Strategies to promote the impact of systematic reviews on health care policy: a systematic review of the literature

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Abstract

The last few decades have seen a growing emphasis on evidence-based decision making in health care. Systematic reviews synthesising research have been a key component of this movement. However, there is concern that such syntheses do not have the expected impact on policy with more work needed to enable us to maximise their potential. The aim of this review was to identify and evaluate potential strategies for increasing the impact of systematic reviews on policy. Such strategies may include incorporating active strategies for dissemination and knowledge transfer but more work is needed to evaluate their benefits.

Introduction

Over the last few decades there has been a growing emphasis on the importance of using evidence to inform decision making in health care (Dawes et al., 2005, Sackett et al., 1996). This widespread recognition of the need for practitioners to incorporate evidence into their decision making processes has, unsurprisingly, led to calls for managers and policy makers to consider the evidence when making policy decisions (Cabinet Office, 1999a, Cabinet Office, 1999b, Ham et al., 1995). A key aspect of the move towards evidence-based or evidence-informed practice and policy has been the development of methods for the synthesis and integration of primary research. Although a number of terms have been used for such syntheses the most widely used and understood is systematic review.

In addition, there is an increasing interest in the impact of research, not just on health care practice but also on policy making. 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). Strategies to enhance impact may be focused on any point along this continuum.

On the face of it systematic reviews have several advantages over other types of research which should, in theory, increase their potential for impact. 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). However, despite this apparent rationale for using systematic reviews to inform decision making the extent to which policy makers use systematic reviews as a source of evidence has been questioned (Sheldon, 2005).

A number of factors might be responsible for reducing the impact of systematic reviews on policy. Some of these are, of course, general to all types of research. Policy making is a haphazard and somewhat volatile process (Lomas, 2000a) with research evidence only one determinant in shaping policy. Policy makers may not place a high value on research evidence and may be influenced by many factors including financial imperatives, ideology, legal issues, pressure from stakeholders and public opinion (Davis and Howden-Chapman, 1996, Lavis et al., 2005). In addition, to these general barriers to impact, there are several that are specific to systematic reviews. It has been found that many policy makers may not be aware of what a systematic review is, what it entails and what it is they can offer (Campbell, 2007). Moreover, a lack of good quality primary research for synthesis, a tendency for reviewers to focus on RCTs and controlled evaluations at the expense of other types of research, and inadequate recognition of the importance of contextual factors may reduce the usefulness of systematic reviews to policy makers (Green et al., 2009, Greenhalgh et al., 2003, Oliver, 2001, Pawson, 2002).

It has, therefore, become increasingly apparent that there are many barriers to evidence-informed policy and that researchers and policy makers may need to engage in more 'explicit and active strategies' in order to ensure that research has any meaningful impact on policy (Walter, 2003b). Several authors have already reviewed the literature on strategies for promoting research impact (Innvaer et al., 2002, Mitton et al., 2007, Walter, 2003a) and identified a number of potential barriers and facilitators to research impact. Facilitators included personal contact, timely relevance and the inclusion of summaries with policy recommendations (Innvaer et al., 2002). However, they found much of the literature focused on impact upon practice rather than policy (Walter, 2003a) and none of them focused specifically on promoting the impact of systematic reviews. In this paper we examine strategies for promoting the use of systematic reviews in the development of health care policy.

Aims & Objectives

The aim of this paper was to systematically review the literature on ways of promoting the impact of systematic reviews on health care policy and to distinguish potential facilitators to their use. The overarching research questions were:

- What strategies are available to increase the impact of systematic reviews on health care policy?

- What strategies are effective in increasing the impact of systematic reviews on health care policy?

- What are the potential barriers and facilitators to the use of systematic reviews in the development of health care policy?

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Methods

Inclusion criteria

We searched for papers that either described or evaluated strategies designed to promote the influence of systematic reviews on health policy. There is a distinction to be made between the natural uncontrolled spread of research and innovation (diffusion) and more active conscious efforts to spread research (dissemination) (Green et al., 2009), this review is concerned with active strategies to promote the influence of systematic reviews on health care policy. This included papers focusing on interventions designed to improve the dissemination of systematic reviews, or efforts to involve policy makers in the review process through collaboration. In addition, we included studies that explored policy maker's views on barriers and facilitators to the use of systematic reviews in the policy development process. Papers that appeared to be describing a process more akin to guideline development, rather than the promotion of specific reviews, were excluded. As the focus of the review was on policy we excluded studies focusing on the implementation of systematic review evidence into clinical practice. We included all quantitative and qualitative study designs, and also papers describing specific strategies to promote the impact of reviews. The rationale for including descriptive papers was that whilst there is a growing literature on increasing research impact, there are few empirical studies evaluating methods to promote research impact (Mitton et al., 2007).

Identification of studies

We searched for published and unpublished papers using the following databases: Pubmed, CINAHL, The Cochrane Library (including Cochrane Database of Systematic Reviews, DARE,

Methods studies, Technology Assessments and Economic Evaluations) and ISI Web of Science. Preliminary scoping searches were conducted in February 2010 and full searches were run in January 2011. There were no date restrictions but only papers published in English were included. Search terms can be seen in Box 1.

 In addition, to the database searches we contacted experts and used lateral search techniques such as checking reference lists and using the 'related articles' function on Pubmed and 'cited by' function on Google Scholar for studies identified as relevant. Such lateral search techniques are recommended when searching for studies in a complex area (Greenhalgh and Peacock, 2005).

Data extraction and analysis

Two reviewers independently examined the title and abstract of citations identified by the electronic search and applied the selection criteria to the study reports. Data were extracted by one author (FB) and checked by the second author (KS). Data were extracted on the type of study, aims and objectives, strategies employed to increase impact and the main results. Owing to the inclusion of a number of descriptive studies we were not able to formally quality assess all studies. However, where possible, two reviewers independently assessed the quality of the selected studies using design assessment checklists. The quality criteria were informed by several sources including the Cochrane Collaboration risk of bias tool (Higgins, 2008) and a framework for assessing quality in qualitative research designed by Spencer and colleagues (Spencer et al., 2003). The latter has been adapted by the authors for use in previous reviews (Bunn et al., 2008, Pocock et al., 2010). The core quality assessment principles are summarised in Table 1. The results of the included papers are

presented narratively and as the literature specifically relating to systematic reviews was sparse the results of the studies included in the review are considered in the wider context of the general literature on research impact, dissemination and knowledge transfer.

Results

Description of included studies

Initial electronic database searches generated 768 records. From these, 48 were identified as potentially relevant and full texts were checked. Of those thirteen papers met the inclusion criteria (Atkins et al., 2005, Brussoni et al., 2006, Ciliska et al., 1999, CRD, 2009, Dobbins et al., 2001a, Dobbins et al., 2001b, Dobbins et al., 2004a, Dobbins et al., 2009a, Dobbins et al., 2009b, Dobbins et al., 2004b, Keown et al., 2008, Lavis et al., 2005, Yousefi-Nooraie et al., 2009). Two studies were reported in more than one paper. A survey by Dobbins and colleagues was reported in two papers (Dobbins et al., 2001a, Dobbins et al., 2001b), as was an evaluation of knowledge transfer strategies (Dobbins et al., 2009a, Dobbins et al., 2009b). Seven papers were from Canada, two the UK, one the USA and one Iran. Five papers related directly to strategies to increase the impact of systematic reviews (Atkins et al., 2005, Brussoni et al., 2006, CRD, 2009, Dobbins et al., 2009a, Keown et al., 2008), but only one (Dobbins et al., 2009a) included a formal evaluation of these methods. This was a randomised controlled trial to test the effectiveness of knowledge transfer and exchange (KTE) strategies in Canadian public health decision making. The intervention compared three different strategies: access to an online registry of systematic reviews evaluating public health interventions, targeted evidence messages and knowledge brokering (Dobbins et al., 2009a). The other four described strategies to increase the

impact, or improve dissemination, of systematic reviews, these strategies were generally

based on experience and had not been formally evaluated. The remaining studies involved

surveys (Ciliska et al., 1999, Dobbins et al., 2001a, Dobbins et al., 2004b, Yousefi-Nooraie et

al., 2009), and interviews or focus groups (Dobbins et al., 2004a, Lavis et al., 2005) to

explore the views and preferences of policy makers regarding systematic reviews and

barriers and facilitators to their use. More details of the included papers can be seen in

Table 2.

Study quality

The one RCT (Dobbins et al., 2009a) was judged to be at low risk of bias on the domains of

sequence generation, allocation concealment and reporting of outcome data. However,

there was some potential for bias in the way outcomes were measured and collected.

Outcomes were self-reported and high turnover meant that different decision makers

completed baseline and follow-up surveys. Three of the surveys (Ciliska et al., 1999,

Dobbins et al., 2001b, Dobbins et al., 2004b) were judged to have representative samples

and outcomes were ascertained in a standardised way using questionnaires that had been

tested for reliability and validity. In all three over 80% of those approached agreed to

participate. In the other survey (Yousefi-Nooraie et al., 2009) the sample was considered to

be biased towards those who already had an interest in systematic reviews as it only

included people attending systematic review workshops. In addition, the questionnaire had

not been tested for reliability and validity. Two studies used qualitative methods, in one

(Dobbins et al., 2004a) overall reliability was judged to be high and in the other (Lavis et al.,

2005) it was assessed as low. However, in the latter limited description of the qualitative

component made quality assessment difficult. The remaining papers involved no empirical

element and have not been formally quality assessed.

Findings

Policy makers views on systematic reviews

There was some discrepancy in the literature as to the extent to which policy-makers used

systematic reviews as a source of research evidence. In interviews with policy makers in

Canada and the UK (Lavis et al., 2005) it was found that none of the policy makers cited

systematic reviews as a source of evidence but rather they were influenced by factors other

than research including legal issues, pressure from stakeholders and public opinion. Policy

makers tended not explicitly to place a high value on research evidence and certainly not on

systematic reviews (Lavis et al., 2005). This was echoed in a UK report that found few policy

makers had heard of systematic reviews or meta-analyses nor were they aware of what

these entailed or what they could offer (Campbell, 2007). However, more positive findings

came from a number of Canadian studies. In a telephone survey of public health policy

makers in Ontario 57% of those surveyed had heard of systematic reviews and when

prompted with a description of a review 62% were able to give examples of reviews they

knew about. It is not possible, however, to discern from this study whether the reviews fed

directly into the development of policy (Ciliska et al., 1999). In two later surveys, conducted

to ascertain the role of recently completed systematic reviews in the development of public

health policy, systematic reviews were seen as useful by policy makers and were valued

above other types of research evidence (Dobbins et al., 2001a, Dobbins et al., 2001b,

Dobbins et al., 2004a). These studies by Dobbins and colleagues were, however, conducted

in an area of Canada where there have been considerable efforts to develop a policy-making

culture that values research evidence. In addition, the nature of these studies, with their focus on systematic reviews, may have promoted policy makers to give more credence to systematic reviews than they otherwise might have done.

Interviews with policy makers identified a number of barriers to the use of systematic reviews including timeliness, availability of research results, relevance and a lack of skills to understand and interpret reviews. In the study in Iran concerns were slightly different as a less well developed systematic review infrastructure meant that a lack of trained methodologists and limited access to international databases were barriers.

From the papers a number of strategies were identified that might increase the influence of systematic reviews on health care policy. These strategies largely related to three main themes: collaboration between researchers and policy makers, appropriate dissemination strategies, and examinations of context and applicability in reviews. Each of these themes is explored in more detail in the sections below. Each section begins with a general overview of the literature concerning the promotion of research impact followed by a more detailed focus on the studies included in this review that relate specifically to systematic reviews.

Strategies for promoting the influence of systematic reviews on health care policy

Collaborative approaches

A key mechanism to drive research impact, and one that has received much attention in the literature, is initiatives to increase collaboration between researchers and decision makers. Indeed, systematic reviews of barriers and facilitators to the use of research evidence by health policy makers have found that a key facilitator, and one supported by the most

consistent and rigorous evidence, was interaction and personal contact between researchers and policy makers (Innvaer et al., 2002, Lavis et al., 2005), such as the use of policy networks that brought policy-makers together with researchers through formally structured mechanisms (Lavis et al., 2005). Interpersonal networks may be crucial for the circulation of knowledge (Dopson et al., 2002) and developing partnerships between researchers and users is seen by some as a 'precondition of delivering evidence-based policy-making' (National Audit Office, 2003).

One of the roots of current collaborative approaches is based in academic work around knowledge translation (Denis and Lomas, 2003). Knowledge translation, which is also known as knowledge utilization, knowledge exchange, research transfer and research utilization, has been defined as 'a process by which relevant research information is made available and accessible for practice, planning, and policy-making through interactive engagement with audiences and supported by user-friendly materials, and a communications strategy that enhances the credibility of the organisation and, where relevant, reinforces key messages from the research'(Program in Policy Decision-Making, 2003).

The transfer of information from researchers to decision makers has been a subject of interest since the 1950s (Huberman, 1990). Although the process was initially conceptualized as a logical flow of information from researchers to policy makers (Wingens, 1990) more recent approaches have conceptualized knowledge translation less as a linear one-way transfer of information from researchers to policy makers but more as a collaborative process that involves interaction and exchange among researchers producing information and potential users such as policy makers and service providers (Huberman,

1994, Jacobson et al., 2003). Whilst proponents still see a distinction between the scientist and the non-scientist there is a 'mutual respect for the distinctive expertise that each brings to the research process' (Denis and Lomas, 2003). The distinction between models of knowledge transfer and uptake involving either the active promotion of research use by researchers (producer-push) or active efforts by decision makers to identify research or research expertise (user-pull) have been supplanted by an interaction model to enhance knowledge transfer and uptake (Landry et al., 2001).

A variety of mechanisms have been proposed to bridge the gap between researchers and policy makers. This includes joint researcher-decision maker workshops, the inclusion of decision makers in the research process, collaboration in the development of research priorities and questions and the use of intermediaries or knowledge brokers with an understanding of the culture of both decision maker and researcher environments and with the necessary communication, networking, problem solving and negotiation skills (Lomas, 2007). In a review of the evidence on promoting innovations in service organizations Greenhalgh and colleagues use the term 'boundary spanners' to describe individuals with significant social ties both inside and outside the organization (Greenhalgh et al., 2004). They suggest that such people can play a pivotal role in promoting the uptake of innovations. However, research on knowledge brokering is limited and questions remain about the effectiveness and cost-effectiveness of this strategy (Pyra, 2003).   Indeed, it has been argued that much of the thinking about knowledge transfer and exchange (KTE) relies on anecdotal evidence or rhetoric rather than on rigorous evidence. In a systematic review of knowledge transfer and exchange strategies (Mitton et al., 2007) the authors included

over 80 studies but, of those, only about 20% reported a real-world application of a KTE strategy and even fewer had been formally evaluated.

Collaborative approaches and systematic reviews

We found three papers that looked specifically at collaborative approaches to promote the use of systematic reviews, one was an RCT (Dobbins et al., 2009a) and the other two were descriptive (Brussoni et al., 2006, Keown et al., 2008). In one the authors, describe strategies to create opportunities for stakeholder engagement throughout the stages of a systematic review (Keown et al., 2008). They identified five potential opportunities for stakeholder engagement throughout the review process including identifying topics, defining review questions, and in the dissemination of review results. From their observations of the process the authors noted a number of benefits of stakeholder engagement which include an added depth to the review, better defined research questions, improved clarity of the final report and helpful input into recommendations. They claim that policy makers feel the process makes the reviews more useful. The authors did note, however, that involving stakeholders in the systematic review process requires a level of flexibility that could potentially compromise scientific rigour (Keown et al., 2008). In the RCT, they found that knowledge-brokering did not have a significant impact and was less effective than tailored, targeted messages. Knowledge-brokering was, however, more effective in organisations that placed less value on research than those that already recognised the importance of evidence-based decision making. This, they say, could be because there was less scope for improvement in organisations that already had a positive culture towards research use.

Dissemination strategies

Another factor that has received much attention is the way in which research is disseminated. This category, of course, overlaps with the previous section on knowledge transfer as some methods of dissemination may involve collaboration and interaction between researchers and decision makers. For the majority of researchers dissemination is most commonly constituted by traditional approaches such as publication in peer-review journals and conference presentations. Despite the dependence on such methods of dissemination there is a lack of evidence as to whether passive modes of dissemination, such as publication in a journal, are effective in driving research impact (Walter, 2003a). Indeed, a number of studies have found that the format of communication and presentation by researchers is often not considered 'user-friendly' by policy makers (Lomas, 2000b, Nutley, 2003a, Walter, 2003a). In a systematic review of evidence from interview studies of barriers and facilitators to the use of research evidence by policy makers, the inclusion of summaries with policy recommendations was a commonly reported facilitator (Innvaer et al., 2002). Moreover, research use studies suggest that it is important to present research findings in formats that are tailored to potential customers (Lomas, 1991, Willison and MacLeod, 1999); systematic reviews of interventions to increase impact upon health care practice have found that active implementation strategies such as reminders, incentives, peer review, marketing and educational interventions are more effective in changing behavior than passive distribution of recommendations, educational materials or guidelines (Walter, 2003a).

Dissemination strategies and systematic reviews

Six papers included information relating to dissemination strategies and systematic reviews. One evaluated different methods of dissemination (Dobbins et al., 2009a), three looked at views of decision makers on the best ways to disseminate reviews (Ciliska et al., 1999, Dobbins et al., 2004a, Lavis et al., 2005), one described lessons learned about how to increase the impact of reviews (Atkins et al., 2005) and one describes a framework for use by researchers seeking to promote the findings of a systematic review (CRD, 2009). In the latter, guidance for undertaking reviews by the NHS centre for Reviews and dissemination, they suggest that dissemination is an integral part of the review process and should be considered from an early stage to allow time for planning, development and implementation.

In semi-structured interviews with managers and policy makers Lavis and colleagues found that barriers to research influence were the use of jargon and the fact that researchers often only publish for a scholarly audience in academic journals (Lavis et al., 2005). They explored the optimal way to present systematic review evidence and found that most policy makers supported a 1:3:25 format (i.e. one page of take home messages, a three-page executive summary that summarizes the full report, and a 25 page report, as well as a longer technical report if necessary). They argue that this format has the advantages of delivering research reports in a way that is more likely to be read, being tailored to meet the needs of different audiences, and helping researchers learn to present their findings clearly and concisely.

A number of papers stressed the importance of executive summaries or targeted messages. In the randomised controlled trial, of knowledge transfer and exchange strategies in public health decision making, the use of targeted messages was more effective in promoting

evidence-informed decision making compared with alternatives such as a website offering

access to an online registry of research evidence or knowledge-brokering groups (Dobbins et

al., 2009a). In a telephone survey to determine whether recent systematic reviews of public

health interventions were used in the development of new provincial public health policies

in Canada it was found that policy makers considered the executive summary to be the most

influential part of the review (Dobbins et al., 2004b). It has also been suggested that the

'up-front placement of take-home messages' is particularly important as it reflects how

many policy-makers actually read research reports (Lavis et al., 2005). However, there is

some research to suggest that such a format may, in some instances, alienate those who are

in disagreement or less receptive to the conclusions presented (Lavis, 2004, Lavis et al.,

2006b).

The conclusions and recommendation sections of systematic reviews were also highlighted

by some studies as particularly key for decision makers. Surveys and focus groups with

Canadian policy makers found that when reading systematic reviews they focused most on

the results, conclusions and discussion sections (Ciliska et al., 1999) and that

recommendations were considered important (Dobbins et al., 2004a).

Initiatives to increase the usefulness of systematic reviews for policy makers

It has been argued that key to making systematic reviews more useful to policy makers is for

the researcher to include an assessment of both the context in which the research was

conducted and the applicability to a local setting (Gruen et al., 2005, Pawson et al., 2005).

There is an increasing realisation that it is not enough to focus solely on 'what works' as

policy makers have more complex questions and need to know 'what works for whom and in what circumstances' (Solesbury, 2001).

Contextualisation and systematic reviews

A number of the included papers suggested that considerations of applicability to a local setting or specific population could potentially make systematic reviews more relevant to policy makers (Brussoni et al., 2006, Ciliska et al., 1999, Lavis et al., 2005). Such assessments of context might make reviews more useful and, therefore, more influential in the policy making process (Lavis et al., 2005). Brussoni et al (Brussoni et al., 2006) describe a collaborative process to develop evidence based policy relating to the installation of smoke alarms. This involved the consideration of the local context which they suggest resulted in practical recommendations reflecting real world practice. However, their approach was not formally evaluated.

In reality, assessing context and applicability is not always straightforward. Although tools exist to assess applicability (Lavis et al., 2004, NICE, 2006) there is still a large degree of subjectivity in applying them. However, the biggest challenge for reviewers is that much of the information reviewers need to make decisions about generalisability, such as details about the specific content of interventions, the providers, duration, intensity, participants and setting, is often missing from primary studies. In addition, there is as yet a lack of evidence that efforts to address applicability will increase the impact of reviews on policy. Assessments of context are also dependent on the medium of dissemination and the audience. For example, Cochrane reviews are designed to be suitable for international audiences and so are generally not specific to one context. Lavis suggests that one way

forward may be for researchers to produce reviews that can add to the international literature and that also include a locally adapted version (Lavis et al., 2005).

Discussion

We found 13 papers (eleven studies or reports) that were concerned in some way with promoting the impact of systematic reviews. A number of these investigated the views of decision makers on ways to increase the impact of systematic reviews on the policy making process. Facilitators included 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. Although our findings related specifically to systematic reviews they are similar to more general overviews of barriers and facilitators to the use of research evidence by policy-makers (Innvaer et al., 2002). We found only one study formally evaluating an intervention to promote the use of systematic reviews in the development of health care policy. This lack of good quality evidence has also been highlighted in a review of knowledge transfer and exchange (KTE) strategies (Mitton et al., 2007).

Making judgements about the effectiveness of strategies to increase the impact of systematic reviews on policy is complicated by the difficulties associated with assessing research impact. In the RCT (Dobbins et al., 2009a) they used a global measure of evidence-informed decision making but say that this proved to be too vague as an outcome measure. They suggest that the use of concrete outcomes such as public health policies may be more appropriate. However, determining the impact of research upon such policies is not straightforward (Hanney, 2007) as it may be difficult to isolate the role research has played

in relation to the many other confounding factors that might contribute to policy development (Boaz, 2008, Carden, 2004, Hanney et al., 2000, Lavis et al., 2003). Measuring impact is further complicated by the distinctions between direct or indirect influence. Indirect impact, such as raising awareness or influencing policy deliberations, may be far harder to distinguish than instrumental or direct use of research.

There is clearly some discrepancy in the literature over the extent to which policy makers actually make use of systematic review evidence in the policy development process. Although some of the Canadian studies showed a positive response to the use of systematic reviews other evidence suggests that systematic reviews are not well used or understood by many policy makers (Campbell, 2007). Seven of the included studies were from Canada where the promotion of research transfer and uptake and evidence-based decision making have been identified as important priorities for the Canadian health-care system (National Forum on Health, 1997). The findings of the Canadian papers may not be as applicable to other countries that have not made the same efforts to develop policy-making cultures that value research evidence.

There are a number of well documented barriers that researchers and policy makers need to overcome before research can have an impact on policy. Some of the barriers that policy makers face, such as a lack of access to journals, lack of time to read and appraise articles, and a lack of critical appraisal skills, could feasibly be overcome by systematic reviews where reviewers have already done the work of finding relevant research, appraising their quality, and synthesizing the results (Ciliska et al., 1999). However, it would appear that this alone is not enough to make reviews accessible and relevant to policy makers.

The papers identified in this overview of the literature suggest a number of strategies for promoting the use of systematic reviews by policy makers. One of these is the use of knowledge transfer strategies. However, although such strategies were described in a number of the studies concerning systematic reviews they were only formally evaluated in one study (Dobbins et al., 2009a) which found that simple KTE strategies, such as targeted messages, may be as effective as more complex ones such as knowledge brokering. Despite the increasing popularity of knowledge transfer and exchange strategies some commentators have been critical of what they see as an overly simplistic approach which they say does not adequately reflect 'the challenges, subtlety and complexity of research use' (Davies et al., 2008). They argue that ideas of knowledge transfer are based in the traditional rational-linear models of research use and that 'the baseline assumption of two communities too easily leads to unsophisticated notions of knowledge and knowledge transfer' (Davies et al., 2008). They suggest the term 'knowledge interaction' may be more appropriate to 'describe the messy engagement of multiple players with diverse sources of knowledge'. In a systematic review of KTE strategies (Mitton et al., 2007) the authors are also critical of the conceptualisation of KTE and argue that current ideas do not fit with the underlying complexities and politics of health policymaking. They suggest that the misalignment between evidence producers and decision makers needs to be given greater weight in discussions about KTE.

A number of other barriers to collaborative approaches have been identified (Lomas, 2000b, Walter, 2003a), both at the individual and the organizational level, and are linked to relationships between researchers and decision makers, modes of communication, time and timing, and context (Mitton et al., 2007). Developing effective partnerships requires time

and energy and researchers may not have sufficient time or resources to develop linkage with policy makers (Lomas, 2000b, Walter, 2003a). Researchers have also cited problems identifying the point of entry into decision making organisations, difficulties balancing the competing agendas of partnerships and organisations and frustration with the frequent restructuring and changes of personnel in decision making organisations. Indeed, in the RCT of KTE included in this review (Dobbins et al., 2009a) the high turnover of public health decision makers may have led to errors in outcome measurement.

In addition, collaborative approaches may require some changes in the way researchers think, for example by broadening the range of methodologies used and rethinking the way problems are defined, (Denis and Lomas, 2003). They may also necessitate the researcher developing new skills in communication and negotiation (Lomas, 2000b), skills they currently lack or do not wish to acquire (Carden, 2004). Barriers faced by policy makers included a lack of access to research findings, little time to read research, a poor understanding of research and inadequate skills to interpret it, and being overwhelmed by the sheer volume of research literature available (Nutley, 2003a, Walter, 2003a). In addition decision makers often need results faster than researchers can produce them (Campbell, 2007, Lomas, 2000b).

It has been questioned by some whether researchers should be seeking to promote these collaborative approaches or whether such relationships may be responsible for compromising research quality. It has been argued that if researchers do what is required for research to be used, then it may 'fail to fulfil one of its most important functions which is to be objective, reliable and unbiased' (Innvaer et al., 2002). Combined with these problems is the potential conflict between policy makers' desire to control findings for political

reasons with researchers' need to publish (Lomas, 2000b). In the light of the additional

resources required for incorporating KTE strategies into projects, and the fact that such

funding is very often lacking, some researchers have raised the question of who should be

responsible for developing and initiating KTE strategies. Should it be the role of researchers

or policy makers (Mitton et al., 2007), and who should be responsible for funding it?

The most effective way in which to disseminate systematic review findings is a key concern

for researchers. Several studies considered this and concluded that the key was to

accompany the full report with a short, concise summary of the findings (Ciliska et al., 1999,

Lavis et al., 2005). Targeted messages may also be effective (Dobbins et al., 2009a).

However, summarising lengthy and complex reviews is challenging and more work is

required on how to make scientific findings more accessible to policy makers and

practitioners.

Several papers highlighted the importance of including recommendations in a review and

saw this as a facilitator to impact. However, the extent to which it is within the remit of

systematic review authors to make recommendations for policy and practice was a matter

of some debate in the literature. One of the original tenets of systematic reviewing,

designed to maintain scientific rigour and reduce the risk of bias, was that reviewers should

provide an accurate and unbiased assessment of what the data show rather than

interpreting them in light of their own personal opinion. This has, however, led to some

readers being frustrated by a lack of firm recommendations from systematic reviews, and

disappointment when reports conclude that there is insufficient information to answer

critical questions (Atkins et al., 2005). However, in his review of ways to improve the

usefulness of systematic reviews for policy makers, Lavis suggests that researchers should

avoid providing specific recommendations as research evidence alone is insufficient for making recommendations and researchers may not have a good sense of the values of those who will be affected by their decisions (Lavis et al., 2005). His reservations are supported by a UK researcher, Annette Boaz, who compared five reviews on the subject of mentoring to assess whether they were useful tools for guiding policy. She found different viewpoints and contradictory advice in the reviews she studied, and suggests that if reviewers feel under pressure to deliver clear policy recommendations this may lead them inflate the conclusions and 'go beyond the evidence' (Boaz, 2005).

A number of the papers also suggested that the usefulness, and, therefore, influence, of reviews might be increased by considerations of the applicability of findings to particular settings and contexts and for specific populations. One of the criticisms of systematic reviews has been that a reliance on highly controlled research, such as RCTs, may limit their utility for policy makers and those in the 'real world'(Green et al., 2009). There is, however, a growing literature on improving the usefulness of systematic reviews by incorporating a broader range of literature, including qualitative studies. Researchers have developed techniques that allow them to include diverse types of studies in reviews and to address questions about cost-effectiveness, process, mechanisms and meanings (Dixon-Woods et al., 2005, Mays et al., 2005, Pawson et al., 2005, Thomas et al., 2004). The argument for such approaches is that they are more likely to yield reviews that are relevant to the decisions that policy-makers may face. The arguments against these methods are that they may introduce bias into what would otherwise be an approach that strives to minimise bias (Lavis et al., 2006a). Whilst broadening review criteria and incorporating both quantitative and qualitative studies in mixed methods reviews may increase the usefulness of reviews it

may also directly mitigate against timely delivery.   Timeliness has been identified as a key facilitator of research use (Ciliska et al., 1999, Innvaer et al., 2002, Lavis et al., 2005, Mitton et al., 2007) and there is an obvious tension between the need to make reviews more useful, by exploring context, applicability, views and experiences and process, and the demands for timeliness.

Systematic reviews, even though generally quicker to produce than primary research, may still take too long to be useful to policy makers (Campbell, 2007). In a review of evidence-based policy for practice for the Government Social Research Unit in the UK (Campbell, 2007) the authors suggest that to address the issue of timeliness there needed to be a modification of systematic reviews and the development of 'rapid evidence assessments' using similar rigorous techniques but in a much shorter time frame.   How the authors envisage a process that maintains the same standards but takes less time is not specified. Some have suggested that less rigorous rapid reviews could be a bridge between science and policy making (Campbell, 2007, Rotstein and Laupacis, 2004, Watt et al., 2008). However, the scope of such syntheses may be more limited and they may not adhere to any single validated methodology (Watt et al., 2008).

Limitations

There are a number of methodological issues that could have a bearing on the validity of these results.   Like previous reviews in this area (Mitton et al., 2007) the majority of the literature we found was descriptive or explorative with only one study formally evaluating methods to promote impact. This lack of empirical studies makes it difficult to make recommendations about what strategies systematic reviewers should employ to increase

the impact of their work, and this paper can only provide suggestions about potential strategies rather than making claims about effectiveness. Despite efforts to identify all eligible studies we cannot exclude the possibility that some studies were missed. Indeed, it has recently been noted that the diversity of terminology to describe efforts to bridge the research to practice gap makes the retrieval of KT studies difficult (Lokker et al., 2010) However, the use of lateral search techniques should have reduced the likelihood that we missed studies.

Conclusion

There is a growing acceptance that active strategies are needed to facilitate the impact of research, including systematic reviews, on policy and practice and strategies for KTE and dissemination are seen by many as an essential part of the review process. The format and mode of dissemination is a key area of consideration for systematic reviewers and particular attention should be paid to producing brief review summaries. Considerations of applicability to local context and the inclusion of diverse study types may increase the usefulness or reviews to policy makers. It is clear, however, that these strategies for increasing research impact require considerable investment on the part of the researcher 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.

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