do provide is some indication of the interest around a review, and the way Cochrane Reviews may have affected on knowledge production by stimulating discussion and debate. This includes discussion and debate amongst researchers and practitioners but also amongst service users and members of the general public. For example, a review on active versus expectant management for women in the third stage of labour[70] had an Altmetric score of 37 (a score higher than 97% of its peers).

TABLE 12 Summary of citation analysis data from WoS, Scopus and Google Scholar

Citations	WoS	Scopus	Google Scholar
Total number of citations (all 60 reviews combined)	2192	3562	8333
Mean number of citations	36.5 (R 19, S 45)	59.3 (R 33, S 72)	138.8 (R 62, S 177)
Median number of citations	20	28.5	72
Interquartile range	7–51	11–80	25–168
Variation in counts	0–348	0–467	5–737

R, random review; S, review selected for impact.

Further breakdown of this score shows how the review has impacted on the research and practice community and stimulated debate. For full details of the citations counts and Altmetric scores for each review, see *Appendix 4*. Five of the 60 reviews had been accompanied by a podcast and press release on publication.[71–75] These had all been picked up in the press with the number of mentions ranging from 37 to 100.

Results of documentary review

Review downloads

We looked at information on the number of times that the reviews were downloaded between 2007 and 2011. Data on the number of downloads was provided by Wiley, the publisher of The Cochrane Library. It was able to supply us with the number of full-text downloads for all years and abstract downloads for 2009–11. The number of downloads varied considerably between reviews. Of the sample of 60 reviews, the 10 that were downloaded most frequently (full text and abstract) can be seen in *Figures 3–5*. These figures give an indication of the impact of reviews within the research and practice communities and show how downloads for reviews have increased over the 5-year period.

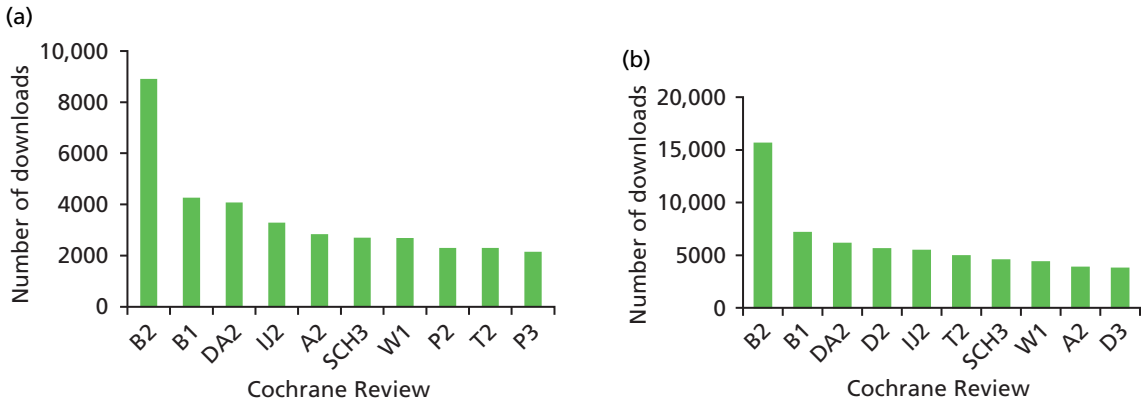

FIGURE 3 Top 10 downloads from The Cochrane Library in 2009. Identifying codes for reviews can be seen in *Appendix 4*. a, Top 10 full-text downloads from 2009. b, Top 10 abstract downloads from 2009. This figure has been reproduced from figure 3 © Bunn *et al.* The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/.

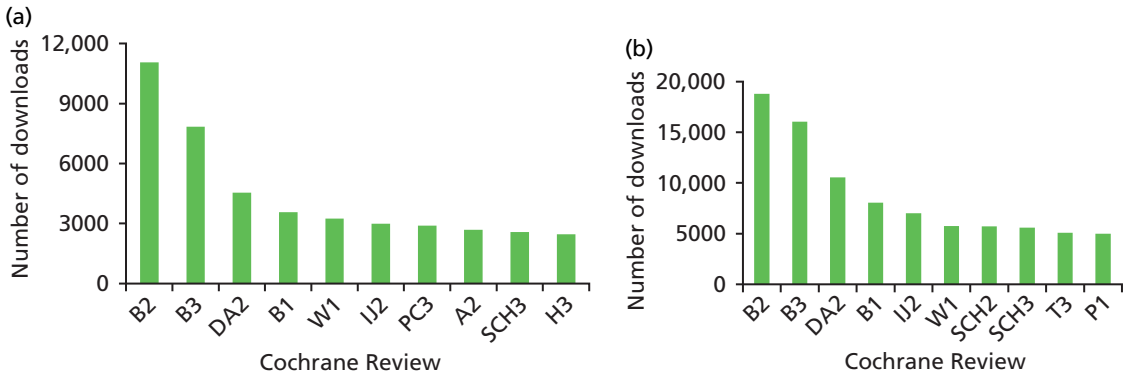

FIGURE 4 Top 10 downloads from The Cochrane Library in 2010. Identifying codes for reviews can be seen in *Appendix 4*. a, Top 10 full-text downloads from 2010. b, Top 10 abstract downloads from 2010. This figure has been reproduced from figure 3 © Bunn *et al.* The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/.

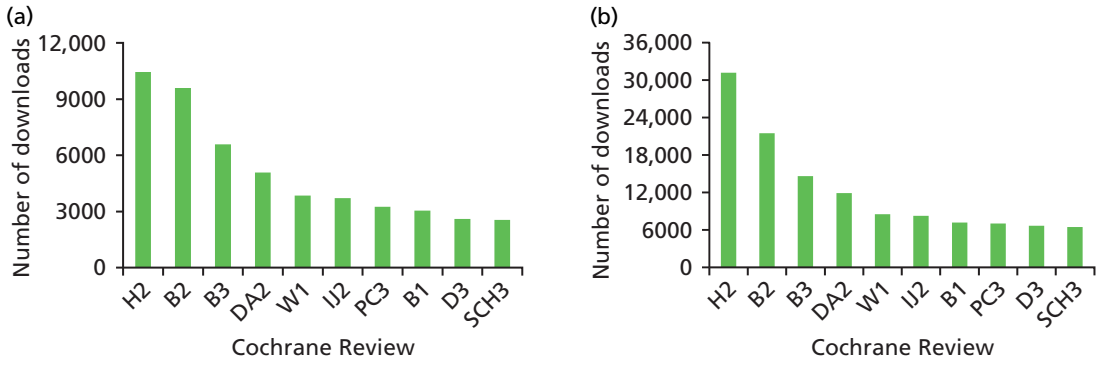

FIGURE 5 Top 10 downloads from The Cochrane Library in 2011. Identifying codes for reviews can be seen in *Appendix 4*. a, Top 10 full-text downloads from 2011. b, Top 10 abstract downloads from 2011. This figure has been reproduced from figure 3 © Bunn *et al.* The impact of Cochrane Systematic Reviews: a mixed method evaluation of outputs from Cochrane Review Groups supported by the UK National Institute for Health Research *Syst Rev* 2014;**3**:125,[38] under Creative Commons Licence 4.0, https://creativecommons.org/licenses/by/4.0/.

Summary of impact

Overall, 40 of the 60 reviews had been cited in some form of clinical guidance and 15 had influenced further primary research. There were 12 examples of impact on practice or services but not all of these were verified. A summary of the main impacts can be seen in *Appendix 5*. The data in *Appendix 5* are collated from the questionnaires, citation analyses, documentary review and internet searches and show the impact of the reviews in terms of knowledge production, research targeting, informing policy and impact on practice and services.

Chapter 6 Interviews with guideline developers

Introduction

Clinical guidelines have been defined as 'an attempt to distil a large body of medical expertise into a convenient, readily usable format'[76] and as 'systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances'.[77] A number of potential health- and service-related benefits of clinical practice guidelines have been identified.[77] This includes improvement in the quality of health care, a reduction in variation in service delivery among different providers and geographical regions, better equity and improved efficiency. Although the methods and analyses described in previous chapters enabled us to ascertain if Cochrane Reviews have been cited in guidance, it did not necessarily tell us the role Cochrane Reviews play in the development of guidance, for example whether they are just used as supporting evidence or they were instrumental in informing guidance. Therefore, in order to gain a greater understanding of the role that Cochrane Reviews play in the development of guidance, we undertook semistructured telephone interviews with key informants at national and international bodies involved in the development of guidance.

Methods

Sample and data collection

We undertook telephone interviews with a purposive sample of GDs from NICE and NICE National Collaborating Centres, SIGN and WHO. In the first instance one of the authors (PA) identified potential participants, with further snowballing as required. Recruitment was stopped once we felt data saturation was reached. Our sample attempted to capture a range of experiences (both positive and negative) of using Cochrane Reviews in guideline development. The focus of the data collection was to identify the way Cochrane Reviews are used in the development of guidance and to identify barriers and facilitators to their use. We used a semistructured interview schedule which was guided by our evaluation framework and by previous literature on barriers to review impact.[78] Interviews were taped and transcribed in full and lasted between 20 and 40 minutes.

Analysis

Owing to time limitations, and because we had a relatively small number of transcripts for analysis, we undertook the qualitative data analysis by hand. In order to elicit key features of GDs' experiences of using Cochrane Reviews, we used thematic content analysis.[79] To ensure a degree of inter-rater reliability and transparency, two authors (of AM, FB and DT) independently read and coded each transcript. From this a list of initial codes and themes were created which were then further refined after discussion with the wider project team.[80]

Findings

Altogether we interviewed eight participants: four from NICE (or NICE collaborating centres), two from SIGN and two from WHO. Out of the eight participants, five were female and three were male. More details of the participants and their roles can be found in *Table 13*.

Participants have been assigned a number, which is linked to any quotes in the text. In order to preserve interviewees' anonymity these numbers were assigned randomly.

TABLE 13 Details of interview participants

Organisation	No. of participants	Role
NICE – internal	2	Technical analyst, clinical guidelines team × 2
NICE – external collaborating centres	2	Senior systematic reviewer × 2
SIGN	2	Evidence and information scientist × 1, programme manager × 1
WHO	2	Senior manager × 2

The analysis resulted in six overarching themes and a number of subthemes relating to the views and experiences of GDs and their use of Cochrane Reviews. The overarching themes are:

- the process of using Cochrane Reviews in the development of guidance
- the quality of Cochrane Reviews
- culture and approaches
- up-to-date evidence
- methodological issues
- collaboration and communication.

These themes and subthemes can be seen in *Box 1*, and are described in more detail in the text.

Theme 1: the process of using a Cochrane Review in the development of guidance

It was clear that Cochrane Reviews were used at a number of different stages of the guideline development process. They were often used early in the process, for example to scope review questions and assess the strength of existing evidence.

> *Normally at the guideline group meetings I might present the findings [of Cochrane Review] . . . to give them an introduction into what kind of research is out there already.*
>
> *Participant 4*

BOX 1 Results of thematic analysis: themes and subthemes

1. The process of using CR in the development of guidance.
    - Scope for guidelines set by guideline development group but CR may be used to inform guideline questions and assess potential strength of evidence base.
    - CRs used early in process/used in development phase.
    - Systematic reviews top of evidence hierarchy/priority over other forms of evidence.
    - GDs will use CR if available, but not always possible – CR may not be available/may not 'fit'.
    - GDs may use whole CR or parts of CR (e.g. using evidence tables)/parts used vary.
    - CRs can save GD time (e.g. using existing searches/data).
    - GDs may build on work of Cochrane reviewers/existing reviews.
    - GDs may redo the review (depending on resources).

BOX 1 Results of thematic analysis: themes and subthemes (*continued*)

2. Quality of CRs.

   - Cochrane is a respected/trustworthy brand.
   - GDs look for CR first.
   - Transparent/easy to replicate.
   - Robust methods.
   - Variable quality (not all good).
   - Perception that quality may be poorer in older reviews.

3. Culture and approaches.

   - Cochrane and GDs have similar attitudes towards evaluating and appraising evidence.
   - Cochrane embedded in culture of guideline development.
   - Some differences in methods (e.g. CRs double data extraction but some GDs not).
   - Judgement part of guideline development process (but not part of CR process).
   - Cochrane and GDs may have different scopes/focus/drivers behind review questions.
   - Tensions between different perspectives and interests (e.g. academic/clinical/policy).
   - GDs sometimes need to be 'pragmatic'.
   - Resources – different timeframes and sources of funding.

4. Up-to-date evidence.

   - CRs can be out of date (this limits their impact).
   - CRs become out of date quickly.
   - Some confusion around dates of updates.
   - Some GDs (e.g. WHO) work with CRGs to update reviews (they fund this).
   - Factors contributing to delay in updates unclear, but lack of resources, reviewer delay and slow editorial processes indicated.

5. Methodological issues.

   - Cochrane methods respected.
   - Newer is better (newer CRs seen as methodologically better).
   - May be statistical issues (wrong data/statistical methods – barrier to use).
   - Lack of clarity on which follow-up data used from papers.
   - Network meta-analysis, comparative analysis reviews.
   - GRADE (NICE has to use it, Cochrane does not).
   - Cochrane focuses on RCTs – not always appropriate, particularly for public health.
   - GDs want better facilities for sharing and reanalysing data from CRs.

6. Collaboration/communication.

   - Good communication improves use of review.
   - Timing of communication important.
   - Dialogue/clear communication/negotiation important with appropriate persons.
   - Collaboration and positive engagement might help to speed things up.
   - Close collaboration between WHO and certain Cochrane groups.
   - Formal links between CRG and GDs to promote use of CR.
   - GDs experience problems communicating with CRGs.
   - Issues of ownership/authorship – recognition and reward.

CR, Cochrane Review; GRADE, Grading of Recommendations Assessment, Development and Evaluation.

All of the GDs we spoke to said that they would search for Cochrane Reviews as part of the guideline process, with searching for Cochrane Reviews often seen as a priority.

> *If you find a couple of good Cochrane Reviews you think oh thank heavens, you know Cochrane have done it. So we would use those first and foremost.*
>
> *Participant 8*

If suitable Cochrane Reviews existed they would be used as they were or built on and updated.

> *We would build on an existing review if it directly addresses the review question and then we might just update the search to look for some new evidence.*
>
> *Participant 5*

However, GDs were not always able to use existing reviews because they needed updating or did not focus on the same questions or outcomes as the guidance under development.

> *If it fits the review protocol perfectly, we will just use the review as a review . . . Obviously, it's quite rare that that happens.*
>
> *Participant 7*

> *[T]hey [Cochrane reviewers] perceive a particular question from more of an academic ground while within the guideline development group they tend to want to find answers that are more applicable on the ground, in clinical practice.*
>
> *Participant 7*

However, even when GDs were not able to use the whole Cochrane Review, it appeared that they often built on existing reviews or used component parts of the review, such as the search strategy, evidence tables, quality assessments or analyses.

Theme 2: quality of Cochrane Reviews

Views on the quality of Cochrane Reviews varied between interviewees but on the whole Cochrane Reviews were seen as of high quality and robust. The transparency of Cochrane Reviews was seen as an advantage in that it made the reviews easy to interpret and replicate.

> *Well I think they're kind of gold dust, you know, I'm always really pleased when I find one because I think they're good quality but they're also laid out in a very systematic way.*
>
> *Participant 8*

> *It's, you know, a very reliable, trustworthy brand that people know about.*
>
> *Participant 1*

However, there were some concerns about review quality, with the suggestion that not all Cochrane Reviews were of the same quality and that older reviews were sometimes of poorer quality than newer ones.

> *I think the majority of Cochrane Reviews are better than the normal systematic reviews published out there but within Cochrane Reviews you do find quite poor-quality Cochrane Reviews.*
>
> *Participant 7*

Theme 3: culture and approaches

It was clear that there were many similarities in the culture and approaches of Cochrane and the GDs. The GDs took a similar approach to that of Cochrane reviewers towards evaluating and interpreting evidence and both seem to prioritise systematic reviews and RCTs as gold standard evidence.

> *I think their [Cochrane] processes are quite similar to the processes that we use, so if I know that there's a Cochrane Review published I'll definitely go to that as my first line.*
>
> *Participant 4*

Guideline developers, however, sometimes included broader types of evidence than Cochrane Reviews (e.g. including observational studies), and, because of the time frame in which guidelines are produced, they sometimes had to make more pragmatic decisions about the review process (e.g. doing only a percentage of double data extraction and critical appraisal in contrast with the Cochrane standard of independent double data extraction).

There were also perceived differences in the way review questions were developed, with interviewees reporting that they felt Cochrane Reviews sometimes took too narrow a focus to be useful for guideline development.

> *There are people [referring to Cochrane reviewers] who will take a kind of broad view and put a lot of interventions together, and then do kind of analyses comparing among them. And that's really the strategy that you need for a guideline. You're interested in choosing among a set of treatment alternatives, knowing whether one treatment is better than nothing. And then there are a fair number of Cochrane Reviews that look at one tiny little thing . . . well, it's difficult for us to use that sort of thing in the guideline.*
>
> *Participant 3*

Another participant acknowledged that, although Cochrane Reviews with a narrow focus could be a problem:

> *Cochrane is moving more towards comparative effectiveness reviews.*
>
> *Participant 2*

Theme 4: up-to-date evidence

A recurring theme throughout the interviews was around the need for up-to-date evidence. As one participant put it, their first concern about Cochrane Reviews was:

> *Is the right question there and in the library, and is it up to date?*
>
> *Participant 2*

They went on to say that the likelihood of this was rather 'hit and miss'. In fast-moving fields Cochrane Reviews could become out of date quickly.

> *The growth in this field is so rapid that, you know, if a Cochrane Review is 2 years out of date, we're going to end up redoing the searches and having to add studies to the analysis and things.*
>
> *Participant 3*

Guideline developers also felt that it took too long for Cochrane Reviews to be updated. Factors that were felt to contribute to this delay in updates included a lack of resources for updating, reviewer delay and slow editorial processes on the part of CRGs. Out-of-date reviews appeared to be less of an issue for GDs at WHO, as they had close links with several CRGs and had the resources to pay Cochrane groups to update their reviews.

Theme 5: methodological issues

It was clear that the methods used for Cochrane Reviews were well respected by GDs. Despite this there were instances when GDs felt that the wrong statistical approach had been used in the Cochrane Review or that there was a lack of information about the way statistical calculations had been performed:

> *Sometimes I wasn't clear about what correlations they used to adjust the standard deviations and I couldn't find it inside the text.*
>
> *Participant 4*

There was a suggestion that policy-makers might require different review approaches (such as overviews and network meta-analyses) from that of the traditional Cochrane Review. It was also felt that GDs would benefit from the development of ways of sharing data.

> *I would like to see us get to a point where we're sharing data. Where, you know, we're entering information in a way that means, when somebody has extracted 50 studies of drugs for schizophrenia, if we want to look at another question that isn't answered in the way that they've analysed the data, we can go and just reanalyse the data.*
>
> *Participant 3*

Theme 6: collaboration and communication

A recurring theme throughout the interviews was the importance of good communication between guideline development and Cochrane authors and CRGs. Although GDs had positive experiences of collaboration with CRGs, this was not always the case and there were instances where GDs had found contacting and collaborating with CRGs or review authors difficult.

> *I think it's more about, you know, the communication and collaboration, so, you know, how can we share the information, I think that's the problem at the moment, and it's extremely difficult when you have so many different Cochrane groups and they all work differently, so, trying to establish that kind of relationship is quite difficult.*
>
> *Participant 7*

It was clear, however, that GDs saw the importance of collaborating more closely with CRGs and some were attempting to do so. For example, one interviewee spoke of the efforts they were making to build better communication with CRGs into their processes:

> *We would send out information to the Cochrane Review Group that has done the reviews, our review questions and the reviews that we think would be appropriate to try and get some feedback about the, um, whether any of those reviews are being updated or whether there's any new reviews that we don't know about in the pipeline. And that's something that we're currently in the process of doing for a new guideline that we're working on.*
>
> *Participant 5*

Several participants referred to issues around ownership of reviews or adequate recognition for Cochrane authors as a barrier to better collaboration.

> *I think there's a concern, you know, on the Cochrane side, about how their work will be used and we need to find a way that, you know, Cochrane are confident that their work is being cited properly and represented accurately.*
>
> *Participant 3*

Barriers and facilitators to the use of Cochrane Reviews

It is clear from the data presented that there are a number of barriers and facilitators to the use of Cochrane Reviews in the development of guidance. These relate to the process of guideline development, the quality and methods used for Cochrane Reviews, the culture and approaches of Cochrane and GDs and collaboration and communication between review authors or CRGs and GDs. Some of the main barriers and facilitators identified from our analyses are summarised in *Table 14*.

TABLE 14 Barriers and facilitators to the use of Cochrane Reviews in the development of guidance

Barriers	Facilitators
Process	
• CR may not be available, may not fit with guideline scope • CR may be out of date • Cochrane too slow to update	• Similar evidence hierarchy • Similar processes for critical appraisal • GD can use all or part of CR • CR can save GDs time
Quality and methods	
• Variable quality (not all CR good) • Quality may be poorer in older reviews • Statistical issues (e.g. CR not used outcome measures, statistics GD want) • Need for network meta-analysis and comparative analysis reviews • GRADE (NICE have to use it, CR do not) • Lack of facilities for sharing data	• Respected/trustworthy brand • Transparent/easy to replicate • Robust methods • Quality may be better in newer reviews
Culture and approaches	
• Different time frames and resources • Cochrane and GD may have different scopes, review focus, drivers • Tension between different needs and perspectives (e.g. researcher, clinician, policy-maker)	• Similar attitudes towards evaluating and synthesising evidence • Cochrane embedded in culture of guidelines
Collaboration and communication	
• Problems communicating with review authors and CRGs • Issues of ownership and authorship	• Good communication between GDs and authors or CRGs improves use of CR (timing important) • Collaboration and positive engagement might help to speed things up • Formal links between CRG and GDs to promote use of CR

CR, Cochrane Review; GRADE, Grading of Recommendations Assessment, Development and Evaluation.

Chapter 7 Discussion

The overall aim of this study was to identify the impacts on health care, patient outcomes and value for money of Cochrane Reviews published between 2007 and 2011. The evaluation focused on the outputs of 20 CRGs that have their editorial bases in the UK and that receive support from the NIHR Systematic Review Programme. We collected data through questionnaires, bibliometric and documentary review and semistructured interviews.

Summary of findings

In total, 85% of CRGs and 48% of review authors returned questionnaires. There was evidence that all the CRGs had published reviews that had some impact. The clearest impacts were on research targeting and health-care policy, with less evidence of direct impact on clinical practice and the organisation and delivery of NHS services. Although there was evidence to suggest that some of our sample of 60 reviews had had a significant impact on research, health-care policy or clinical impact, others appeared to have had little or no impact on the research and practice communities. The reviews that demonstrated the clearest evidence of impact were those that had been updated during 2007–11 rather than first published during that time.[60,71,81]

Evidence of impact varied between CRGs and between reviews. These differences between CRGs might be attributable to a number of factors, including the scope or speciality of the group, the type and number of outputs, methods used for dissemination and knowledge transfer and the extent to which CRGs routinely collected data on impact. Amongst the sample of 60 reviews, variation might be accounted for by the relevance of the review question and findings to decision-makers, the date of the publication, the strength of the evidence or the strategies used for disseminating the findings.

Knowledge production and research targeting

Identifying gaps in the evidence and stimulating research

We found some evidence that Cochrane Reviews had played a role in identifying gaps in the evidence and stimulating new research. The CRGs provided 40 examples of reviews that had influenced primary research, and of the sample of 60 reviews 13 (22%) of the sample of 60 reviews had been cited in a protocol or the background of a primary research study. Much of the follow-on research took the form of RCTs (a number of which were funded by NIHR). Most of the examples of research impact related to work conducted by the Cochrane authors themselves; respondents were less aware of any influence on the research of others.

As well as influencing the conduct of new research, there was evidence that Cochrane Reviews had contributed to the creation of new knowledge and the stimulation of discussion and debate. The citation counts, altmetric scores and data on downloads from The Cochrane Library give an indication that a number of the reviews had had a significant impact on knowledge production. The data do suggest that many of the reviews in our sample had been of interest to decision-makers. For instance, of the 60 reviews 27 had had 100 or more citations in Google Scholar and five had received over 400 citations. Citation counts in WoS and Scopus were lower than those in Google Scholar. It seems likely that WoS and Scopus are underestimating the impact of Cochrane Reviews. However, as there are also some concerns about the accuracy of Google Scholar, evaluations of citation data for Cochrane Reviews should include more than one database.

Informing policy development

Systematic reviews from all 20 CRGs were cited in clinical or practice guidance of some sort. In total there were 722 citations in 248 guidelines (or in the evidence reviews used to develop the guidance) with 481 reviews being cited at least once. This included 62 sets of international guidance, 175 sets of national guidance and 10 examples of local guidance. Eighty-seven sets of national guidance were developed in the UK, with Cochrane Reviews cited in 30 sets of NICE guidance and 23 sets of SIGN guidance. Of the guidance classified as international, 35 were global (e.g. that produced by the WHO) and 21 were European. We found only 10 examples of local guidance. However, this may be because local guidance is often not publicly available and is more difficult to find. Although CRGs and review authors gave us a number of examples where they felt Cochrane Reviews had influenced local guidance (e.g. at hospital or department level), most were excluded from our final numbers, as we were unable to verify them. It is therefore possible that our evaluation underestimated the impact of Cochrane Reviews on local guidance.

The use of Cochrane Reviews in the preparation of guidance

Determining how Cochrane Reviews are used in the preparation of guidance is challenging.[15] The fact that a review is cited in a guideline does not mean that it was instrumental in the development of the final guidance. Conversely, a Cochrane Review might have been used to inform policy development but may not be referenced or cited. To explore the way in which Cochrane Reviews are used in the preparation of guidance (including that produced by NICE) we conducted semistructured interviews with GDs. The results of the thematic analysis suggest that searching for relevant Cochrane Reviews is part of the guideline development process and that Cochrane Reviews often play an instrumental role in informing guidance. It appeared that Cochrane Reviews influenced guideline development in a variety of ways and at a number of different stages of the process. As well as being used to inform the evidence review on which the guidance was based, they were often also used at the beginning of the guideline development process, to scope review questions and ascertain the strength of existing evidence. GDs also often used Cochrane Reviews to inform their own evidence reviews, drawing on component parts of Cochrane Reviews such as search strategies, lists of included and excluded studies, data on the assessment of risk of bias and analyses. However, a number of factors limited the impact of Cochrane Reviews on the development of guidance: relevant Cochrane Reviews were not always available or did not fit with the guideline scope, they were out of date or the methods used were not the same as those required by the GDs. For example, GDs at NICE are required to use Grading of Recommendations Assessment, Development and Evaluation (GRADE),[82] whereas not all Cochrane Reviews use GRADE.

Impact on clinical practice and services

There was evidence to suggest that Cochrane Reviews had led to improvements to the health service such as the safer or more appropriate use of medication and other health technologies. However, whether or not these changes were directly as a result of the Cochrane Review and not the result of subsequent clinical guidance was difficult to judge. Moreover, attributing particular behaviour changes, health benefits or cost savings to a particular systematic review (or reviews) is difficult. Generally, new research adds to an existing pool of knowledge[65] and many research projects may lie behind a specific advance in health care.[66] Many Cochrane Reviews have a narrow focus (often deliberately) and it may not be reasonable to expect them to have an impact on their own.

Although some review authors who responded to the questionnaire thought that their review had had an impact on practice and health services, the majority were unsure if their work had changed the behaviour of health-care professionals, managers or members of the public, or if it had helped to increase quality and equity, improve effectiveness or reduce costs. There was little evidence to suggest that Cochrane Reviews had had a direct effect on NHS organisation and delivery. This is perhaps not surprising, as it has been suggested that some policy and practice areas lend themselves more readily to being informed by research than others. For example, it may be easier for research to influence the development of practice policies, such as the use of resources by practitioners, rather than governance policies that relate to organisational and financial structures. Moreover, the Cochrane group that focuses on organisation and delivery of services (the Effective Practice and Organisation of Care Group) is not based in the UK and was therefore not included in the study.

Impact on future clinical practice

There is evidence to suggest that Cochrane Reviews contribute to creating knowledge about, and confidence in, the value of treatments. Cochrane Reviews have the potential to impact on practice and policy and some produce findings that could lead to cost savings and health-service benefits. For instance, 19 reviews which fell within the scope of this evaluation were featured in Cochrane Quality and Productivity Topics. These identified a number of potential benefits including economic benefits through cash savings or the release of cash, improvements in clinical quality, the reduction in the use of unproven or unnecessary procedures and improvements in patient and carer experiences.

Barriers and facilitators to review impact

Interviews with GDs identified a number of potential barriers to review impact. One of the themes that emerged from the interviews with GDs was the need for up-to-date evidence. Reviews that were considered to be out of date, that took too long to update or that had too narrow a scope were of less use to policy-makers. This finding ties in with previous literature on research impact which suggests that timeliness and nature and strength of the evidence are facilitators of research use.[83–86] Evidence from the interviews with GDs also suggested that a lack of collaboration and communication between GDs and CRGs acts as a barrier to the use of Cochrane Reviews in the development of guidance. There is evidence to suggest that the social networks of researchers play a vital role in the communication and dissemination of research[87,88] and the degree of impact. This was borne out by our evaluation, as close collaboration between CRGs and GDs (such as that between the Pregnancy and Childbirth group and the Department of Reproductive Health at the WHO) appeared to increase the use of Cochrane Reviews in the guideline development process.

Limitations

Evaluating the impact of research is complex and difficult and there are a number of methodological issues that might have a bearing on the validity of the results of this study. It is acknowledged that knowledge-production activities related to health research are easier to distinguish than impact on policy or health gain.[34] Moreover, there is a lack of agreed instruments or methods for determining impact.[34] Although health benefits and broader economic benefits may be viewed as the real payback from health research, these are hard to measure, as it is difficult to attribute particular health gains to specific pieces of research.[29] Indeed, although we made some inferences about the wider health and economic benefits of Cochrane Reviews, these are difficult to prove. This evaluation focused on the impacts of published outputs only. It is likely that funding to CRGs results in other forms of payback that are not identified in this study; for example, benefits in terms of research capacity building, methodological development and the promotion of evidence-informed decision-making.

Our approach included the use of citation analysis, with higher citation counts taken as an indicator of greater impact within the research and practice communities. It has been argued that such techniques focus on the quantity of research outputs instead of outcomes or impact.[17] In addition, it may take several months or even years for a work to be first cited and there are questions about the reliability of citation data for Cochrane Reviews. However, we used a mixed-methods approach, including documentary review, questionnaires with CRGs and review authors, and interviews with GDs, which allowed us to get a more comprehensive picture of impact. We also supplemented traditional citation counts with the use of alternative metrics which provided an indication of the amount of attention a review had received in social media.

We examined the impact of three reviews per CRG. Although we attempted to include a representative sample of reviews, by selecting some randomly and some on the basis of impact, our sample is small and it is possible that the reviews we chose are not typical of the outputs of those CRGs. There may also be better examples of impact. Only 29 authors (48%) responded to the survey, which raises further questions about the generalisability of the findings. However, this response rate compares favourably with a previous

survey of Cochrane authors in which 26% of contact authors responded.[89] Moreover, although we identified a considerable number of guidelines that had cited Cochrane Reviews, it is unlikely that this list is exhaustive. In particular, we may not have identified local guidelines, non-UK national guidelines or guidelines published in languages other than English.

Much of the data presented in this report are stratified by CRG. However, the varied nature of review topics and differences in the number of questionnaires returned for each group and the length of time since publication mean that it may not be appropriate to make direct comparisons between reviews or between CRGs. It is likely that reviews published more recently may not have had sufficient time to generate citations or impact on policy or practice. It takes a number of years for citation counts to peak, typically 3 or 4 years post publication, and a window of 5 years has been suggested as most appropriate for research assessment.[90,91] Indeed, it may take up to 10 years for the full impact of research to be apparent.[92]

This was a retrospective evaluation of impact and as such may be a greater risk of recall bias than one in which data is collected prospectively. Moreover, as many of the data were collected from those most closely associated with the reviews, authors and editorial bases, there is a possibility that respondents might have inflated the impact of their work. In order to prevent this, the research team critically reviewed the information provided, sought evidence to verify impacts and checked identified impacts were related to an output produced in the time frame of interest (2007–11).

As we interviewed only eight GDs, all of whom came from leading guideline development agencies, it is possible that the findings may not be directly transferable to other organisations. Moreover, the majority of the interviewees were based in the UK and their views and experiences may not be the same as those of GDs in other countries. Despite this, consistent and recurring themes emerged from the interviews and the views expressed are concordant with literature in this area.[78]

Implications of the findings

The results of the impact analysis presented in this study provides evidence that some Cochrane Reviews produced by NIHR-funded CRGs have had an impact on clinical practice, clinical guidance and the conduct of new primary research. Although we found limited evidence that Cochrane Reviews had had a direct effect on clinical practice, there is evidence that they have an indirect impact on health-care and patient outcomes through their role in informing further primary research and clinical guidance. Although the implementation of NICE guidance has been shown to be variable,[93,94] there is evidence that clinical guidelines can be effective in changing the process and outcome of care.[95–99]

Similarly to other evaluations of the impact of health-care research, we have found that impacts on policy and research are more easily discernible than those on clinical practice and that there are significant difficulties associated with determining the impact of specific pieces of research.[34] The focus of this evaluation was on the outputs of 20 CRGs covering a broad range of health-care topics. It is possible that it would be easier to determine impact on clinical practice and the behaviour of health-care providers if such evaluations had a narrower focus. This might allow the use of more qualitative and quantitative methods targeted at specific groups of health-care providers.

Although the interviews suggested that Cochrane Reviews are embedded in the guideline development process, there were a number of barriers to their use, including having too narrow a focus or being out of date. Both formal and informal networks are needed to facilitate the transfer of research knowledge to decision-makers[100] and improved collaboration and communication between GDs and CRGs might facilitate the use of Cochrane Reviews in the development of guidelines.

Previous research has identified a number of potential facilitators for increasing the impact of systematic reviews on the policy-making process. This includes involving policy-makers in the review process, making reviews relevant to local settings and contexts, collaboration between researchers and policy-makers and disseminating the results of systematic reviews in user-friendly formats.[78] Tailored messages may be an effective strategy for promoting evidence-informed decision-making,[101,102] as is identification of the audience for whom the review is planned.[37] This might include the general public, patients, clinicians, managers and public policy-makers. Such considerations will have a bearing on the way the question is formulated and the review undertaken. Considerations of applicability to local context and the inclusion of diverse study types may also increase the usefulness or reviews to policy-makers.[8,84] However, strategies for increasing research impact may require considerable investment on the part of the researcher in terms of time, resources and the development of new skills.[11,103] Despite a growing body of work on increasing research impact, the benefit of such developments is not established and further work in this area is needed.[78,85,101]

Conclusions

The last few decades have seen a growing emphasis on evidence-informed decision-making in health care, with research syntheses such as systematic reviews seen as key sources of evidence. In addition, more recently, there has been burgeoning interest in the way in which research is used; researchers are increasingly expected to demonstrate that their work has contributed to society in some way, whether this is through an impact on the economy, quality of life or public policy. This study brings these two trends together in an exploration of the impact of systematic reviews on health-care and patient outcomes.

We identified a number of impacts and likely impacts of Cochrane Reviews. The clearest impacts of Cochrane Reviews are on health-care policy, particularly in the form of clinical guidelines. Interviews with GDs suggest that Cochrane Reviews are embedded in the guideline development process. However, reviews with a narrow focus or that are out of date are of less use to decision-makers, and improved communication between CRGs, review authors and GDs might facilitate their impact on the development of guidance. We found less evidence of a direct impact on clinical practice and the organisation and delivery of NHS services.

An overall aim of the study was to provide information on whether or not Cochrane outputs represent value for money. Methods to quantify and measure value for money remain elusive. Cochrane Reviews influence guidelines, the implementation of which might lead to better outcomes for patients and potential cash savings or economic benefits. However, the extent to which guidelines are implemented and the outcomes of implementation are difficult to measure. What this report does offer is some sense of the size of the knowledge cascade and the way that Cochrane Reviews are contributing to the overall body of evidence.

This study provides some evidence that Cochrane systematic reviews can contribute to evidence-informed decision-making. However, the production of a rigorous review of the evidence is not in itself enough to guarantee impact and there is a growing acceptance that active strategies are needed to facilitate the impact of research, including systematic reviews, on policy and practice. Strategies for knowledge transfer and dissemination are seen by many as an essential part of the review process. It is clear, however, that these strategies for increasing research impact require considerable investment in terms of time, resources and the development of new skills. Despite a growing body of work on increasing research impact, the benefit of such developments is not established and further work in this area is needed. Finally, although it is important for researchers to consider how they might increase the influence of their work, such impacts are difficult to measure. Questions remain about how we define and measure impact and more work is needed to develop suitable methods for impact analysis.

Recommendations for practice and research

Areas for future research identified by the study include the following:

- Further work to develop methods to identify the impact of systematic reviews on health-care practice and the behaviour of clinicians, policy-makers and service users, in particular identifying ways of identifying impact on clinical practice.
- Qualitative research exploring how decision-makers interpret and understand systematic reviews and how this might be facilitated.
- Research into the impact on clinical practice, which may be more easily discernible if evaluations have a narrower focus (e.g. looking at more specific areas of health care); this would allow the use of methods targeted at specific groups of health-care providers.
- Further work on how to define and evaluate the value for money of specific reviews or groups of reviews.
- Further evaluation of the format of Cochrane Reviews including how to present complex scientific information in a format that is accessible for decision-makers.
- Further development and evaluation of knowledge transfer strategies designed to increase the use of Cochrane Reviews in evidence-informed decision-making.
- Further work to improve the completeness of citation data for Cochrane Reviews on WoS and Scopus and verify data accuracy on Google Scholar.

Areas for future practice identified by the study include the following:

- Develop formal networks for collaboration and communication between GDs and CRGs.
- Investigate the ways Cochrane share data with GDs. However, this would need support across all the collaboration, not just the UK. It would need to be done in a way that recognises and rewards the contribution of Cochrane authors and CRGs and may need to be financially incentivised.
- Investigate the ways Cochrane and CRGs identify and document impact on clinical decision-making and practice.
- Routinely collect examples of actual and potential impact by CRG editorial bases.

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Contributions of authors

Frances Bunn, Daksha Trivedi, Phil Alderson and **Steve Iliffe** wrote the protocol.

Frances Bunn, Daksha Trivedi, Laura Hamilton, Alice Martin and **Emma Pinkney** analysed the data.

Frances Bunn wrote the first draft of the report.

Phil Alderson, Steve Iliffe and **Daksha Trivedi** contributed to the writing of the report.

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Appendix 1 Cochrane Review Group questionnaire

An evaluation of the impacts and likely impacts of Cochrane reviews published during 2007-2011 by Cochrane Review Groups that are supported by the National Institute of Health Research (NIHR)

Questionnaire for Cochrane Review Groups funded by NIHR HTA Systematic Review Programme

The University of Hertfordshire, University College London and The National Institute for Health and Clinical Excellence are working together on an evaluation of the impacts and likely impacts of Cochrane Reviews published between the years 2007-2011 by Cochrane Review Groups that are supported by the National Institute of Health Research (NIHR). **This evaluation has been commissioned by the NIHR HTA Systematic Reviews Programme and will inform the quinquennial review.**

The survey will seek to collect information on the actual and potential impacts of a sample of Cochrane reviews first published, or substantially updated, by NIHR funded Cochrane Reviews Groups during the period 2007 - 2011.

The questionnaire is designed to give you an opportunity to tell us about the impact you think reviews published by your group might have had. We are primarily interested in impacts in the UK (particularly on the NHS) but if you are aware of other types of impact then please include them. We are not expecting you to search for evidence of impact but just to let us know about anything you may already be aware of.

Please note that although we are collecting information on the impacts of individual reviews, the focus of the evaluation is the impact of the outputs of NIHR funded Cochrane Review Groups as a whole rather than the performance of the individual CRGs or review teams.

Dr Frances Bunn is leading the research. If you have any questions about completing the questionnaire please contact Frances at [redacted], email: [redacted]

Many thanks in advance for your help.

A. SYSTEMATIC REVIEWS CONSIDERED MOST LIKELY TO HAVE HAD AN IMPACT

1 Please state the title of your CRG

2. We would like to identify a sample of reviews that have already had an impact. Taking into consideration all reviews that your CRG first published on the Cochrane Library between the years of 2007-2011 can you give **some examples** of those that you think have had the most impact[1]?

Please consider only those **first published** between 2007-2011 and not updated reviews

Please list **up to 5 reviews**

Review title and year first published	**Evidence of impact**

3 Taking into consideration reviews that have been **substantially updated** during the period of 2007-2011 can you give some examples of those which you think have had the most impact?

[1] This might include impact on research, health system policy/decision making, behaviour, health care practice, service organisation and economics.

Please list **up to 5** substantially updated reviews

Review title and year first published	**Evidence of impact**

B. USE OF THE SYSTEMATIC REVIEW FINDINGS IN THE RESEARCH SYSTEM

4. Are you aware of any reviews first published by your CRG between the years 2007-2011 that have generated subsequent research (e.g. contributed to successful grant applications for primary research)? Yes ☐ No ☐

This might include further research by the authors of the systematic review or research conducted by others.

5. If you answered yes to question 4 please give further details

Review title	Further details of subsequent research (e.g. project title/topic/funder/year?)

C. USE OF SYSTEMATIC REVIEW FINDINGS IN HEALTH SYSTEM POLICY/DECISION MAKING

NB. Questions about applications of the findings by practitioners etc form the next section

6. Review findings can be used in **policy/decision making** at any **level** (e.g international, national, regional, local trust or unit, professional, administrative or managerial) of the health service. Taking into consideration all reviews that your CRG first published on the Cochrane Library between the years of 2007-2011 can you give **any examples** of how review findings have been used in policy/decision making?

Examples of the policy relevance could take many forms including: statements by policy makers; citing of the findings in a clinical guideline from a national or local professional group etc.

Please give relevant references/evidence

Review Title	Evidence of impact

D. APPLICATION OF THE SYSTEMATIC REVIEW FINDINGS THROUGH CHANGED BEHAVIOUR

7. Taking into consideration all reviews that your CRG first published on the Cochrane Library between the years of 2007-2011 can you give **any examples** of how review findings have led to changes, either directly or through the application of research-informed policies, in the behaviour of any of the following?

Medical/allied health professionals/other providers

Health care managers

Health service users or the wider public

Review title	Impact on behaviour	Any supporting evidence

E. HEALTH/HEALTH SERVICE/ECONOMIC BENEFITS ARISING FROM THE SYSTEMATIC REVIEW FINDINGS

8. Various possible health/health service/economic benefits from the application of research findings can arise. These benefits include: improved service delivery; cost savings; improved health; an increase in values considered desirable e.g. equity.

Taking into consideration all reviews that your CRG first published on the Cochrane Library between the years of 2007-2011 can you give **any examples** of how review findings might have led to health/health service/economic benefits?

Review title	Nature of benefits	Any supporting evidence

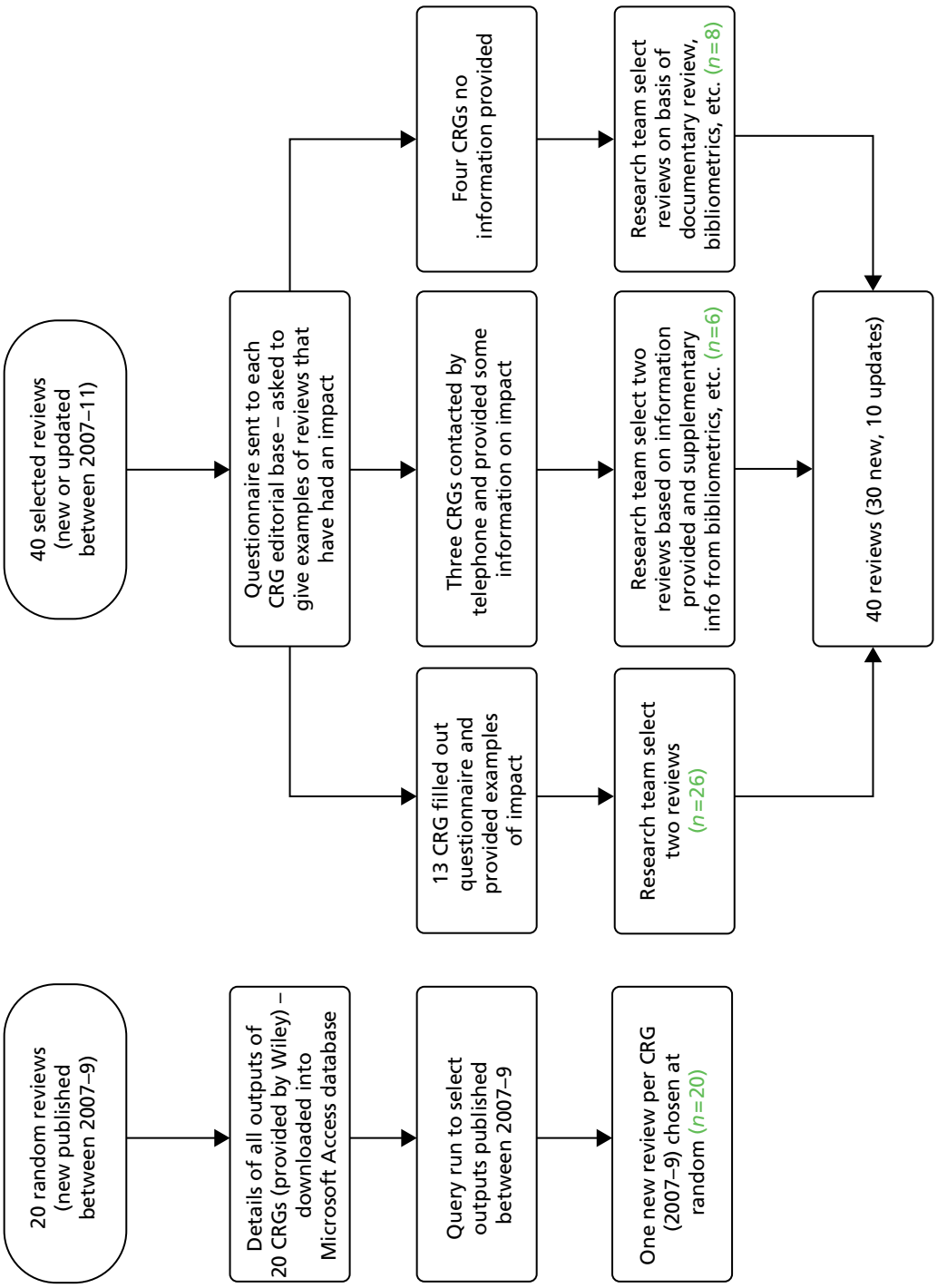
F. COMMENTS

9. If you wish, please add any further information that is not covered elsewhere

END

Thank you for your help

Appendix 2 Selection process of 60 reviews for further analysis


40 selected reviews (new or updated between 2007–11)
Questionnaire sent to each CRG editorial base – asked to give examples of reviews that have had an impact
Four CRGs no information provided
Research team select reviews on basis of documentary review, bibliometrics, etc. (n=8)
Three CRGs contacted by telephone and provided some information on impact
Research team select two reviews based on information provided and supplementary info from bibliometrics, etc. (n=6)
13 CRG filled out questionnaire and provided examples of impact
Research team select two reviews (n=26)
40 reviews (30 new, 10 updates)
20 random reviews (new published between 2007–9)
Details of all outputs of 20 CRGs (provided by Wiley) – downloaded into Microsoft Access database
Query run to select outputs published between 2007–9
One new review per CRG (2007–9) chosen at random (n=20)

Appendix 3 Author questionnaire

An evaluation of the impacts and likely impacts of Cochrane reviews published during 2007-2011 by Cochrane Review Groups that are supported by the National Institute of Health Research (NIHR)

Questionnaire for authors of Cochrane Systematic Reviews

The University of Hertfordshire, University College London and The National Institute for Health and Clinical Excellence are working together on an evaluation of the impacts and likely impacts of Cochrane Reviews published between the years 2007-2011 by Cochrane Review Groups that are supported by the National Institute of Health Research (NIHR). **This evaluation has been commissioned by the NIHR HTA Systematic Reviews Programme and will inform the quinquennial review.**

We are collecting information on the actual and potential impacts of a sample of Cochrane reviews published by NIHR funded Cochrane Review Groups during the period 2007-2011. The survey will seek to collect information on the actual and potential impacts of a sample of Cochrane reviews first published, or substantially updated, by NIHR funded Cochrane Reviews Groups during the period 2007 - 2011. We are not expecting you to search for evidence of impact but just to let us know about anything you may already be aware of.

Dr Frances Bunn is leading the research. If you have any questions about completing the questionnaire please contact Frances at [redacted], email:[redacted]

Many thanks in advance for your help.

Please complete by xx

A. PUBLICATIONS NOT PREVIOUSLY LISTED

1. Please list any **additional publications (other than the Cochrane Review itself)** that have resulted directly or indirectly from the review.

Include any accepted publications that are in press but not any that are only at the submitted stage. For each publication please:

Additional Publications

B. **USE OF THE SYSTEMATIC REVIEW FINDINGS IN THE RESEARCH SYSTEM**

2. Has the review generated subsequent research by **any of the review authors?** Yes ☐ No ☐

3. If so, please give details of further grants and/or research projects

Research project title/topic/date	Funder	Amount

4. Are you aware of any ways in which your review has contributed to further research conducted **by others?** Yes ☐ No ☐ Don't know ☐

5. If yes, please indicate.

Project team	Research project title/topic/date	Further Details

C. USE OF SYSTEMATIC REVIEW FINDINGS IN HEALTH SYSTEM POLICY/DECISION MAKING

NB. Questions about applications of the findings by practitioners etc form the next section

6. Review findings can be used in policy/decision making at any level (e.g international, national, regional, local trust or unit, professional, administrative or managerial) of the health service.[1]

Have the findings from your review already been used in any such ways? Yes ☐ No ☐ Don't know ☐

7. Are there any reasons for expecting the findings to be used for future policy/decision making? (e.g. are they being used in guidelines that are

under development) Yes ☐ No ☐ Don't know ☐

8. If you have replied **Yes** to either **Q6 or Q7** please give details of the use and/or expected use including: the **level** (e.g. international, national, regional, local) at which policies/decisions were (or might potentially be) influenced– please give relevant references/evidence.

[1] Examples of the policy relevance could take many forms including: statements by policy makers; citing of the findings in a clinical guideline from a national or local professional group etc

D. APPLICATION OF THE SYSTEMATIC REVIEW FINDINGS THROUGH CHANGED BEHAVIOUR

9. Do you think the findings from your review have **already led** to changes, either directly or through the application of research-informed policies, in the behaviour of the following types of people[2]?

Please cross (X) the appropriate box.

Types of people	Yes	No	Don't know
A. Medical/allied health professionals/other providers			
B. Health care managers			
C. Health service users or the wider public			

10. If you replied **Yes** to **Q9** please specify: the population whose behaviour has changed and any evidence to support claims that such changes in behaviour were caused by, or related to, the review findings

[2] This might include changes in clinical behaviour (e.g. changes to the use of particular drugs or treatment) or the way managers organise or commission services.

E. HEALTH/HEALTH SERVICE/ECONOMIC BENEFITS ARISING FROM THE SYSTEMATIC REVIEW FINDINGS

11. Various possible health/health service/economic benefits from the application of research findings can arise. These benefits include: improved service delivery; cost savings; improved health; an increase in values considered desirable e.g. equity.

Do you think any such benefits have **already arisen** as the result of the application of your review findings[3]?

Please cross (X) the appropriate box.

Nature of health/health service/economic benefits	Yes	No	Don't know	Not applicable
A. Cost reduction in the delivery of existing services				
B. Qualitative improvements in the process of service delivery				
C. Increased effectiveness of services, e.g. increased health				
D. Equity, e.g. improved allocation of resources at a district/hospital level, better targeting and accessibility				
E. Economic benefits from a healthier workforce and reduction in working days lost				

12. If you replied **Yes** to **Q11** please specify, giving any supporting evidence, for example the nature of the benefits; how and why the benefits have accrued.

Nature of benefits	Supporting evidence

[3] This could include impacts to either NHS or commercial sectors

F. COMMENTS

13. If you wish, please describe any other consequences of the research project not already covered.

14. Do you have any additional comments?

END
Thank you for your help

Appendix 4 Details of reviews selected for further analysis

TABLE 15 Further details of Cochrane Reviews selected for additional analysis: includes citation, country of first author and whether it was a new or updated review

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Airways	Smith I, Nadig V, Lasserson TJ. Educational, supportive and behavioural interventions to improve usage of continuous positive airway pressure machines for adults with obstructive sleep apnoea. *Cochrane Database Syst Rev* 2009;**2**:CD007736	A1	New	No	35	35	59	6
	Puhan MA, Gimeno-Santos E, Scharplatz M, Troosters T, Walters EH, Steurer J. Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. *Cochrane Database Syst Rev* 2011;**10**:CD005305	A2	New	Yes	49	80	168	6
	Chong J, Poole P, Leung B, Black PN. Phosphodiesterase 4 inhibitors for chronic obstructive pulmonary disease. *Cochrane Database Syst Rev* 2011;**5**:CD002309	A3	New	No	4	9	41	0
BJM	Howe TE, Rochester L, Jackson A, Banks PMH, Blair VA. Exercise for improving balance in older people. *Cochrane Database Syst Rev* 2007;**4**:CD004963	B1	New	No	66	123	248	8
	Cameron ID, Murray GR, Gillespie LD, Cumming RG, Robertson MC, Hill KD, *et al.* Interventions for preventing falls in older people in residential care facilities and hospitals (protocol). *Cochrane Database Syst Rev* 2005;**3**:CD005465	B2	Update[b]	Yes	348	467	737	77
	Cameron ID, Murray GR, Gillespie LD, Robertson MC, Hill KD, Cumming RG, *et al.* Interventions for preventing falls in older people in nursing care facilities and hospitals. *Cochrane Database Syst Rev* 2010;**1**:CD005465	B3	Update[b]	Yes	96	42	242	39
Cystic Fibrosis	Morrison L, Agnew J. Oscillating devices for airway clearance in people with cystic fibrosis. *Cochrane Database Syst Rev* 2009;**1**:CD006842	C1	New	Yes	10	8	25	0
	Plummer A, Wildman M. Duration of intravenous antibiotic therapy in people with cystic fibrosis. *Cochrane Database Syst Rev* 2008;**2**:CD006682	C2	New	Yes	4	12	19	0
	Roberts D, Brunskill S, Doree C, Williams S, Howard J, Hyde CJ. Oral deferiprone for iron chelation in people with thalassaemia. *Cochrane Database Syst Rev* 2007;**3**:CD004839	C3	New	No	15	18	43	0

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Dementia and Cognitive Improvement	Forbes D, Forbes S, Morgan DG, Markle-Reid M, Wood J, Culum I. Physical activity programs for persons with dementia. *Cochrane Database Syst Rev* 2008;**3**:CD006489	D1	New	No	37	59	100	1
	McGuinness B, Craig D, Bullock R, Passmore P. Statins for the prevention of dementia. *Cochrane Database Syst Rev* 2009;**2**:CD003160	D2	Update	No	58	104	147	2
	Siddiqi N, Holt R, Britton AM, Holmes J. Interventions for preventing delirium in hospitalised patients. *Cochrane Database Syst Rev* 2007;**2**:CD005563	D3	New	No	42	104	185	2
DAN	Justo L, Soares BG, Calil H. Family interventions for bipolar disorder. *Cochrane Database Syst Rev* 2007;**4**:CD005167	DA1	New	Yes	8	10	24	0
	Mead GE, Morley W, Campbell P, Greig CA, McMurdo M, Lawlor DA. Exercise for depression. *Cochrane Database Syst Rev* 2008;**4**:CD004366	DA2	New	No	138	235	441	51
	Price JR, Mitchell E, Tidy E, Hunot V. Cognitive behaviour therapy for chronic fatigue syndrome in adults. *Cochrane Database Syst Rev* 2008;**3**:CD001027	DA3	Update	No	51	83	276	1
ENT	Uscategui T, Doree C, Chamberlain IJ, Burton MJ. Corticosteroids as adjuvant to antiviral treatment in Ramsay Hunt syndrome (herpes zoster oticus with facial palsy) in adults. *Cochrane Database Syst Rev* 2008;**3**:CD006852	ENT1	New	No	9	11	18	1
	Harvey R, Hannan SA, Badia L, Scadding G. Nasal saline irrigations for the symptoms of chronic rhinosinusitis. *Cochrane Database Syst Rev* 2007;**3**:CD006394	ENT2	New	Yes	56	103	168	11
	Calderon MA, Alves B, Jacobson M, Hurwitz B, Sheikh A, Durham S. Allergen injection immunotherapy for seasonal allergic rhinitis. *Cochrane Database Syst Rev* 2007;**1**:CD001936	ENT3	New	Yes	121	260	338	1
Epilepsy	Hemming K, Maguire MJ, Hutton JL, Marson AG. Vigabatrin for refractory partial epilepsy. *Cochrane Database Syst Rev* 2008;**3**:CD007302	E1	New	No	7	19	32	0
	Kerrigan S, Grant R. Antiepileptic drugs for treating seizures in adults with brain tumours. *Cochrane Database Syst Rev* 2011;**8**:CD008586	E2	New	No	1	1	10	2
	Appleton R, Macleod S, Martland T. Drug management for acute tonic–clonic convulsions including convulsive status epilepticus in children. *Cochrane Database Syst Rev* 2008;**3**:CD001905	E3	Update	No	17	40	100	0

continued

TABLE 15 Further details of Cochrane Reviews selected for additional analysis: includes citation, country of first author and whether it was a new or updated review (*continued*)

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Eyes and Vision	Rolim de Moura CR, Paranhos A Jr, Wormald R. Laser trabeculoplasty for open angle glaucoma. *Cochrane Database Syst Rev* 2007;**4**:CD003919	EV1	New	Yes	1	11	45	0
	Burr J, Azuara-Blanco A, Avenell A, Tuulonen A. Medical versus surgical interventions for open angle glaucoma. *Cochrane Database Syst Rev* 2009;**1**:CD004399	EV2	Update	Yes	0	2	65	0
	Parravano M, Menchini F, Virgili G. Antiangiogenic therapy with anti-vascular endothelial growth factor modalities for diabetic macular oedema. *Cochrane Database Syst Rev* 2009;**4**:CD007419	EV3	New	Yes	12	21	34	3
Gynaecological Cancer	Kong AA, Johnson N, Cornes P, Simera I, Collingwood M, Williams C, *et al.* Adjuvant radiotherapy for stage I endometrial cancer. *Cochrane Database Syst Rev* 2007;**2**:CD003916	GC1	New	No	23	28	64	1
	Jaaback K, Johnson N, Lawrie TA. Intraperitoneal chemotherapy for the initial management of primary epithelial ovarian cancer. *Cochrane Database Syst Rev* 2011;**11**:CD005340	GC2	Update	No	53	21	129	0
	Akl EA, Labedi N, Barba M, Terrenato I, Sperati F, Muti P, *et al.* Anticoagulation for the long-term treatment of venous thromboembolism in patients with cancer. *Cochrane Database Syst Rev* 2008;**1**:CD006650	GC3	New	Yes	28	48	61	0
Heart	Guo R, Pittler MH, Ernst E. Hawthorn extract for treating chronic heart failure. *Cochrane Database Syst Rev* 2008;**1**:CD005312	H1	New	No	16	47	95	13
	Taylor F, Ward K, Moore TH, Burke M, Davey Smith G, Casas JP, *et al.* Statins for the primary prevention of cardiovascular disease. *Cochrane Database Syst Rev* 2011;**1**:CD004816	H2	New	Yes	54	65	282	34
	Inglis SC, Clark RA, McAlister FA, Ball J, Lewinter C, Cullington D, *et al.* Structured telephone support or telemonitoring programmes for patients with chronic heart failure. *Cochrane Database Syst Rev* 2010;**8**:CD007228	H3	New	No	56	75	225	1

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Incontinence	Fader M, Cottenden AM, Getliffe K. Absorbent products for light urinary incontinence in women. *Cochrane Database Syst Rev* 2007;**2**:CD001406	IN1	Update[c]	No	10	10	15	0
	Silva LA, Andriolo RB, Atallah ÁN, da Silva EM. Surgery for stress urinary incontinence due to presumed sphincter deficiency after prostate surgery. *Cochrane Database Syst Rev* 2011;**4**:CD008306	IN2	New	No	4	2	5	0
	Hagen S, Sinclair L, Cross S. Washout policies in long-term indwelling urinary catheterisation in adults. *Cochrane Database Syst Rev* 2010;**3**:CD004012	IN3	New	No	6	5	11	0
Injuries	Ker K, Blackhall K. Bradykinin beta-2 receptor antagonists for acute traumatic brain injury. *Cochrane Database Syst Rev* 2008;**1**:CD006686	IJ1	New	Yes	7	11	13	0
	Perel P, Roberts I, Pearson M. Colloids versus crystalloids for fluid resuscitation in critically ill patients. *Cochrane Database Syst Rev* 2007;**4**:CD000567	IJ2	Update	Yes	86	201	735	106
	Henry DA, Carless PA, Moxey AJ, O'Connell D, Stokes BJ, McClelland B, *et al.* Anti-fibrinolytic use for minimising perioperative allogeneic blood transfusion. *Cochrane Database Syst Rev* 2007;**4**:CD001886	IJ3	New	Yes	81	188	595	0
Neuromuscular	Bosboom W, Vrancken AF, van den Berg LH, Wokke J, Iannaccone ST. Drug treatment for spinal muscular atrophy type I. *Cochrane Database Syst Rev* 2009;**1**:CD006281	NM1	New	No	8	7	9	0
	Kuwabara S, Dispenzieri A, Arimura K, Misawa S. Treatment for POEMS (polyneuropathy, organomegaly, endocrinopathy, M-protein, and skin changes) syndrome. *Cochrane Database Syst Rev* 2008;**4**:CD006828	NM2	New	Yes	14	29	46	1
	Manzur AY, Kuntzer T, Pike M, Swan AV. Glucocorticoid corticosteroids for Duchenne muscular dystrophy. *Cochrane Database Syst Rev* 2008;**1**:CD003725	NM3	Update	No	57	127	305	0

continued

TABLE 15 Further details of Cochrane Reviews selected for additional analysis: includes citation, country of first author and whether it was a new or updated review (*continued*)

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Oral Health	Weston P, Yaziz YA, Moles DR, Needleman I. Occlusal interventions for periodontitis in adults. *Cochrane Database Syst Rev* 2008;**3**:CD004968	O1	New	No	2	5	6	0
	Oliver R, Clarkson JE, Conway D, Glenny AM, Macluskey M, Pavitt S, *et al.* Interventions for the treatment of oral and oropharyngeal cancers: surgical treatment. *Cochrane Database Syst Rev* 2007;**4**:CD006205	O2	New	No	2	15	14	11
	Walsh T, Worthington HV, Glenny AM, Appelbe P, Marinho VCC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev* 2010;**1**:CD007868	O3	New	No	25	15	103	13
PaPaS	Eccleston C, Williams AC, Morley S. Psychological therapies for the management of chronic pain (excluding headache) in adults. *Cochrane Database Syst Rev* 2009;**2**:CD007407	P1	New	Yes	58	103	151	7
	Bausewein C, Booth S, Gysels M, Higginson IJ. Non-pharmacological interventions for breathlessness in advanced stages of malignant and non-malignant diseases. *Cochrane Database Syst Rev* 2008;**2**:CD005623	P2	New	No	27	86	139	4
	Cramp F, Daniel J. Exercise for the management of cancer-related fatigue in adults. *Cochrane Database Syst Rev* 2008;**2**:CD006145	P3	New	Yes	93	176	276	69
Pregnancy and Childbirth	Berghella V, Hayes E, Visintine J, Baxter JK. Fetal fibronectin testing for reducing the risk of preterm birth. *Cochrane Database Syst Rev* 2008;**4**:CD006843	PC1	New	Yes	13	27	37	0
	Boulvain M, Kelly AJ, Irion O. Intracervical prostaglandins for induction of labour. *Cochrane Database Syst Rev* 2008;**1**:CD006971	PC2	New	No	11	16	34	0
	Begley CM, Gyte GM, Murphy DJ, Devane D, McDonald SJ, McGuire W. Active versus expectant management for women in the third stage of labour. *Cochrane Database Syst Rev* 2010;**7**:CD007412	PC3	New	Yes	29	16	499	37

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Schizophrenia	Furtado VA, Srihari V, Kumar A. Atypical antipsychotics for people with both schizophrenia and depression. *Cochrane Database Syst Rev* 2008;**1**:CD005377	SCH1	New	No	5	7	20	3
	Gorczynski P, Faulkner G. Exercise therapy for schizophrenia. *Cochrane Database Syst Rev* 2010;**5**:CD004412	SCH2	New	Yes	7	16	74	1
	Cleary M, Hunt GE, Matheson SL, Siegfried N, Walter G. Psychosocial interventions for people with both severe mental illness and substance misuse. *Cochrane Database Syst Rev* 2008;**1**:CD001088	SCH3	Update	Yes	30	59	103	2
Skin	Ersser SJ, Latter S, Sibley A, Satherley PA, Welbourne S. Psychological and educational interventions for atopic eczema in children. *Cochrane Database Syst Rev* 2007;**3**:CD004054	SK1	New	Yes	14	29	67	0
	Chi CC, Lee CW, Wojnarowska F, Kirtschig G. Safety of topical corticosteroids in pregnancy. *Cochrane Database Syst Rev* 2009;**3**:CD007346	SK2	New	Yes	5	10	16	0
	Sladden MJ, Balch C, Barzilai DA, Berg D, Freiman A, Handiside T, *et al.* Surgical excision margins for primary cutaneous melanoma. *Cochrane Database Syst Rev* 2009;**4**:CD004835	SK3	New	Yes	16	10	70	0
Tobacco Addiction	Bala MM, Strzeszynski L, Cahill K. Mass media interventions for smoking cessation in adults. *Cochrane Database Syst Rev* 2008;**1**:CD004704	T1	New	Yes	42	89	162	1
	Parsons AC, Shraim M, Inglis J, Aveyard P, Hajek P. Interventions for preventing weight gain after smoking cessation. *Cochrane Database Syst Rev* 2009;**1**:CD006219	T2	New	No	40	61	126	2
	Callinan JE, Clarke A, Doherty K, Kelleher C. Legislative smoking bans for reducing secondhand smoke exposure, smoking prevalence and tobacco consumption. *Cochrane Database Syst Rev* 2010;**4**:CD005992	T3	New	No	33	31	123	17

continued

TABLE 15 Further details of Cochrane Reviews selected for additional analysis: includes citation, country of first author and whether it was a new or updated review (*continued*)

CRG	Review title and year of publication[a]	Code	New or update	Questionnaire returned	Citations WoS	Citations Scopus	Citations Google Scholar	Altmetric score
Wounds	Moore ZE, Cowman S. Risk assessment tools for the prevention of pressure ulcers. *Cochrane Database Syst Rev* 2008;**3**:CD006471	W1	New	No	12	27	51	0
	McInnes E, Dumville JC, Jammali-Blasi A, Bell-Syer SE. Support surfaces for treating pressure ulcers. *Cochrane Database Syst Rev* 2011;**12**:CD009490	W2	New	Yes	3	0	5	4
	O'Meara S, Al-Kurdi D, Ologun Y, Ovington LG. Antibiotics and antiseptics for venous leg ulcers. *Cochrane Database Syst Rev* 2008;**1**:CD003557	W3	New	Yes	37	43	102	3

BJM, Bone, Joint and Muscle trauma; DAN, Depression, Anxiety and Neurosis; ENT, Ear, Nose and Throat; PaPaS, Pain, Palliative and Supportive Care.

a For each CRG the first review listed was chosen randomly and the second and third on the basis they may have had an impact.

b This review was previously published in 2003 as 'Interventions for preventing falls in elderly people'. The review was split and the current reviews were published in 2010.

c This review was previously published in 1999 as 'Absorbent products for the containment of urinary and/or faecal incontinence in adults'. This review was split and the current review was published in 2007.

Appendix 5 Summary of main impacts for 60 selected reviews

TABLE 16 Summary of the main impacts for 60 selected reviews

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
Airways				
Educational, supportive and behavioural interventions to improve usage of continuous positive airway pressure machines for adults with obstructive sleep apnoea, 2009	GS citations = 59	–	Yes (1 national)	–
Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease, 2009	GS citations = 168	Yes – RCT	Yes (6 national, 1 international)	–
Phosphodiesterase 4 inhibitors for chronic obstructive pulmonary disease, 2011	GS citations = 41	–	–	Phosphodiesterase 4 inhibitors no longer recommended in practice. Potential link to review Puhan (2011)
BJM				
Exercise for improving balance in adults, 2007	GS citations = 737 Podcast on The Cochrane Library and press release (81 press mentions)	–	Yes (1 national)	–
Interventions for preventing falls in older people living in the community, 2009	GS citations = 737 One of top 10 most cited reviews in CL in 2011 Has led to a number of follow-on publications High number of downloads, high altmetric score	Yes – primary research Impact on choice of outcome measures for falls reviews (not verified)	Yes (3 national, 1 local)	–
Interventions for preventing falls in older people in nursing care facilities and hospitals, 2010	GS citations = 242 One of top 10 most cited reviews in CL in 2011, high altmetric score	–	Yes (4 national, 1 local)	–

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
Cystic Fibrosis and Genetic Disorders				
Oscillating devices for airway clearance in people with cystic fibrosis, 2009	GS citations = 25	Yes – RCT	Yes (2 national, 1 local)	–
Duration of intravenous antibiotic therapy in people with cystic fibrosis, 2008	GS citations = 19	Yes – RCT	–	–
Oral deferiprone for iron chelation in people with thalassaemia, 2007	GS citations = 43	–	Yes (1 national)	–
Dementia and Cognitive Improvement				
Physical activity programs for persons with dementia, 2008	GS citations = 100	–	–	–
Statins for the prevention of dementia, 2009	GS citations = 147	–	–	Cochrane quality and productivity topic
Interventions for preventing delirium in hospitalised patients, 2007	GS citations = 185	–	Yes (1 national)	–
Depression, Anxiety and Neurosis				
Family interventions for bipolar disorder, 2007	GS citations = 24	Yes (details not clear)	Yes (1 international, 2 national)	Anecdotal evidence used to influence local practice (no supporting evidence)
Exercise for depression, 2008	GS citations = 441 One of top 10 most cited reviews in CL in 2011	–	Yes (4 national, 1 international)	–
Cognitive behaviour therapy for chronic fatigue syndrome in adults, 2008	GS citations = 276	–	Yes (1 international)	–

continued

TABLE 16 Summary of the main impacts for 60 selected reviews (*continued*)

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
ENT				
Corticosteroids as adjuvant to antiviral treatment in Ramsay Hunt syndrome (herpes zoster oticus with facial palsy) in adults, 2008	GS citations = 18	–	–	–
Nasal saline irrigations for the symptoms of chronic rhinosinusitis, 2007	GS citations = 168	–	Yes (1 international, 4 national)	–
Allergen injection immunotherapy for seasonal allergic rhinitis, 2007	GS citations = 338 Highly cited	–	Yes (2 international, 1 national)	–
Epilepsy				
Vigabatrin for refractory partial epilepsy, 2008	GS citations = 32	–	–	–
Antiepileptic drugs for treating seizures in adults with brain tumours, 2011	GS citations = 10	–	–	–
Drug management for acute tonic–clonic convulsions including convulsive status epilepticus in children, 2008	GS citations = 100	–	Yes (1 international)	–
Eyes and Vision				
Laser trabeculoplasty for open angle glaucoma, 2007	GS citations = 45	–	Yes (2 national)	–
Medical versus surgical interventions for open angle glaucoma, 2009	GS citations = 65	–	–	–
Antiangiogenic therapy with anti-vascular endothelial growth factor modalities for diabetic macular oedema, 2009	GS citations = 34 Resulted in follow-on paper[104]	–	Yes (2 local)	Anecdotal evidence that findings of review have affected local clinical practice (not verified)

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
Gynaecological Cancer				
Adjuvant radiotherapy for stage I endometrial cancer, 2007	GS citations = 64	–	–	–
Intraperitoneal chemotherapy for the initial management of primary epithelial ovarian cancer, 2011	GS citations = 129	–	–	–
Anticoagulation for the long term treatment of venous thromboembolism in patients with cancer, 2008	GS citations = 61	Yes – led to further Cochrane Reviews	Yes (1 national)	–
Heart				
Hawthorn extract for treating chronic heart failure, 2008	GS citations = 95	–	–	–
Statins for the primary prevention of cardiovascular disease, 2011	GS citations = 282 High number of downloads, highly cited since publication	–	Yes (2 national)	–
Structured telephone support or telemonitoring programmes for patients with chronic heart failure, 2010	GS citations = 225 Podcast and press release (100 press mentions)	–	Yes (1 international, 1 national)	–
Incontinence				
Absorbent products for light urinary incontinence in women, 2007	GS citations = 15	–	Yes (1 national)	–
Surgery for stress urinary incontinence due to presumed sphincter deficiency after prostate surgery, 2011	GS citations = 5	–	Yes (1 International)	–
Washout policies in long-term indwelling urinary catheterisation in adults, 2010	GS citations = 11	–	Yes (1 international)	–

continued

TABLE 16 Summary of the main impacts for 60 selected reviews (*continued*)

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
Injuries				
Bradykinin beta-2 receptor antagonists for acute traumatic brain injury, 2008	GS citations = 13	Yes – further systematic review and further RCT	Yes (1 national)	Indirect impact – in response to follow-on research, commercial development of drug was stopped
Colloids versus crystalloids for fluid resuscitation in critically ill patients, 2007	GS citations = 735	Yes – RCTs	Yes (1 international, 1 national)	Review (and follow-on research) led to review by EMA and suspension of use of HES
	Highly cited			Cochrane quality and productivity topic
Antifibrinolytic use for minimising perioperative allogeneic blood transfusion, 2007	GS citations = 595	Yes – further review and further RCT	Yes (1 international, 1 national)	Potentially – may have impacted on EMA review
	Highly cited			Potential impact on practice – there has been a switch away from other antifibrinolytic drugs to tranexamic acid
Neuromuscular				
Drug treatment for spinal muscular atrophy type I, 2009	GS citations = 9	–	–	–
Treatment for POEMS (polyneuropathy, organomegaly, endocrinopathy, M-protein, and skin changes) syndrome, 2008	GS citations = 46	–	Yes (1 international)	–
	Some follow-on publications			
Glucocorticoid corticosteroids for Duchenne muscular dystrophy, 2008	GS citations = 305	–	Yes (1 national)	–
Oral Health				
Occlusal interventions for periodontitis in adults, 2008	GS citations = 6	–	–	–
Interventions for the treatment of oral and oropharyngeal cancers: surgical treatment, 2007	GS citations = 14	–	–	–
Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents, 2010	GS citations = 103	–	Yes (7 national, 2 local)	–
	Podcast and press release (37 press mentions)			

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
PaPaS				
Psychological therapies for chronic pain (excluding headache) in adults, 2009	GS citations = 151 Related publication	–	Yes 1 (national)	–
Non-pharmacological interventions for use in breathlessness in the advanced stages of malignant and non-malignant diseases, 2008	GS citations = 139	–	Yes (2 national)	Cochrane quality and productivity topic
Exercise for the management of cancer-related fatigue in adults, 2008	GS citations = 276	–	Yes (2 national)	–
Pregnancy and Childbirth				
Fetal fibronectin testing for reducing the risk of preterm birth, 2008	GS citations = 37	–	–	Potential economic impact – in the USA health insurers may not pay for testing in asymptomatic women (anecdotal, no supporting evidence)
Intracervical prostaglandins for induction of labour, 2008	GS citations = 34	–	–	–
Active versus expectant management for women in the third stage of labour, 2010	GS citations = 499 Further review	Yes – qualitative study	Yes (2 international)	Change in midwifery practice in Ireland (unpublished data)
Schizophrenia				
Atypical antipsychotics for people with both schizophrenia and depression, 2008	GS citations = 20	–	Yes (2 national)	–
Exercise therapy for schizophrenia, 2010	GS citations = 74 Podcast and press release (54 press mentions) Number of related publications published	Yes – primary research (details not clear)	–	Impact on local practice (anecdotal)
Psychosocial interventions for people with both severe mental illness and substance misuse, 2008	GS citations = 103 Number of related publications published	Yes – primary research (details not clear)	Yes (1 national)	–

continued

TABLE 16 Summary of the main impacts for 60 selected reviews (*continued*)

Review title and year of publication[a] (in italic if questionnaire returned)	Knowledge production	Follow-on research	Informing policy	Impact on practice/services
Skin				
Psychological and educational interventions for atopic eczema in children, 2007	GS citations = 67	Yes – RCT	Yes (1 national)	–
Safety of topical corticosteroids in pregnancy, 2009	GS citations = 16	Yes – primary research (details not clear)	Yes (2 national, 1 international)	Potential – reduce adverse effects
Surgical excision margins for primary cutaneous melanoma, 2009	GS citations = 70	–	–	–
Tobacco Addiction				
Mass media interventions for smoking cessation in adults, 2008	GS citations = 162	–	–	–
Interventions for preventing weight gain after smoking cessation, 2009	GS citations = 126	Yes – primary research (RCTs)	Yes (1 national)	–
Legislative smoking bans for reducing secondhand smoke exposure, smoking prevalence and tobacco consumption, 2010	GS citations = 123 Podcast and press release (49 press mentions)	–	–	–
Wounds				
Risk assessment tools for the prevention of pressure ulcers, 2008	GS citations = 51	–	Yes (2 national)	–
Support surfaces for treating pressure ulcers, 2011	GS citations = 5	–	Yes (1 national)	–
Antibiotics and antiseptics for venous leg ulcers, 2008	GS citations = 102	–	Yes (3 national)	–

BJM, Bone Joint and Muscle trauma; EMA, European Medicines Agency; ENT, Ear, Nose and Throat; GS, Google Scholar; HES, hydroxyethyl starch; PaPaS, Pain, Palliative and Supportive Care.
a The first review listed for each CRG was chosen randomly.

Appendix 6 Study protocol

The impact of Cochrane Reviews: an evaluation of the outputs of Cochrane review groups funded by the NIHR

Study Protocol

1. Summary of Research

A mixed methods approach is proposed informed by theories about research use and guided by a framework for evaluating research impact. The work will be undertaken by experienced researchers, with well established links to the Cochrane Collaboration and The National Institute for Health and Clinical Excellence (NICE), and expertise in systematic reviews, guideline development, and the evaluation of research impact. The overall aim is to identify the impacts and likely impacts, both actual and potential, on health care, patient outcomes and value for money, of Cochrane reviews published by NIHR funded Cochrane review groups (CRGs) over the past five years.

Research Plan

There are three work packages, with work packages 1 and 2 being conducted in parallel. The work packages are:

Work package 1 (general overview of impact):

- Questionnaire survey of key staff at 20 NIHR funded CRG editorial bases
- Analysis of existing sources relating to Cochrane Review impact
- Semi-structured telephone interviews with guidelines developers at NICE

Work package 2 (analysis of impact of representative sample of reviews):

- Selection of representative sample of 40 reviews (two per CRG)
- In-depth analysis of impact of representative sample of 40 reviews (including questionnaire survey of first authors and bibliometrics and documentary review)

Work package 3:

- Synthesis of findings from work packages 1 & 2
- Consensus meeting to discuss and agree findings
- Write up and dissemination

Work package 1 (WP1)

A questionnaire will be sent to all managing editors at NIHR funded editorial bases. The purpose of the questionnaire is to obtain a general overview of the impact of the CRG outputs published in the last five years. CRGs will also be asked to nominate reviews that they consider to have had the greatest impact. This information will be used to help inform our selection of reviews for further in-depth analysis in work package 2. We will also undertake secondary analysis of existing

documents and resources on the impact of Cochrane reviews, (e.g. work done by Alderson and Tan on the frequency of citations of Cochrane reviews in NICE guidance, and statistics compiled by Wiley on the impact of Cochrane reviews). In addition, in order to gain further insight into how Cochrane reviews have contributed to the development and preparation of guidance, we propose to undertake semi-structured interviews with a purposive sample of guidelines developers at the National Institute for Health and Clinical Excellence (NICE).

Work package 2 (WP2)

A representative sample of 40 Cochrane reviews published between 2007-2011 will be selected for further in-depth analysis. Two reviews will be picked from each group, with one chosen randomly (stratified by group) and one chosen from those identified by the CRGs as likely to have had impact. In order to identify impacts and likely impacts of this sample of reviews we propose to send a questionnaire to first authors of reviews and undertake bibliometric and documentary analysis. This will allow us to trace and assess the impact of reviews, including whether they have been included in guidelines.

Work package 3 (WP3)

In work package 3 we will synthesise findings from work package 1 & 2 to describe the actual and potential impacts of Cochrane reviews published by NIHR funded CRGs in the last five years. As there are challenges associated with conceptualising and identifying impact, and because individuals may inflate the impact of their own work, findings will be confirmed using a process of consensus. This will involve the project team and members of our advisory and public involvement in research groups. Discussions will be guided by our framework (knowledge production, research targeting, informing policy development, and impact on practice/services) and informed by ideas about type of impact (e.g. instrumental/conceptual or symbolic).

2. Background and Rationale

In recent years there has been a growing interest in the way in which research is used with researchers increasingly expected to consider the wider impacts of their work (HEFC, 2009). This may include the contributions research makes to health, society, culture, the economy, quality of life and public policy. A variety of terms have been used to describe the impact of research on policy and practice, including: research impact, influence, outcomes, benefit, payback, translation, transfer, uptake and utilisation (Boaz, 2008, Carden, 2004). Research can be used either directly in decision-making related to policy or practice, or more indirectly by mobilising support or contributing to the formulation of values, knowledge and debate (Amara et al., 2004, Huberman, 1992, Nutley, 2003b, Weiss, 1976). Indeed, 'research impact forms a continuum, from raising awareness of findings, through knowledge and understanding of their implications, to changes in behaviour' (Nutley, 2003a).

Systematic reviews have several advantages over other types of research that have led to them being regarded as particularly important tools for decision makers. For example, systematic reviews take precedence over other types of research in many hierarchies of evidence as it inherently makes sense for decisions to be based on the totality of evidence rather than a single study (Black, 2001, Sheldon, 2005). Moreover, they can generally be conducted more quickly than new primary research and, as a result, may be attractive to policy makers required to make a rapid response to a new policy issue (Pawson, 2002). Cochrane systematic reviews should be uniquely placed to influence policy, practice and research as they provide a comprehensive critical summary of what is known about effectiveness on a given topic, the rigour of their methods are widely acknowledged, and they are periodically updated in light of new evidence. Moreover, promoting access is one of the key

principles on which the collaboration is based, and there is increasing interest in the dissemination and impact of Cochrane review findings (The Cochrane Library Oversight Committee, 2012).

Yet, it has long been recognised that the relationship between research and policy or practice is a complex one (Weiss, 1976); and that research may not always have the impact that researchers desire (Lomas, 2000). One reason for this is that research evidence is only one factor in shaping policy and practice. Decision makers are subject to many different influences including political imperatives, the media, non research evidence and powerful lobbying groups such as industry (Black, 2001, Campbell, 2007). Moreover, there are significant challenges associated with conceptualising 'impact' and identifying the extent to which systematic reviews are used (Armstrong et al., 2012).

This study will increase knowledge about the extent to which NIHR supported Cochrane reviews influence healthcare policy and practice, and whether they influence the conduct of new primary research studies. It will identify actual and potential impacts of reviews published in the last five years and has the potential to inform existing approaches to impact evaluation and review dissemination.

3. Why this research is needed

The NIHR systematic review programme currently supports the UK Cochrane Centre and the Cochrane Review Groups that have their editorial bases in the UK. It is important that this funding represents value for money and that reviews are useful for practitioners, policy makers, service users and members of the public. One way in which their value might be judged is by the impact that the reviews produced by NIHR funded Cochrane Review Groups have, or potentially have, on policy and practice, and on future research. However, whilst it is acknowledged that Cochrane review groups produce high quality systematic reviews (Moseley et al., 2009, Olsen et al., 2001) there is at present a lack of information about the impacts of Cochrane reviews.

It is widely acknowledged that research use is complex (Lomas, 2000) and it is important to understand how reviews are currently used in order to develop appropriate strategies for knowledge transfer and exchange. The proposed research will add to our understanding of how Cochrane Reviews impact on policy and practice, will inform the development of methods for evaluating the impact of systematic reviews and will inform future strategies for dissemination and knowledge transfer. This study builds on existing work on research impact (Bunn and Kendall, 2011) and the impact of systematic reviews (Alderson and Tan, 2011, Bunn, 2010a, Bunn, 2010b, Bunn and Sworn, 2011) carried out by the project team.

4. Aims & Objectives

The overall aim is to identify the impacts and likely impacts, both actual and potential, on health care, patient outcomes and value for money, of Cochrane reviews published by NIHR funded Cochrane review groups (CRGs) over the past five years.

The research objectives are to identify and describe the impacts of Cochrane reviews in terms of evidence of direct effect on clinical practice; their inclusion in, or use for, the preparation of national or international clinical guidance, such as guidance published by the National Institute for Health and Clinical Excellence (NICE); their likely influence on clinical practice directly (ie without or before, incorporation into national clinical guidance); and their identification of important gaps in knowledge and possible influence on the conduct of new primary research studies. The research questions are:

1. Have systematic reviews produced by NIHR funded CRGs during 2007-11 had a direct effect on clinical practice?

2. Have systematic reviews produced by NIHR funded CRGs during 2007-11 had a direct effect on NHS organisation and delivery?

3. To what extent have reviews, produced by NIHR funded CRGs during 2007-11, been included in clinical guidance, such as that produced by the National Institute of Health and Clinical Excellence (NICE)?

4. To what extent are reviews produced by NIHR funded CRGs used in the preparation of NICE guidance?

5. What evidence is there that systematic reviews produced by NIHR funded CRGs during 2007-11 are likely to change future clinical practice?

6. What influence have systematic reviews, produced by NIHR funded CRGs during 2007-11, had on the conduct on new primary research studies?

7. What are the barriers and facilitators to Cochrane systematic reviews impacting on policy, practice and future primary research?

5. Methods

5.1 Design and conceptual framework

A mixed method approach is proposed informed by theories about research impact and guided by a framework for evaluating research impact that draws on previous work in this area (Buxton and Hanney, 1996, Kuruvilla et al., 2006).

Many different terms have been used to define research impact. However, there is a general consensus of opinion that several types of research impact exist (Estabrooks, 1999, Huberman, 1992, Nutley, 2003a, Weiss, 1976) , including instrumental or direct impact, conceptual impact and symbolic impact. The definitions of each type of impact are as follows:

- Instrumental or direct impact – research findings drive practice decisions or policy-making
- Conceptual impact – where research influences the concepts and language of policy and practice deliberations
- Symbolic impact – research is used to legitimate and sustain predetermined positions

Although health benefits and broader economic benefits may be viewed as the 'real' payback from health research these are hard to measure as it is difficult to attribute particular health gains to specific pieces of research (Hanney et al., 2004a) . Therefore, although we may be able to make inferences about health and economic benefits, these are largely beyond the remit of this evaluation. Instead we will focus on impacts that are more easily assessed, such as clinical practice, service delivery, quality of patient care, policy and the targeting of future research. Our main focus will be on instrumental or direct impact but we will also consider examples of more indirect influence (e.g. conceptual or symbolic), and will include both actual and potential impact. Examples of instrumental use of research might include direct impact on the behaviour of clinicians or the use of evidence to develop or update educational material, policy and guidelines. Likely, or potential, impact will include examples where there is some evidence to suggest the review has had an impact but this is, at present, difficult to substantiate

(for example, when reviews might have impacted on policy and practice deliberations); or where the review is judged to have produced findings that clearly have the potential to impact on policy, service delivery or patient outcomes but there has been insufficient time since publication for impact to have occurred.

5.1.1 Measuring research impact

There is no single standard approach to measuring impact and a variety of evaluative methods exist including bibliometrics, documentary analysis, semi-structured interviews, case studies, panel review, surveys and network analysis (Boaz, 2008, Hanney, 2007). The methods most frequently suggested for analysing the impact of research are bibliometrics, documentary review and interviews (Boaz, 2008, Hanney et al., 2004b). As there are advantages and disadvantages of each method it is generally recommended that a variety of sources to identify research impact are used (Hanney et al., 2004a, Lavis et al., 2003). In light of these considerations we propose to use a mixture of bibliometrics, documentary analysis, questionnaire survey and interviews. These methods are chosen because they are appropriate for determining and comparing the impact of reviews published by 20 CRGs on a variety of topics and over a five year period. They will also enable richer data to be gathered and allow for triangulation. Moreover, these methods will enable us to track backwards from policy documents (WP1) and track forward from specific systematic reviews (WP2). These methods are discussed in greater detail below.

Questionnaires and interviews

Obtaining the 'insider account' has been recommended when evaluating research impact (Hanney, 2007) and it is envisaged that staff at editorial bases and review authors will be important sources of information about review impact. Therefore, we propose to send questionnaires to CRG editorial staff (WP1) and review authors (WP2) in order to obtain their views on the impacts, and likely impacts, of Cochrane reviews included in our analyses. Furthermore, we propose to undertake semi-structured interviews with guidelines developers to gain further insight into how Cochrane reviews have contributed to the development and preparation of guidance.

Documentary analysis

Documentary analysis allows for the 'exploration and interpretation of existing documents and can elicit quantitative or qualitative findings' (Boaz, 2008). This might include identifying key citing papers and relevant clinical guidelines (Hanney et al., 2004b), or policy statements, articles in professional journals or website resources. Benefits of this technique are that it can be applied to a range of sources, provides contextual understanding and is cost-effective (Boaz, 2008).

Bibliometrics

A common method for analysing research impact is to employ bibliometric methods which employ quantitative analyses to measure patterns of scientific publication and citation. One of the most important of these is citation analysis. This technique, which essentially involves counting the number of times a research paper is cited, works on the assumption that influential researchers and important works will be cited more frequently than others (Meho, 2007). Advantages of using this technique is that citation rates are seen as an objective quantitative indicator for scientific success (Bornmann et al., 2008), they are robust and transparent and are relatively simple and cost-effective to perform. However, citation analyses have been criticised as they measure the number of research outputs rather than research outcomes (Boaz, 2008). In order to overcome this

criticism we will use the citation analyses in work package 2 to trace the flow of knowledge and look for any evidence that the reviews have impacted on the research, practice and policy communities. For example, in line with objective two, we will check citations to see if reviews have been cited in guidelines or policy documents.

Traditionally the Thomson Scientific ISI citation databases have been the main tool for citation analyses. However, previous work (Bunn, 2010b, The Cochrane Library, 2008) suggests that citation counts for Cochrane reviews are artificially low in these databases because citing authors have incorrectly referenced Cochrane reviews. Therefore, citation analysis in Web of Science will be supplemented with citation counts from Google Scholar which may more accurately reflect the impact of Cochrane reviews (Bunn, 2010b).

5.1.2 Framework

The use of a framework for structuring assessments of impact has been recommended as it can help organise inquiry (Ostrom, 2007) and allow for more easy comparison across reviews (Wooding et al., 2004). We propose to structure our data collection and analysis using a framework that combines elements from two existing frameworks, the HERG framework for assessing health research payback (Buxton and Hanney, 1996, Buxton and Hanney, 1997, Hanney et al., 2000) and The Research Impact Framework developed by Kuruvilla and colleagues (Kuruvilla et al., 2006). The HERG framework consists of a multidimensional categorization of the benefits, or payback, from health research (Hanney et al., 2000), and includes five main categories: knowledge production, research targeting, capacity building and absorption, informing policy and product development, health benefits and broader economic benefits. The rationale for using this framework is that it is the most commonly used framework in the evaluation of health research impact (Hanney, 2007), is well described in the literature and there are a number of publications detailing suggested methods for conducting evaluations. In addition, although it was not developed specifically for systematic reviews, it has been used to assess their impact (Soper and Hanney, 2007).

As previously stated health benefits and broader economic benefits of research are hard to measure and are largely beyond the remit of this evaluation (Hanney et al., 2004a). Therefore, we propose to use a framework that combines elements of the HERG framework (knowledge production, research targeting, informing policy and product development) with elements (impact on practice/services) from The Research Impact Framework developed by Kuruvilla and colleagues. The latter is a conceptual framework that uses a standardised way of describing a wide range of potential areas of health research impact and is designed to be used by researchers without any specific training in research impact assessment. The framework we propose to use for this evaluation includes the following categories:

1. Knowledge production
    - Impact within research community (e.g. number of times review is cited)
    - Other methods of dissemination (e.g. press coverage, number of mentions in media)
2. Research targeting
    - Influence on other research (e.g. identification of gaps in knowledge, follow-on research)
3. Informing policy development (includes actual & potential)
    - Impact on national or government policy
    - Impact on international policy
    - Policies agreed at national or local level in the form of clinical or local guidelines

- Policies developed by those responsible for training and education

4. Impact on practice/services (includes actual & potential)
   - Quality of care
   - Services management and organisation
   - Cost containment and effectiveness
   - Evidence based practice

5.2 Research Plan

There are three clearly defined work packages, with work packages 1 and 2 conducted in parallel. A diagrammatic summary of the study can be seen in Figure 1.

In work package 1 we will seek to gain a general overview of the impact of the twenty NIHR funded Cochrane Review Groups (CRGs). We will:

- Analyse data on outputs and impact of reviews compiled by CRGs as part of their annual reports to NIHR
- Send a questionnaire survey to key staff at 20 NIHR funded CRG editorial bases to identify examples of impact, and likely impact, on practice, policy and research targeting and to help prioritise reviews for further analysis
- Undertake further analysis of existing sources relating to Cochrane review impact. E.g.:
  - data compiled by Alderson on frequency of citation of Cochrane reviews in NICE guidance
  - data compiled by the UK Cochrane Centre on the use of Cochrane Reviews in NICE & SIGN guidelines
  - data compiled by the publishers of the Cochrane Library (Wiley) on the impact of Cochrane reviews
  - Contact Research Networks to see if able to provide any evidence of impact
- Undertake semi-structured interviews with key personnel at NICE involved in the development of guidelines (focus on impact, potential impact, and use in preparation of guidelines)

In work package 2 we will explore the impacts of a representative sample of Cochrane reviews. We will:

- Identify a representative sample of 40 reviews (two per CRG)
- Send a questionnaire survey to first authors to identify examples of impact or likely impact
- Undertake documentary and bibliometric analysis to identify impact or likely impact

In work package 3 we will synthesise findings from work packages 1 and 2, hold a consensus meeting to discuss and agree findings, write the final report and begin dissemination of the findings.

5.3 Work package 1.

5.3.1 Questionnaire survey of CRG editorial bases

CRGs currently compile data on outputs and review impact as part of the annual reports that they submit to NIHR. However, although data on outputs is available for the whole five year period data on review impact is only available for 2009 onwards. We will, therefore, supplement this existing data with a questionnaire survey to CRG editorial bases. This will help us get an

idea of the range and type of likely impact and an indication of which reviews might have had the greatest impact. In addition, this process will allow us to prioritise reviews for further analysis.

Sample and data collection

We will send a questionnaire survey to the managing editor (n=20) at each NIHR funded CRG. This will be done using Bristol Online Surveys (UH holds a licence). The survey will include questions about general impact (both actual and potential) of the CRG output from the past five years. However, CRGs will be informed that they do not need to provide information already included in the annual reports they submit to NIHR. Questions will be guided by our evaluation framework and will cover knowledge production, contribution to research training and further research and possible impact of the review on health policy and practice. Respondents will be asked to focus on reviews first published, or substantially updated in the five year period between 2007-11 (with a particular emphasis on 2007-9 as this data is not already available) and will be asked, where possible, to provide supporting evidence of impact. Evidence of impact might include inclusion in clinical guidelines, impact on practice (for example changes to clinicians behaviour, changes to service organisation and delivery), or influence on future primary research. CRGs will be asked to identify two reviews published (or updated) in the last five years that they consider to have had the most impact on policy and practice. These reviews will be used to inform the selection process in work package 2. Non responders will be followed up by repeat emails and/or telephone.

Analysis

Data will be imported into excel for analysis. Researchers will scrutinise the responses and extract any examples of actual or potential impact from the information provided by the CRGs. As there is a danger that CRGs may inflate the impact of their work the research team will critically assess information provided and, where possible, seek evidence to verify it. This information will then be organised using our framework (as outlined in 5.1.2) and stratified by CRG.

5.3.2 Documentary analysis and analysis of existing sources

We will undertake analysis of existing material relating to the impact of Cochrane reviews. This would include analysis of data provided by CRGs as part of their annual reports to NIHR, and data on the use of Cochrane reviews in NICE and SIGN guidance (Alderson and Tan, 2011) compiled by NICE and the UK Cochrane Centre. We will re-analyse the data to focus on citations involving reviews published between 2007-11 by NIHR funded CRGs. In addition, we will draw on data from the publishers of The Cochrane Library (Wiley) on the impact of Cochrane reviews. This includes data on: the number of downloads of reviews (abstract only or full text), impact factors for individual Cochrane CRGs, and the number of media mentions for Cochrane reviews. Discussions with Gavin Stewart (associate editor the Cochrane Library) and David Tovey (Editor in Chief Cochrane Library) have confirmed that we would be able to access this data. Our analyses would focus on reviews published (or updated) by NIHR funded CRGs during the period of 2007-11.

Analysis

We will provide tabular and graphical summaries of review outputs structured to reflect the domains of the framework. This will include: knowledge production (citations and other outputs such as media mentions), research targeting (such as any follow on studies), policy impact (e.g. inclusion in guidelines or use for the development of guidelines and impact on practice/services (e.g. impact on clinical behaviour).

5.3.3 Semi-structured interviews with key guideline developers

Although the proposed citation analyses and documentary review will enable us to ascertain if Cochrane reviews have been cited in national or international guidance it will not necessarily tell us the role Cochrane reviews play in the development of guidance, for example whether they are just used as supporting evidence or if they were instrumental in informing guidance. Therefore, we propose to undertake semi-structured telephone interviews with key informants at NICE in order to understand the role that Cochrane reviews play in the development of NICE guidance.

Sample and data collection

We would undertake telephone interviews with a purposive sample of NICE/National Collaborating Centre staff involved in the development of guidelines. Potential participants will initially be indentified by one of the applicants (Alderson) with further snowballing if required. Our sample will attempt to capture a range of experiences (both positive and negative) of using Cochrane reviews in guideline development. Our approach will be iterative and the sample size will be dependent on the themes emerging from the data. However, preliminary discussions suggest that a sample of between five and ten will be sufficient to reach data saturation. The focus of the data collection is to identify the way Cochrane reviews are used in the development of guidance and to identify barriers and facilitators to their use. We will use a semi-structured interview schedule which will be guided by our evaluation framework and by previous literature on barriers to review impact (Bunn and Sworn, 2011). Interviews will be taped and transcribed, and, in order in order to minimise the burden on interviewees, will be kept to 30 minutes only.

Analysis

Qualitative data analysis will be undertaken with the aid of a computer software package designed specifically for qualitative data (NVivo) and will incorporate the principles of the FRAMEWORK approach (Ritchie and Spencer, 1994). This uses five steps: detailed familiarization with the data, identifying key themes to form a coding frame, indexing the material according to the coding framework, and mapping and interpreting the findings in the context of other research in the area and policy and practice considerations (Silverman, 1993). To guarantee a degree of inter-rater reliability and transparency two researchers will independently scrutinize transcripts and emerging themes will be labelled with codes. They will then compare codes with discrepancies resolved by discussion (Barbour, 2001). Emerging themes will be discussed with our guideline development expert (Alderson). As well as this inductive analysis we will also use deductive methods with our coding frame (step 2 of the framework analysis) being guided by our overriding framework (5.1.2).

5.4 Work package 2

In work package two we propose to undertake further analysis on a representative sample of Cochrane reviews published in the last five years. This will enable us to look in greater detail at the impacts, and potential impacts, of our selected reviews.

5.4.1 Identification of representative sample of Cochrane reviews

Selection criteria

We will select a total of 40 systematic reviews, two from each CRG. Twenty reviews will be chosen randomly (stratified by group) and twenty from those identified by the CRGs as likely to have had an impact. This should ensure we have a

representative sample of reviews. The rationale for choosing 40 reviews is that this is judged to be feasible in the time available and will allow us to include two reviews from each CRG. For the purpose of an impact evaluation there generally needs to be sufficient time since the research was completed for change to have occurred. Therefore, we will weight our sample towards those reviews published between 2007-2010. In order to avoid a conflict of interest or bias the applicants will exclude any reviews on which they are an author.

5.4.2 Questionnaire survey with systematic review authors

Sample and data collection

We propose to undertake a questionnaire survey with first authors of all 40 reviews. This will be done using Bristol Online Surveys. Questions will be guided by our evaluation framework and will cover knowledge production (e.g. media mentions), contribution to research training and possible impact of the review on health policy and practice. Authors will also be asked if they think their review identified important gaps in knowledge and/or if it had any influence on the conduct of new primary research. As in WP1 the research team will seek supporting evidence to substantiate claims of impact. For non responders this will be followed by a second mailing and by additional emails and phone calls where necessary. This may include emails to other review authors if the first author does not respond.

Analysis

Data will be imported into excel for analysis. Researchers will scrutinise the responses and extract any examples of actual or potential impact from the information provided by the CRGs. As there is a danger that authors may inflate the impact of their work the research team will critically assess information provided and, where possible, seek evidence to verify it. This information will then be organised using our framework (as outlined in 5.1.2) and stratified by CRG.

5.4.3 Documentary and bibliometric analysis

In order to search for impacts and likely impacts of our selected reviews we would undertake the following bibliometric and documentary analysis:

a) citation analysis in Web of Science and Google Scholar to find out how often the reviews have been cited (knowledge targeting)
b) Screening of references identified in the citation analysis to trace the flow of knowledge to see whether the reviews have been cited in any policy or practice documents (influence on policy and practice)

The citation analyses described above will be supplemented by searches of Google, Google Scholar, NHS Evidence and TRIP using review author and title keywords. Previous studies (Armstrong et al., 2012, Bunn, 2010b) suggest that the most relevant records in searches of Google and Google Scholar will be in the first five pages, and therefore we will screen only the first five pages of records for each review.

Analysis

We will provide tabular and graphical summaries of review outputs structured to reflect the domains of the framework. This will include: knowledge production (citations and other outputs such as reports in press), research targeting (such as any follow

on studies), policy impact (e.g. inclusion in guidelines or use for the development of guidelines, and impact on practice/service (e.g. impact on clinical behaviour).

5.5 Work package 3

In work package 3 we will synthesise findings from work package 1 & 2 to describe the actual and potential impacts of Cochrane reviews published by NIHR funded CRGs in the last five years. Synthesis will be guided by our overarching framework (5.1.2) (knowledge production, research targeting, informing policy development, and impact on practice/services), the results of our framework analysis (5.5.3.) and will take into consideration ideas relating to types of impact (e.g. instrumental/conceptual/symbolic). The findings will be discussed at a consensus meeting involving the research team and members of the advisory and public involvement in research groups. This process will be important in order that we make appropriate judgements about potential or likely impacts and that we ensure that impact is not overstated.

6. Dissemination and projected outputs

Expected outputs from the research will include a full report for the HTA, a shorter summary aimed at members of The Cochrane Collaboration, guidelines developers, practitioners and policy makers; a peer reviewed publication and a possible editorial for the Cochrane Library. Project findings will also be disseminated via professional and research networks and members of the PIRG will assist in the development of a lay summary. It is anticipated that the study will be of interest to those involved in preparing and disseminating Cochrane reviews. Therefore, the findings will be presented at Cochrane meetings (such as the Cochrane Colloquium), and disseminated to CRGs, The UK Cochrane Centre, and to those involved in editing and producing the Cochrane Library. Findings will also be presented at NICE.

7. Plan of investigation and timetable

Further details of the research plan are provided in a gantt chart (see Figure 1). The duration of the study is five months; start date 1st April – end date 1st September 2013.

- Pre-grant: Design draft questionnaire and submit ethics application
- April 2013: Design questionnaire and send to CRGs, begin documentary analyses of existing sources, identify reviews published by each CRG in last five years and choose random sample of one review per group
- May 2013: Send reminders to CRGs who have not responded to the questionnaire, begin semi-structured interviews with guideline developers, select purposive sample of one review per group, begin analysis of email survey to CRGs, send out surveys to review authors
- June 2013: send reminders to non-responders of author questionnaire, begin analysis of author survey
- July 2013: continue with analysis of surveys and documents, hold consensus meeting
- August 2013: synthesise work packages 1 & 2 and prepare final report
- Post grant: write paper/s and disseminate findings

8. Project management

This is a complex project that has to be delivered to a short time frame and to tight deadlines. Dr Bunn is CI and will act as project manager (20% FTE). We propose to employ two full time research assistants at UH. Dr Bunn and Dr Trivedi (10%

FTE) will be responsible for supervising the research assistants at UH. Either Dr Bunn or Dr Trivedi will meet weekly with the RAs employed at UH and the whole project team will meet every two months (either face to face or via teleconference).

Investigations of research impact are often carried out by those with a vested interest in proving the value of research and are, therefore susceptible to bias (Hanney, 2007). All the applicants are involved in the Cochrane Collaboration (all are authors on Cochrane reviews and Bunn and Trivedi are editors with the Cochrane Injuries Group) and may be supposed to have a vested interest in proving the value of Cochrane reviews. They will make every effort to avoid bias but in addition the project will be overseen by an advisory group that involves members without direct links to the Cochrane Collaboration. As well as members of the project team the advisory group will include two members of the Public Involvement in Research Group, a clinician with an interest in quality improvement and the development of clinical guidelines (Dr Linda Patterson Clinical Vice President of the Royal College of Physicians) and clinicians/policy makers with an interest in the use of research (TBA). The group will meet twice during the course of the study and its purpose will be to guide the research, monitor its progress and comment on emerging findings.

9. Approval by ethics committees

Ethical approval will be needed for the questionnaire surveys and interviews with staff at NICE. Although NICE is currently part of the NHS (in April 2013 it will become a non-departmental public body) NHS REC approval is no longer required for interviews with NHS staff. Therefore, we will not need to apply to an NHS REC committee but will obtain any necessary ethical approval via the Nursing, Midwifery and Social Work Ethics Committee at the University of Hertfordshire. The nature of this study means that we do not anticipate any difficulties obtaining ethical approval, and the committee is able to fast track applications if necessary.

10. Patient and public involvement

A Public Involvement in Research Group (PIRG) at the University of Hertfordshire has a broad membership of service users and carers. The group has a well-developed support and training programme for members of the public and service users across a range of projects. The group is supported by a dedicated coordinator. Four members of this group have provided feedback on the research proposal and two members will be invited to join the project advisory group. As members of the advisory group they will have the opportunity to comment on research methods and project outputs. In addition, we will invite members of the PIRG to the consensus meeting in work package 3 where they will be involved in interpreting the study findings.

11. Expertise and justification of support requested

The project includes a team of researchers and clinicians, with links to the Cochrane Collaboration and the National Institute for Health and Clinical Excellence, who bring to the project expertise in evidence synthesis, systematic reviews, the development of clinical guidance and the evaluation of research impact.

Bunn (20% FTE) is a senior research fellow in Evidence Based Practice with experience in evidence syntheses and systematic reviews and in methods for evaluating research impact. She has recent experience of conducting qualitative interviews and analysis. She is an editor of the Cochrane Injuries Group and was formerly a managing editor with the Cochrane Collaboration. She is currently CI on an NIHR HS&DR study (11/1017/07) looking at ways to improve service organisation

and delivery for people with dementia and comorbid health conditions. She will lead and have overall responsibility for the day to day management of the study. She will undertake interviews with guideline developers and will supervise the research assistants working on the study.

Trivedi (10% FTE) is a senior research fellow in Evidence Based Practice with experience in qualitative and quantitative systematic reviews, methods in evidence syntheses and epidemiology, including cross-sectional studies. DT is an editor of the Cochrane Injuries Group and a member of the Cochrane Nursing Care Network. She has led and conducted a systematic evidence synthesis commissioned by NICE, an NIHR funded integrated review on the nursing contribution to chronic diseases, and a systematic review on the effectiveness of interprofessional working for older people funded by the NIHR SDO. DT has recently been awarded funding from the NIHR RfPB for an evidence synthesis on managing Behavioural and Psychological Symptoms in Dementia. She will help oversee research assistants, conduct telephone interviews and provide review and survey expertise.

Alderson (2%) is Associate Director in the Centre for Clinical Practice at NICE, where he leads on guideline development methods. He was formerly associate director in the UK Cochrane Centre and has expertise in systematic review methods as well as guideline development. He is currently a co-applicant on NIHR HS&DR project 10/2003/27 looking at developing better guidelines for patients with multimorbidity. He will provide academic expertise, advice on the aspects of the study relating to the development of clinical guidance and will facilitate recruitment for the interviews.

Iliffe (2%) is Professor of Primary Care for Older People at University College London, he has experience of conducting Cochrane Reviews (Hospital at home, Screening for vision loss in asymptomatic older people, Fear of falling), and is a clinical researcher engaged in evaluating complex interventions, with a particular interest in the translation of research findings into practice. He will provide academic and clinical expertise and provide advice on the interpretation of findings.

We have applied for funding for Bunn to project manage, have overall responsibility for the study, undertake interviews with guideline developers, and write the final report; Trivedi to provide additional expertise, advise on survey design and analysis, assist in supervising the RAs and undertake interviews; Alderson to provide expertise on the impact of reviews on guideline development and facilitate recruitment for interviews and Iliffe to provide additional clinical and academic expertise. All applicants will critically review the final report. The research team are well connected to engage the participation of members of the Cochrane Collaboration and guideline developers at NICE in this research. It is envisaged that the team's strong links with the Collaboration will facilitate the participation of CRGs and review authors in the study and will aid dissemination of findings. In addition, applicants will be involved in recruitment and will lead the interviews with guideline developers.

In addition to the project team we have requested funding for two research assistants (100% FTE) who will assist in all aspects of data collection and analysis including questionnaires, documentary review and citation analyses, and undertake general project support. We believe that the scope and anticipated timeline of the study means that two research assistants are required. However, as there will be appropriate support from FB & DT, we have minimised costs by costing these posts on the UH post-grad scale. We envisaged that one RA will be primarily responsible for work package 1 and the other RA for work package 2. However, both RAs would work on any aspect of the study considered necessary by the PI in order to complete the project to time.

Costs for user involvement have been calculated according to the University of Hertfordshire Public Involvement in Research costings (drawn from INVOLVE). These include support for the infrastructure of the PIRG, advisory group and consensus

meeting attendance, review of study documentation, and travel. Other costs include funds for two laptops for the RAs, fees for transcription of the semi-structured interviews, travel and subsistence for the project team and advisory group, and dissemination costs (open access fee and attendance at Cochrane Colloquium).

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