Prioritizing Future Research through Examination of Research Gaps in Systematic Reviews

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March 15, 2012

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Abstract

**Background:** Systematic reviews currently are the optimal method to summarize existing research, yet most reviews also identify key gaps in current research that preclude answering clinical and policy questions in patient-centered outcomes research (PCOR). Identification and prioritization of research gaps has the potential to lead to more rapid generation of subsequent research to address those gaps. Currently, systematic reviews, including those addressing patient centered outcomes, do not systematically address research gaps.

**Methods:** This paper reviews the current methods of research gap identification and prioritization, and presents options for future work. We updated a prior examination of the peer-reviewed literature on methods of identifying and prioritizing research gaps, and conducted a scan of multiple systematic review programs (DERP, Cochrane, AHRQ, NIH consensus panels and others) for methods of research gap analysis.

**Results:** Multiple PCOR groups are currently developing methods to address these issues. Gaps should be identified using pre-existing criteria, and most investigators working in this area use the PICOTS framework to describe the gaps in a structured format. Multi-disciplinary stakeholder panels can assist investigators in prioritizing gaps. Multiple methods are currently in use to prioritize gaps. The steps in the process include: Publication of the review; engagement of stakeholders; identification of research gaps; priority ranking of research gaps; transformation of research gaps into research needs or questions; refinement and re-ranking of priorities by stakeholders; and addition of study design considerations.

**Conclusions:** Although some areas of refinement are needed in the current methods of summarizing and prioritizing gaps, the methods are currently sufficiently developed for use by PCORI. Areas for additional refinement include assessing the reproducibility of prioritization methods, assessing the optimal size and composition of stakeholder panels, and collaborating with end-users of the documents to make them as accessible and actionable as possible.
Acknowledgements

Thanks to the members of the RTI-UNC EPC who contributed to our work on examining research gaps, including Meera Viswanathan, Daniel Jonas, Bradley Gaynes, Lissette Saavedra, and Robert Christian. We also want to thank our colleagues Gillian Sanders at the Duke University EPC and Jeanne-Marie Guise at the Oregon Health and Science University Center for Evidence-based Policy who reviewed this paper and provided helpful comments. Many thanks to Christiane Voisin, our librarian, for conducting our literature searches.
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Introduction

This paper provides an overview of current practices for identifying and prioritizing research gaps to determine research needs for clinical and health policy questions. The Methodology Committee of the Patient Centered Outcomes Research Institute (PCORI) commissioned this paper in December 2011. This paper is part of a series concerning various methods of identifying and establishing research priorities. The other topics in the series are the use of modeling techniques such as value of information (VOI) analysis and the use of peer review.

We were asked to describe the current methods of identifying and prioritizing research gaps based on information from systematic reviews and to assess the utility of these methods for developing new research questions and determining which questions are of the highest priority. Prioritization of PCOR is a core mission of the Institute. We use the term ‘research gap’ to indicate a finding from a systematic review in which a key question has not been answered. Identification of a gap in the prior research thus serves as the first step in development of a new question for PCOR.

This paper is not a systematic review of the literature, but rather a description of current approaches and recommendations for next steps. The primary author is co-director of an Agency for Healthcare Research and Quality (AHRQ) Evidence-based Practice Center (EPC) with significant experience in derivation and prioritization of research gaps from his work with the EPC during the past 2 years. The co-authors are staff of the Research Triangle Institute-University of North Carolina (RTI-UNC) EPC (CW) and post-doctoral fellows (CB, AY) in the AHRQ training program in health services research at UNC.

Although information about research gaps may be found in the discussion sections of many patient-centered outcome research (PCOR) reports including clinical trials, case series, and cohort studies, the focus of this white paper is on the identification and prioritization of research
gaps derived from systematic reviews. The identification of research gaps from and within systematic reviews is common, although the criteria used to date have been variable and often unclear. However, prioritization of research gaps arising out of systematic reviews is not common at present. The methods to identify research gaps are being refined and methods to prioritize the gaps for future research are emerging. We will review the current status of those methods.

Our objectives are to:

- Summarize current systems of identification and prioritization of research gaps arising out of systematic reviews; and
- Make recommendations to PCORI regarding advantages and disadvantages of current methods in the identification and prioritization of research gaps.

A related process that we will not discuss in this paper is the more broad identification of topics for systematic review or other types of comparative effectiveness research. The AHRQ EPC Program has sometimes called these activities ‘issues exploration.’ These activities involve a scoping review, rather than a more detailed systematic review, of a broad range of research issues, with discussion and prioritization of general research areas by groups of stakeholders.

**Background**

Systematic reviews of the published literature are the standard for evaluating the current state of scientific knowledge regarding a specific clinical or policy question.1 Systematic reviews are now common. They may be written for a number of purposes and can provide:

- information to clinicians, policymakers, and the public regarding current diagnostic tests, treatment benefits, and potential harms;
Systematic reviews are distinguished from narrative reviews through the presence of specific study questions, their comprehensive literature search, and use of explicit and transparent methods to assess the quality or risk of bias of included evidence. Similar to any other form of research, systematic reviews often may not definitively answer all of the study questions posed. These unanswered questions are often called ‘evidence gaps’ or ‘research gaps.’ We have chosen to use the term “research gaps” for this paper. Implicit in the use of the term ‘gap’ is the assumption that filling the gap with additional high-quality evidence will lead to the gap being addressed and a subsequent higher level of confidence in the evidence. Some gaps may reflect lack of information regarding certain aspects of the review’s question (such as information regarding some of the important patient-centered outcomes assessed), or gaps may apply to only some sub-sets of the population of interest for the study question, such as ethnic minorities, the elderly, children, or individuals with co-morbidities. Given the increasing recognition that PCOR must be applied to individual patients and consumers in clinical practice, the presence of these gaps represents a challenge to the implementation of PCOR in clinical practice and policy implementation.

We will review the current literature on assessment and prioritization of research gaps below, but there currently exists only emerging guidance over when and how to assess gaps arising out of systematic reviews. The most recent methods guidance for systematic reviews was the 2011 Institute of Medicine (IOM) report “Finding What Works in Health Care”. The report mentions gap identification as one element of the systematic review process but does not
provide detailed guidance on how to accomplish the identification or prioritization of gaps. The AHRQ methods series on future research needs methods, published online in the past several months, represents emerging guidance and will be discussed in detail later in this paper.

One reason for the current emphasis on the assessment of research gaps is the increasingly prominent position of systematic reviews in the entire PCOR process. (Figure 1)

**Figure 1. Schematic showing systematic reviews as part of patient-centered outcomes research**

Reducing the amount of time between assessment of the state of a research area through a systematic review and initiation of new studies to fill identified, high priority gaps is a potentially powerful enhancement to PCOR. The schematic in Figure 1 indicates that the assessment and prioritization of research gaps occurs after completion of the systematic review. PCOR is an iterative process. Primary research is summarized in a systematic review, but there may still be a need for additional work to address unanswered questions. New research is conducted, which can then be summarized in several years through an updated review. As noted previously, reviews form the evidence base for practice guidelines and other activities to enhance the quality of care delivered.

Timely completion of gap assessment and prioritization will be important if the goal of targeted and timely conduct of PCOR is to be accomplished. If significant time, greater than a year or so, passes between the completion of the systematic review and the gap assessment, there may be a need for an update of the systematic review to assure readers that the identified gaps have not already been addressed through research published after the final searches for
the systematic review have been conducted. The time span during which a systematic review is relevant is variable depending on the research topic and the number and type of studies performed. One study found that, within 2 years of review publication, 23% of topics had a ‘signal’ that indicated a potential need for an update.\textsuperscript{2} Identification of research gaps is only useful if the gaps are acted upon to speed the development of future research sooner or in a more targeted way than if there were not a formal gap analysis.

The audiences for research gap and prioritization documents can be multiple and may vary somewhat depending on the content area of the systematic review. Researchers and funders are obvious audiences, but clinicians, advocates and patients should also be audiences as we seek to better understand areas of uncertainty in our clinical knowledge. As potential audiences expand, the need for clear explanation of the methods used grows.

**Methods**

We performed a literature scan of multiple sources for background information and examples of current prioritization methods used by selected groups who produce systematic reviews in the broad area of PCOR. We did not examine research gap identification and prioritization in other areas such as basic research. Our literature scan was an update of the PubMed scan performed by Robinson and colleagues at the Johns Hopkins EPC, published in June 2011.\textsuperscript{3}(Appendix A) Their report developed a framework for the identification of research gaps and scanned the peer-reviewed literature for examples of systems to assess and prioritize research gaps. Robinson et al. identified only 5 included articles as relevant. We utilized the same search terms and inclusion criteria as those used by Robinson and colleagues to update their work. We searched for both examples of detailed analyses of research gaps in the literature and methods work on the best way to identify and present this information. We also scanned reports from the Cochrane Collaboration\textsuperscript{4} and the Drug Effectiveness Review Project
(DERP)\textsuperscript{5} that were published between January 2010 and December 2011, and the National Institutes of Health (NIH) Consensus Statements\textsuperscript{6} to determine if reports produced by these groups used and presented a standard methodology for identifying and prioritizing research gaps. Our search strategies and results are presented in Appendix A. After submission of our draft report, an additional methods-oriented project was published, and this publication along with a previously published related article were incorporated into the paper.

Another source of information about methods for identifying and prioritizing research gaps was information from the AHRQ EPC program. This program supports 14 North American universities and contract research organizations to conduct systematic reviews and related activities for the AHRQ Effective Health Care program. Eight of the EPC’s were selected in 2010 through an American Reinvestment and Recovery Act (ARRA) sponsored initiative to conduct multiple systematic reviews and future research needs (FRN) activities. These FRN activities involved examination of recent comparative effectiveness research systematic reviews, with identification of research gaps and prioritization of those gaps through interaction with a multidisciplinary group of stakeholders. The stakeholder groups were specific for each future research need project. Each of the 8 EPC’s has conducted at least one FRN project, and a total of > 20 projects are anticipated to be conducted by the end of calendar 2012. In addition, the EPC’s conducted a number of methods projects and white papers for AHRQ, describing identification of research gaps and their prioritization. We reviewed both complete and, when available, draft methods papers and FRN reports through the Effective Health Care Web site \textsuperscript{7}. One of the methods papers published in 2011\textsuperscript{8} provides an overview of the current presentation of research gaps in the peer reviewed literature; we summarize these results later in this paper. A complete list of AHRQ FRN reports and methods papers is provided in Appendix B. We also
identified several systems of research gap prioritization from our readings, and when possible, we accessed their Web sites and contacted their coordinators for information.

**Results**

The results of our searches for reports and manuscripts that provided information about methods of identifying and prioritizing are summarized in Table 1, details of the search strategies and full results are in Appendix A. We will begin with prior peer reviewed literature, then discuss examples of current systematic review programs, concluding with the most developed research gap program, the ‘Future Research Needs’ reports from the Agency for Healthcare Research and Quality (AHRQ)

**Table 1. Sources assessed for information about methods for identifying and prioritizing research gaps**

<table>
<thead>
<tr>
<th>Source</th>
<th>Number of full text publications reviewed</th>
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<tbody>
<tr>
<td>Peer reviewed literature</td>
<td>15</td>
</tr>
<tr>
<td>Drug Effectiveness Review Project (DERP)</td>
<td>4</td>
</tr>
<tr>
<td>National Institutes of Health (NIH) Consensus Development Conference Statements</td>
<td>5</td>
</tr>
<tr>
<td>Cochrane Collaboration</td>
<td>19</td>
</tr>
<tr>
<td>Global Evidence Mapping (GEM)</td>
<td>1</td>
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<tr>
<td>The Lind Alliance</td>
<td>1</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality</td>
<td>16</td>
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</tbody>
</table>

**Peer reviewed literature**

Research gaps are frequently discussed as part of systematic reviews, but this identification and discussion is often non-specific, and therefore may be of little assistance to stakeholders. The amount of text devoted to this activity is limited, and the discussion is often very general: “larger trials are needed” etc. Trikalinos and colleagues at the Tufts EPC reviewed 50 randomly selected peer-reviewed systematic reviews published in high-impact peer reviewed journals
between 2005-10. Only about half of the reviews discussed future research needs at all and only one-fifth described study designs that would address research gaps. The amount of text devoted to future research in the report was almost always (90%) less than a paragraph.

Robinson and colleagues conducted a focused literature search for published articles that described the identification of research gaps from systematic reviews or related processes such as health technology assessments. We updated this search and found a substantial increase in the number of articles that either identified gaps from systematic reviews using explicit methods or discussed methods of conducting such gap analyses. Robinson searched between 2001 and 2009 and identified 5 eligible articles. We searched the two subsequent years (2010-2011) using identical search strategies and exclusion criteria and ultimately identified 13 eligible articles. One article from an additional study was published after submission of the draft paper. We included this article and a previously published related article in the final paper. The 2010 paper by Li et al. did not meet our inclusion criteria since it focused on guidelines, but the follow-up 2012 paper examined gaps and systematic reviews, we included both papers since they reference each other.

We found similarities and differences between publications in these two time periods. Among the similarities was variation in the methods used to identify and prioritize research gaps. Robinson and colleagues noted that the organizing principles of methods utilized in the articles they identified varied and included key questions, a care pathway, a PICO format, topic areas, and a decision tree. In our updated review of the literature we also found a variety of organizing principles including: key question, topic area, categorized risk groups, a GRADE rating system, score ranking, and evidence mapping techniques. Several of the articles describe the development of a framework or tool for identifying and prioritizing research gaps and applying it to a specific topic area as an example for application. There were no replications or
evaluations of reproducibility of the methods or frameworks. Another similarity was that 2 of the 5 articles in Robinson’s work included discussion of the methods of prioritization of gaps while 7 of the 13 articles in our updated review included such discussion on prioritization of gaps.

Compared to the literature identified in the earlier search, the articles in our more recent review were more likely to describe the use of a diverse stakeholder panel involved in the prioritization process. For example Ballini et al, described using a multidisciplinary panel consisting of clinicians, clinical engineers, methodologists, epidemiologists, health economists, hospital administrators and other stakeholders throughout the decision making process.\textsuperscript{11} Taken as a whole, the literature shows the development of formal processes, including frameworks, and involving stakeholders in identifying and prioritizing research gaps. The variety of approaches used could be considered typical for a developing field, and this literature scan should be repeated in 1-2 years. We did not identify any empiric work to recommend a ‘best practice’.

A very recent publication by Li and colleagues, with a prior methods publication, combined some elements of topic identification and prioritization derived from gaps in systematic reviews.\textsuperscript{9,10} This multi-year project took a somewhat different approach from other methods we reviewed. The investigators began with an examination of guidelines as topic generation and prioritization, with subsequent assessment of systematic reviews to assess the evidence base. Specifically, the authors identified topics through examination of existing published guidelines on glaucoma. They then surveyed ophthalmologists regarding which clinical questions they felt were already answered by available evidence; for questions which had not been answered the respondents used a Likert scale for prioritization. The methods included two rounds of prioritization using a modified Delphi process to arrive at a list of topics. The investigators then searched for systematic reviews that had addressed those selected high priority questions.
They assessed identified systematic reviews for quality, and excluded the majority because of poor quality. The evidence base that could address the issues raised in the guidelines was therefore assessed, focusing on the priorities identified through the guideline-focused topic generation process and additional guidance from the practice community.

**Drug Effectiveness Review Project (DERP)**

From a review of 4 original DERP comparative effectiveness reviews published between January 2010 and December 2011, DERP\(^5\) we found that the methods do not include a structured approach to research gaps. Although the DERP evidence reports present the available evidence on specific drug therapies and attempt to clarify clinically important questions for decision-makers and the public, these reports do not include discussions regarding identification of gaps or methods for assessing future research needs. The reports detail the process for the development and approval of key questions to be addressed in the review, including stakeholder involvement with Medicaid agencies.

**Cochrane Collaboration**

We assessed 19 Cochrane Collaboration systematic reviews\(^{12-29}\) published between January 2010 and December 2011. We did not find any that implemented a structured approach to research gap identification or prioritization. While most reviews did include an “implications for future research” section in the text, these statements were frequently less specific than guidance suggests in the Cochrane Review Handbook.\(^{30}\) Guidance provided in the handbook recommends that implications for *how* research might be done and reported should be distinguished from *what* future research should be done. It also stresses the need for clarity and specificity in the section. The format of the future research should be presented in a format recommended by Brown et al.\(^{31}\) The format (EPICOT) is essentially the same as the PICOTS
(Population, Intervention, Comparator, Outcome, Timeframe, Setting) format and may include additional considerations such as the disease burden of the condition being addressed, the timeliness (e.g. length of follow-up, duration of intervention), and study type and design considerations that would best suit subsequent research. While the handbook does not provide guidance on how research gaps should be identified or prioritized, it does provide informative considerations in presenting these gaps that should facilitate prioritization.

**Global Evidence Mapping (GEM)**

The Global Evidence Mapping (GEM) initiative from Monash University in Australia places systematic reviews within an overall process of ‘evidence mapping,’ which includes question development, question prioritization, evidence search and selection (which may or may include a systematic review) and data extraction. Gap analysis is mentioned as part of planning for future research after the systematic review is completed. A flowchart presented in the paper by Bragge et al., illustrates the evidence mapping process.

Stakeholders (patients, caregivers, clinicians, researchers, policymakers) are explicitly mentioned within GEM documents as critical to research question development and prioritization. Online surveys are used to elicit input from stakeholders, and domains such as clinical importance, variability of current opinion, and whether the question is an emerging area of clinical practice are used as criteria for prioritization. The GEM system differs from that used by AHRQ (described below) in that it is somewhat less structured, and it has a major focus on prioritization of question development. However, authors assert that the GEM initiative has many potential outputs and applications and that the evidence maps may be tailored to specific needs as this methodology helps to identify where research is available and where gaps suggest new research is needed.
The James Lind Alliance

The James Lind Alliance\textsuperscript{34,35} in the United Kingdom (UK) is relatively new (established in 2004), but seems quite relevant to the goals of PCORI. The Lind Alliance is supported by the Medical Research Council (MRC) and the UK National Institute for Health Research. The Alliance supports the development of partnerships of practicing clinicians, patients and advocacy groups in the prioritization of areas of uncertainty in clinical medicine. Researchers who do not practice medicine and industry representatives are explicitly excluded from the prioritization process, the rationale being that these groups already have substantial influence in research. Areas of uncertainty to be prioritized must be contained in the database maintained by the National Health Service (NHS) “Database of Uncertainties about the Effect of Treatment” (UK DUETS). Uncertainties may be nominated for the UK DUETS database though: patients’, caregiver’s and clinicians’ questions about the effects of treatment; research recommendations in reports of systematic reviews of existing research and in clinical guidelines in which knowledge gaps are revealed; and ongoing research, both in the form of systematic reviews in progress and new ‘primary’ studies.\textsuperscript{36} The ways in which gaps are identified and presented is not clear. Several options are presented for prioritization by the James Lind Alliance partnership, including Delphi and nominal group process techniques. There is some latitude provided to partnerships to modify prioritization methods depending on the nature of the partnership and the clinical problem being addressed. Great emphasis is placed on participation from a range of stakeholders.

Other organizations

Robinson and colleagues, as part of an AHRQ methods project, contacted 64 US and international organizations that conduct reviews to determine how they assessed research gaps, and received responses from 37 organizations.\textsuperscript{3} Only five reported a formal process for
the identification of research gaps and/or needs. These were the Program in Evidence-based Care in Canada, the Health Services Assessment Collaboration in New Zealand, National Institute for Health and Clinical Excellence (NICE) in the UK, the Scottish Intercollegiate Guidelines Network (SIGN), and the National Kidney Foundation in the US. These groups generally utilized the PICO (population, intervention, comparator, outcome) framework. The NICE system is focused on the development of guidelines, and not generation of new primary research, but does have some similarities in the use of criteria for prioritization and the role of prioritization panels composed of multiple constituencies.37

Agency for Healthcare Research and Quality Future Research Needs

The AHRQ future research needs (FRN) process, although new, has been very active over the past 2 ½ years. This represents the most explicit current research gap identification and prioritization activity we have identified, and is one model for PCORI. The 8 selected EPC’s each conducted a pilot FRN project, extracting research gaps from a systematic review, and then transformed them into prioritized research questions with the aid of multidisciplinary stakeholder groups.38-46 As a pilot initiative, each initial FRN project was intentionally conducted with relatively little guidance from AHRQ; the subsequent projects were refined following email and in-person discussion among the EPC’s and AHRQ, and the production of multiple working papers authored by teams from the same 8 EPC units.3,8,47-52 We will not review each of the working papers in detail, but rather will describe the current state of the AHRQ process. Table 2 lists the current methods papers and their topics. We will discuss advantages and disadvantages of the process the discussion section.
Table 2. AHRQ future research needs methods papers

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Title</th>
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<tbody>
<tr>
<td>Brasure, et al. 2010</td>
<td>Finding Evidence on Ongoing Studies</td>
</tr>
<tr>
<td>O’Haire, et al. 2011</td>
<td>Engaging Stakeholders to Define and Prioritize Research Needs</td>
</tr>
<tr>
<td>Myers, et al. 2011</td>
<td>Determining Appropriate Use of Modeling or Value of Information When There is a Model</td>
</tr>
<tr>
<td>Meltzer, et al. 2011</td>
<td>Value of Information with Minimal Modeling</td>
</tr>
<tr>
<td>Draft document under review</td>
<td>Prioritization Criteria Methodology for Future Research Needs Proposals Within the Effective Health Care Program [Draft]</td>
</tr>
</tbody>
</table>

Abbreviations: AHRQ = Agency for Healthcare Research and Quality;

The steps shown in Figure 2 outline the main components of the process; some of them occur simultaneously.

Figure 2. Flowchart of FRN process

1. Systematic review is published with EPC-determined research gaps
2. Orientation of stakeholders to CER question, FRN process, and prioritization criteria
3. Elaboration and consolidation of research gaps through iterative process with stakeholders
4. Priority ranking of the research gaps
5. Transformation of research gaps into research needs
6. Refinement and re-ranking of priorities by stakeholders
7. Addition of study design considerations

a This figure was adapted from a draft AHRQ FRN methods paper.
b May include identification of additional research gaps.
c Reduction through topic consolidation, preliminary prioritization, and consideration of ongoing research (duplication criteria).
d Research gaps that address specific methods issues would not use PICOTS framework.
e May require iterative steps.
1. **Publication of the systematic review.** AHRQ has not addressed whether the group identifying and prioritizing the research gaps is the same as the team conducting the systematic review. Having the same team conduct both activities (systematic review and gap identification and prioritization) should have significant efficiency advantages. However, a few investigators have mentioned the utility of having a ‘fresh set of eyes’ who have not previously been involved with the review conduct the gaps analysis. We will discuss the skill set needed for assessment of research gaps in the discussion section below.

2. **Stakeholder engagement.** Stakeholders need to be engaged early in the process, and their recruitment will likely take place simultaneously with the team identifying research gaps. AHRQ has discussed issues of stakeholder engagement in a methods document “Engaging stakeholders to identify and prioritize future research needs”\(^{47}\). The importance of orienting stakeholders to the process and training those who are new to PCOR and related issues was emphasized. Great variability was found in current methods of utilizing stakeholders for research prioritization, and future consistency is recommended. Categories of stakeholders include: patients and caregivers; advocates; health professionals; policymakers; researchers; research funders; insurers/payers; and manufacturers. The types of stakeholders, but not necessarily the identities, needed for a given topic should be specified prior to beginning the prioritization process. Experience has demonstrated that recruitment can be challenging, as potential stakeholders may have many competing time obligations. Some EPC’s reported ‘snowball sampling’ in which a potential stakeholder might be over-committed, but refer the EPC team to a colleague.
The relationship of patients and consumers to advocacy groups largely composed of patients, caregivers and consumers is potentially complex. Advocacy groups have the advantage of potentially representing a synthesis of opinions of many patients and caregivers, but direct communication with individuals affected by the condition may be attenuated when advocacy groups are relied upon. Some advocacy groups may also potentially be affected by funding from external groups with competing interests. As noted in many documents, patients and caregivers may require additional training in the nature of the research process, research gaps, and formulation of research questions in order to most effectively participate in the process. Such training can help to ensure that their voices are heard at the deliberations. Some groups had conference calls with consumers separately from the more technical calls with researchers and clinicians, but there was no consensus that this was preferable. Several organizations, including NICE, have developed stakeholder training, and PCORI could build on these prior efforts. The training should have two aspects: a general orientation to research methods in PCOR, and the specific issues related to research gap identification and prioritization. Many stakeholders may have competing interests as part of the gap identification and prioritization process. Clinicians and researchers could potentially have financial conflicts of interest through ownership of stock, or a revenue stream through performance of a clinical procedure. Patients or advocates could have fixed views as to the benefit of a treatment or need to address a research question, representing a non-financial conflict of interest. Disclosure of such financial and non-financial conflicts of interest is critical, but a topic for discussion is whether such competing interests would be disqualifying from panel participation. Many of the AHRQ future research needs projects have worked with stakeholders who may have declared competing interests, but to meaningfully participate in the
process they do need to be open to new evidence. Commercial stakeholders’
participation is more complex. If a medication class is the topic of study, would one
need all manufacturers at the table? This might generate an over-representation of
influence from industry. The size of the stakeholder groups in the AHRQ EPC work
was modest, generally 8-12, with a few EPCs engaging more than 20. There were
two reasons for this size of panel: to manage the calls, since conference calls of more
than this size become unwieldy and some individuals may not speak up, but there
were also regulatory issues of the number of individuals who can answer surveys
under federal contract. This latter reason will not be relevant for PCORI work.

A management issue when working with stakeholder groups on research gap issues
is that the stakeholders may raise research gaps that are distant from the scope of the
systematic evidence review that is the basis for identification of the gaps. Without a
review of the literature to work from, the stakeholders may identify or prioritize ‘gaps’
that have already been addressed. However, enthusiasm and good ideas should not
be dismissed by the team, and such out of scope gaps should be referred for
consideration for PCORI sponsored systematic reviews or research proposals. In
general, research gaps to be prioritized should be within the scope of key questions of
the systematic review.

Currently, the EPC’s provide stakeholders with the executive summary of the
systematic review, which is about as long as a journal article; general materials
regarding the gap identification and prioritization process; materials on criteria for
prioritization; and a listing of current research studies relevant to the topic derived
from web-based resources. Stakeholders will need to be provided with criteria for
prioritization. AHRQ has used modifications of their Effective Health Care criteria for
choosing systematic review topics.\textsuperscript{53} Criteria that have been proposed have included: societal burden of the condition in terms of costs and suffering; feasibility of the future research; likelihood that the results will affect practice and policy; non-redundancy of the work. Redundancy would be an issue if an identified research gap was the topic of a large, ongoing research study the results of which had not yet been reported. Searches of grants.gov and clinicaltrials.gov may be helpful in identifying ongoing studies, although stakeholders are also often aware of ongoing potentially definitive studies, the presence of which may affect the priority placed on a gap. Most EPC groups did not provide stakeholders with instructions regarding weighting across these criteria, and each stakeholder will bring their own priorities to the table. For example, caregivers may be particularly concerned with issues related to the burden of suffering caused by a condition, and these concerns may be reflected in their rankings. We view this as appropriate and the reason why they are on the panel.

3. Identification of research gaps. Research gaps may or may not be explicitly identified in a systematic review. Currently, authors often identify gaps in the discussion section, but we have found that they may be scattered throughout the document, and might be found in both the results and discussion sections. Robinson et al. (2011) defined a ‘gap’ as “topic or area for which missing or inadequate information limits the ability of reviewers to reach a conclusion for a given question.” Additional specificity to the identification of research gaps can be obtained through identifying the reason why the research gap is present. Robinson\textsuperscript{3} and the EPC’s identify 4 main reasons, although more than one reason may be present for a given gap:

- Insufficient or imprecise information
- Biased information
• Inconsistency or unknown consistency
• Not the right information (such as not the appropriate outcome measured or population assessed)

These potential reasons for gaps can be traced back to the rating systems for strength of evidence, especially the Grading of Recommendations Assessment, Development and Evaluation (GRADE) and related systems, currently used by the AHRQ EPC’s and multiple other systematic review groups. A standard nomenclature for the reason for the gap provides a needed aspect of transparency to the process of gap identification. “Insufficient” information could be said to be a gap when there are either no studies or only high risk of bias studies on a topic, leading to a low or insufficient strength of evidence rating. GRADE strength of evidence ratings are often ‘low’ or ‘insufficient’, these ratings below “high” or “moderate” imply that there are significant remaining gaps needing to be addressed by future research.

One issue that is unresolved is the granularity of the gaps. For example, if an identified gap is the lack of research on the effectiveness of an intervention in minority populations, is that one gap or should the gaps be separated for each racial/ethnic group (African Americans, Asians, Native Americans, Latinos etc.)? Some authors have grouped gaps by the key question, although some gaps cut across multiple questions. Some groups also visually illustrate gaps with a variation of the analytic framework used in the systematic review.

4. **Priority ranking of research gaps.** Systematic reviews can generate a large number of gaps, especially for questions in which there may be multiple sub-questions and a paucity of available research. Simply listing 20-40 gaps may not help researchers or funders to identify the highest priority areas. A number of methods have been used
to rank research gaps. In our scan of the literature, no one method appears to be dominant, and each likely has advantages and disadvantages, outlined below: The AHRQ FRN projects have to date used ranking exercises when the number of gaps is low, as well as likert scales and multi-voting.

- Ranking 1-xx. This has the advantage of transparency, but may be difficult to accomplish when the number of choices to be ranked is large.\(^\text{38,41-45}\)

- Likert scale. Each research gap is ranked on a 1-5 (or 1-7) scale from ‘most important’ to ‘least important’ and is rated by the stakeholders. This type of response is familiar to most, proceeds quickly and is easy to summarize. The main disadvantage is that many of the research gaps may be scored as ‘important’, leading to a ceiling effect and close clustering of ratings. If gaps are given average ratings of 6.9, 6.88 and 6.83, are these ranking meaningfully different?\(^\text{39,41,43}\)

- Multi-voting. A form of nominal group process, stakeholders are provided with a fixed number of ‘votes’ and they can apply more than one vote to a given gap. This method is transparent and may give greater separation between higher and lower rated gaps than likert scaling. These voting processes can be used in multiple rounds. Judgment is required by the study team on the number of votes available, and the maximum number of votes that can be applied to any gap.\(^\text{39}\)

- Pair-wise comparisons. Stakeholders are presented with pairs of gaps and compare them with each other. Statistical techniques such as analytic hierarchy process are then used to derive an overall ranking.\(^\text{56}\) The pairwise comparisons are easy to perform, although the analytic methods may be perceived as non-transparent.
• Delphi methods. Participants answer questionnaires or perform other rating methods in multiple rounds. They are shown the results and the rationale, and move toward consensus. The process may be prolonged; ratings may be influenced by vocal outliers.\textsuperscript{38,45}

• Consensus conference. An in-person meeting provides an opportunity for all voices to be heard and responded to, and also for the stakeholders to develop personal relationships with each other. Facilitation of the process requires significant skill, and the process is at risk for being overly influenced by more vocal stakeholders. The consensus process may utilize other ranking methods within the conference.

5. **Transformation of research gaps into research needs**: The phrasing of research gaps is generally in the form of declarative sentences and ideally indicates the type of gap that is being addressed (lack of evidence, wrong population, biased evidence, inconsistent evidence). Some groups transform the gap into a research question or a ‘future research need’. This phrasing is often similar to a specific aim that would appear in a grant proposal. In PCOR research, it can contain all of the elements needed for a research project, including the elements of Population to be addressed; the Intervention (or test) to be examined; the Comparator; the patient-centered Outcomes to be measured; the Timeframe of the evaluation; and the Setting in which the research will be conducted (PICOTS). Some research gaps may not fit into this framework, such as needs identified for improving essential methods in that area. Methods may include refinement in measurement of outcomes, or methods work regarding analytic issues.
6. **Refinement and re-ranking of priorities by stakeholders.** When a large number of initial research gaps are identified, more than one round of ranking by the stakeholder group may be needed. A qualitative refinement can also occur, with discussion among the stakeholders and investigators as to issues such as the appropriate population definitions, the best outcomes to be assessed, and the appropriate timeframe of follow-up. The AHRQ experience has employed 2 rounds of prioritization, with a total of at least 3 conference calls or web-conferences, one for orientation and two to discuss rankings and revisions.

7. **Addition of study design considerations.** Although not a core component of gap identification and prioritization, some discussion of how the identified high-priority research gaps could be operationalized has been used in prior gap analyses, especially through the AHRQ future research needs teams. The team assessing the research gaps will have thought through these issues and presented preliminary considerations for resolution of the gap; this takes advantage of the thought they have already put into the process. Systematic reviewers will have deep knowledge of the advantages and risk of bias of study designs, but may not have experience in the practical considerations of primary data collection or secondary data analysis. The addition of researchers with practical knowledge in these content and methods issues of enrollment and data access will assist the process. Research in some conditions may have specialized issues regarding patient identification, recruitment, and retention.

The AHRQ team, in a document outlining a framework for study design considerations, proposed several criteria that could be used to assess whether a given study design was
appropriate for a given gap.\textsuperscript{48} The first criterion addresses the validity of the study design in addressing the research gap, the other 3 address the feasibility of the study design.

- Advantages of the study design for producing a valid result
- Resource use, size and duration needed to conduct the study
- Availability of appropriate data and/or ability to recruit subjects
- Ethical, legal and social issues

Trialists, epidemiologists and health policy researchers may use somewhat different terms to describe the same study designs, and a common terminology will be important. An AHRQ working paper has made a start on this process.\textsuperscript{57} Although the study designs proposed may often include randomized trials, feasibility and other factors may often lead investigators to consider alternatives such as secondary data analyses to detect rare but serious harms, or long term cohort studies to assess adherence in real-world settings. One additional issue sometimes incorporated into future research need considerations is estimates of the sample size needed within each study design. These calculations will require involvement of an analyst with epidemiology or biostatistics expertise. PCOR often involves comparisons between active interventions, and the effect size between active interventions is generally smaller than the effect size between an active intervention and no treatment or placebo. Estimating the larger sample size needed to identify a clinical and policy relevant difference in treatment outcome may influence prioritization, when sample sizes (and resources needed) required are very large.

**Example: Future Research Needs for Attention Deficit Hyperactivity Disorder**

In 2011, the RTI-UNC EPC completed an FRN project\textsuperscript{58} using the systematic review conducted by the McMaster University EPC\textsuperscript{59} titled, "Future Research Needs for Attention Deficit Hyperactivity Disorder: Effectiveness of Treatment in At-Risk Preschoolers; Long-Term
Effectiveness in All Ages; and Variability in Prevalence, Diagnosis, and Treatment.” The key questions for this review are shown in Table 3.

**Table 3. Key questions from comparative effectiveness review**

<table>
<thead>
<tr>
<th>KQ1</th>
<th>Among children less than 6 years of age with Attention Deficit Hyperactivity Disorder or Disruptive Behavior Disorder, what are the effectiveness and adverse event outcomes following treatment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>KQ2</td>
<td>Among people 6 years of age or older with Attention Deficit Hyperactivity Disorder, what are the effectiveness and adverse event outcomes following 12 months or more of any combination of follow-up or treatment, including, but not limited to, 12 months or more of continuous treatment?</td>
</tr>
<tr>
<td>KQ3</td>
<td>How do A) underlying prevalence of Attention Deficit Hyperactivity Disorder, and B) rates of diagnosis (clinical identification) and treatment for Attention Deficit Hyperactivity Disorder vary by geography, time period, provider type, and sociodemographic characteristics?</td>
</tr>
</tbody>
</table>

After gleaning 20 research gaps and mapping them to the key questions from the systematic review, the investigators presented the list to a group of 12 stakeholders, including funders, advocates, clinicians, regulators, researchers and policymakers. After stakeholder input, the list included 29 research gaps. Eight of these 29 research gaps emerged as the top future research needs after two rounds of prioritization using an online prioritization tool.

Figure 3 shows the presentation of one of the top priority research needs from the beginning of the process to the end.
**Figure 3. Example of transforming a research gap into a research question**

**Identify Research Gap:**

For children less than 6 years of age with disruptive behavior disorder or ADHD, limited data are available about the efficacy and effectiveness of psychosocial treatment programs (e.g., parent training and school-based interventions), alone or in combination with pharmacological interventions, compared with other psychosocial treatment programs, alone or in combination with pharmacological interventions. (KQ 1)

**After One Round of Prioritization Apply PICOTS and Develop Research Question:**

<table>
<thead>
<tr>
<th>P</th>
<th>I</th>
<th>C</th>
<th>O</th>
<th>T/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &lt; 6 years diagnosed with ADHD or at risk for ADHD or diagnosed with disruptive behavior disorder (including ODD and CD by DSM)</td>
<td>Psychosocial interventions alone (including parent training and school-based interventions)</td>
<td>Pharmacological treatments, alone or in combination with psychosocial treatments</td>
<td>Outcomes for children and parents*</td>
<td>6 Months/1 Year</td>
</tr>
</tbody>
</table>

* Outcomes for children and parents include change in ADHD symptoms, social functioning, emotional regulation, executive functioning, treatment adherence, behavior problems, global functioning, academics, and parent competence.

**Research Question:** For children less than 6 years of age with disruptive behavior disorder or ADHD, what is the comparative efficacy and effectiveness of specific psychosocial treatments alone compared with pharmacological treatments alone or in combination with psychosocial treatments for patient outcomes?

**After Second Round of Prioritization Develop Study Design Considerations:**

**Randomized controlled trials**

For this research need, randomized trials could be designed to test various components in a 2x2 matrix of psychosocial treatment variants (parent training, school-based intervention, combination, or pharmacological).

- Advantages of study design for producing a valid result
  - Randomized trials of variants of pharmacologic interventions are an ideal consideration as such designs can allow isolation of causal inferences related to the intervention being tested. Multiple-armed trials would allow testing of several hypotheses regarding relative efficacy of singular or combination treatment components. Similarly, such study designs can address any additive benefits or harms associated with addition of medication to a psychosocial intervention, compared with a psychosocial intervention alone. RCTs provide ideal control for selection bias. Community-based study settings and broad eligibility criteria will be critical to assure generalizability to the population of young children with the condition.

- Ability to recruit/availability of data
  - ADHD is a common condition in this age group with uncertainty regarding treatment choice; the study designs here are CERs in which all arms receive some treatment. This will aid recruitment.

- Resource use, size, and duration
  - This design approach would be resource intensive, as differences among the groups may be difficult to detect without a sufficiently large sample size \(N = 840; n = 210\) per treatment arm. However, ADHD is common and currently incurs large health care and social costs, justifying an adequately powered trial. Multisite trials will be needed, increasing management complexity of the studies. Assessment of outcomes such as school achievement will require follow-up of several years.

- Ethical, legal, and social issues
  - Young children are a vulnerable population and careful informed consent will need to occur, but given the uncertainty regarding treatment choice in this population, high-quality trials are needed.
Discussion and Recommendations

Our scan of the literature and active PCOR programs, including our own experience, indicates that identification and prioritization of research gaps from systematic reviews has recently become more common and more developed. Multiple organizations in the US and internationally are using a more structured approach to examining the results of systematic reviews and prioritizing identified research gaps. Although we identified different approaches, there were significant common elements across the programs. They are generally based on systematic review; use the PICOTS and/or GRADE strength of evidence frameworks to describe the gaps; use stakeholders in prioritization; use criteria to guide the stakeholder ratings; and may provide preliminary guidance on the study design that might be helpful in addressing the research gap. PCORI can use these existing methods for research prioritization without waiting for additional methods work, although we will discuss areas where we judge that additional methods work would enhance the process below.

Like all research methods, we perceive advantages as well as the need for additional refinements to the process for identification and prioritization of research gaps arising out of systematic reviews. The main advantages include: the transparency of the process; easily interpretable results; modest resources in terms of funds and time (4-7 months) required for the identification and prioritization of research gaps from a systematic review. The more the process of identifying research gaps overlaps with the systematic review process, the quicker the review will be able to influence the generation of new research. However, if the identification of gaps occurs too early, the systematic review results may only be in an early draft stage and subject to modification in the review process. Experience both with the AHRQ process and with the European initiatives to date has found that stakeholders are willing and able to participate. The approach piloted by Li and colleagues using guidelines to assist in topic identification and prioritization prior to examination of systematic reviews is interesting and worthy of additional
testing, but the multi-year duration of their proposed process may be longer than PCORI desires.

Areas that need to be clarified in the identification and prioritization of gaps are in part due to the relative novelty of incorporating gap identification and prioritization with systematic reviews as part of an overall process of PCOR. The methods are still in evolution. For example, the reliability of prioritization methods as currently practiced has not yet been assessed. Will two different panels of similar stakeholders arrive at similar priorities? Somewhat different stakeholder panel composition might well result in different priorities. A related issue is whether the stakeholder priorities are considered final or are advisory to the commissioning organization, PCORI, which must ultimately be responsible for the funding of the future research. Factors not available to the stakeholders, such as resources available, may affect final priorities.

The size and composition of the stakeholder groups has been variable across PCOR groups and additional information on the optimal size and composition of the groups would be helpful. Some groups have sought broad input through on-line voting, although using this type of public input can be problematic since it may be prone to gaming through ‘letter writing campaigns,’ and may generate opinions substantially outside of the scope of the original systematic review without orientation to the goals and process. The timeline for research prioritization would be longer if substantial time is spent on recruitment and training of large groups. Such tradeoff are inevitable in any public engagement process, The ongoing ‘Community Forum’ project sponsored by AHRQ may be useful in this regard.60

The need for training and orientation of stakeholders to the process is true for many components of PCOR, and we are aware of ongoing work by PCORI in this regard. Unresolved issues include identifying optimal ways to elicit preferences from patients and caregivers in settings where some of the research issues discussed may be technical. Since the duration
and cost of an FRN exercise is modest, it would be possible to ask two different teams to conduct parallel research gap identification and prioritization exercises. Such experiments could also test the utility of varying the number and composition of the stakeholder groups, or different methods of prioritization. A related issue is the role of peer review and public comment once the prioritization exercise has been completed and posted. While comments may be helpful in providing advice on the methods or interpretation of the gaps and prioritization, modification of the priorities would be problematic since the stakeholders would have already made their input. When stakeholders with competing interests are included in the process (for good reasons), a critical requirement to ensuring their engagement is assuring them that they can participate in downstream research activities. At the same time, the process should not confer undue advantage on them. The compromise that AHRQ arrived at is that the stakeholders engage in prioritization but are not involved in the final identification of research needs. Once the document comes out for public comment, everyone gets access to it at the same time.

A modest issue regarding formatting of research gaps is whether to rank order the gaps, or alternatively group the top ranked gaps and consider them all ‘high-priority.’ The interpretation of ordinal ranking may be problematic when the priority given to several of them is quite similar.

We anticipate that there may need to be some flexibility in the prioritization and presentation of research gaps. The purpose of the review and the content area will vary, so should the type of stakeholder and the type of input vary as well? A well-developed systematic review with many effectiveness trials may identify gaps in areas such as the assessment of specific sub-populations or gaps such as the need for very specific head to head trials. A less well developed literature may have much more basic gaps such as need for adequately powered trials of basic efficacy and effectiveness of the test, intervention or policy. The nature and
number of gaps will be quite different in these two situations. A related issue is the specificity of the gaps. Gaps related to methods are, in our experience, not identified in systematic reviews in the same way as content-related gaps. Their presentation is generally not in the form of PICOTS. Methods research may be high priority if its accomplishment is a precondition for additional hypothesis testing work. Given the state of the field, some flexibility in presentation seems appropriate.

An additional area of uncertainty is how prescriptive to make research gaps, including the utility of adding study design considerations to the research gap document. The systematic review team will need to engage individuals with knowledge of primary and secondary research design issues. However, the recommendations of the FRN group should not pre-empt creativity on the part of future researchers, but rather serve as a point of departure for future discussions regarding addressing important health care questions.

Without dissemination to appropriate stakeholders, gap analysis is likely to have relatively little impact. Multiple audiences will be interested in the results of the gap analysis and prioritization, including advocates, patients, researchers and funders. But will funders utilize the information? Early and ongoing discussion with funders, including PCORI, federal funders, and foundations regarding the format and content of research gap analyses will be important. Convening small groups of users of these documents to assist in the refinement of presentation or prioritization results would be helpful. Such work would be a very specific form of dissemination research within PCOR. Communication over time will be critical, since if the research gap and prioritization process is not useful to these stakeholders, modification will need to take place.

In addition to the need for transparency, ideally there should be coordination in identification of gaps across various systematic review groups, funders, and stakeholders. We do not
recommend that all agencies have identical processes, such a policy would be inappropriate since they may have different organizational goals. If different groups utilize differing criteria and especially different terms to describe research gaps and their prioritization, then confusion will occur. We recommend that PCORI communicate with these groups to share ideas and methods.

Table 4 summarizes the methods refinements that could lead to the production of meaningful and timely research priorities.

<table>
<thead>
<tr>
<th>Table 4. Methods refinements for research gap identification and prioritization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Work with funders, advocates and others regarding the optimal format and presentation of future research needs documents.</td>
</tr>
<tr>
<td>2. Evaluate different stakeholder panel size and composition in prioritization.</td>
</tr>
<tr>
<td>3. Evaluate the reliability of stakeholder prioritization through replication studies.</td>
</tr>
<tr>
<td>4. Test different methods of prioritization to assess for transparency, reproducibility and efficiency.</td>
</tr>
<tr>
<td>5. Clarify role of gap identification and prioritization with other methods such as VOI.</td>
</tr>
<tr>
<td>6. Collaborate with other PCOR programs in refining this area and disseminating methods.</td>
</tr>
</tbody>
</table>

Abbreviations: PCOR = Patient-centered outcomes research; VOI – Value of Information

Although we have identified a number of areas for additional methods research, we believe that PCORI could conduct gap identification and prioritization now using existing methods. The most extensive and explicit body of work is that developed by the AHRQ EPC consortium and we think this could easily be adapted to PCORI’s specific needs and used while additional refinements are developed.

We view the identification and prioritization of research gaps in a transparent and engaged manner as a key component of patient centered outcomes research. Given the benefits of systematic reviews in the identification and prioritization of gaps, sustained efforts are needed to increase the understanding of each stage or process involved in the use of systematic reviews for such purposes. Although there are a number of areas in which these methods need additional refinement and elaboration, the current methods are ready for
application to the field and can be used by PCORI. Research gap identification and prioritization has the advantages of relatively low cost, short time frame, and transparent methods. Multiple groups are currently using some version of these methods, and useful methods work either has been conducted or is underway in the US. Analysis of gaps and their prioritization can be used as a basis for selecting a few research gaps as candidates for modeling using value of information (VOI) analysis or discussion at consensus meetings. In this way, identification and prioritization of gaps can be viewed as complementary to these other methods.
References


53. AHRQ Effective Health Care Program Selection Criteria. 2012. Available at: http://www.effectivehealthcare.ahrq.gov/index.cfm/submit-a-suggestion-for-research/how-are-research-topics-chosen/


Appendix A. Literature Search Strategies and Results

PubMed Search Update Date: 12/20/2011. Purpose: Update the for the “Focused Literature Review” from the Robinson et al FRN methods paper titled, “Framework for Determining Research Gaps During Systematic Reviews.” Their search was done in PubMed on April 22, 2010 and we decided to limit the search to 3 months prior, so we used the Entrez date (the date that the citation was added to PubMed) of January 2010 to the present.

Table A - 1. PubMed Query

<table>
<thead>
<tr>
<th>Search</th>
<th>Query</th>
<th>Items found</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>#3</td>
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<td>11598</td>
</tr>
<tr>
<td>#4</td>
<td>Search evidence-based medicine[MeSH Terms]</td>
<td>43954</td>
</tr>
<tr>
<td>#5</td>
<td>Search systematic reviews[tiab]</td>
<td>6501</td>
</tr>
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<tr>
<td>#17</td>
<td>Search #16 AND (2010/01:2011/12[edat])</td>
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</tr>
</tbody>
</table>

We screened 348 titles and abstracts from this update literature search. Using the reasons for exclusion, listed it table A-2, we excluded 301 titles and abstracts.

Table A - 2. Reasons for Exclusion

<table>
<thead>
<tr>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not English Language</td>
</tr>
<tr>
<td>2. No objective to identify research gaps/needs</td>
</tr>
<tr>
<td>3. Not a systematic review</td>
</tr>
<tr>
<td>4. Did not include description of methods or process for identifying research gaps/needs</td>
</tr>
<tr>
<td>5. Were otherwise eligible, but used guidelines as basis for identification of research gaps/needs.</td>
</tr>
</tbody>
</table>

Out of the 47 articles we included for full text review, we excluded 28 articles, leaving 19 eligible articles. Six of these were methods papers or AHRQ Future Research Needs Pilot Project Papers. We ultimately abstracted information from 13 peer-reviewed publications. Two additional papers, representing one study, were added after initial submission of the manuscript.
**Cochrane Library search** Date: 12/21/2011. Description: This is a translation of the 12/20 PubMed search shown previously. It is limited to New, Conclusions Changed, or Major Change in record status, as well as limited to products published between 2010 and 2011. Of the 25, 20 are Cochrane Reviews, 3 were trials, and 2 were methods studies.

**Table A - 3. Cochrane Library Query**

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<td>MeSH descriptor <strong>Review Literature as Topic</strong> explode all trees</td>
<td>85</td>
</tr>
<tr>
<td>#2</td>
<td>MeSH descriptor <strong>Meta-Analysis as Topic</strong> explode all trees</td>
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<tr>
<td>#3</td>
<td>MeSH descriptor <strong>Evidence-Based Medicine</strong> explode all trees</td>
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<tr>
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<tr>
<td>#17</td>
<td>(#15) with New, Conclusions changed or Major change in Record Status</td>
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</tr>
<tr>
<td>#18</td>
<td>(#17), from 2010 to 2011</td>
<td>25</td>
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</tbody>
</table>
After reviewing abstracts from the 25 Cochrane Library search results, we identified 19 for full text review, excluding methods papers. We reviewed these for information about methods of identifying and prioritizing research gaps. None of these 19 provided sufficient detail about identifying or prioritizing research gaps to warrant inclusion.

**Drug Effectiveness Review Project (DERP)** Date: 12/22/2011. We searched the current list of completed DERP reports for new reports published between January 2010 and December 2011. We found 4 new reports completed during this time period. We reviewed these for information about methods of identifying and prioritizing research gaps. None of these provided sufficient detail about identifying or prioritizing research gaps.

**National Institutes of Health (NIH) Consensus Conference Statements** Date: 12/22/2011. We looked for NIH Consensus Conference statements online and their associated AHRQ evidence reports. We found 5 consensus statements published in 2010. We reviewed these for information about methods of identifying and prioritizing research gaps. None of these provided sufficient detail about identifying or prioritizing research gaps.
Appendix B. Agency for Healthcare Research and Quality Future Research Needs Papers as of February 2012

AHRQ Future Research Needs Reports


AHRQ Future Research Needs Methods Papers
These and forthcoming future research needs methods papers are available from:


