

Screening for Abdominal Aortic Aneurysm: protocol for updating the USPSTF systematic review and meta-analysis

This systematic review
protocol was registered with the International Prospective
Register of Systematic Reviews (PROSPERO)
(Registration #CRD42015019047)

Date: March 31st, 2015

Suggested citation:

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PR and DS are the guarantors. DFL, RW and MUA drafted the protocol. DFL, RW and MUA contributed to the development of the selection criteria, the risk of bias assessment strategy and data extraction criteria. MUA provided statistical expertise. MR peer reviewed the search strategy developed by the United States Preventive Services Task Force. All authors read, provided feedback and approved the final protocol.

Acknowledgements:

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Funding:

Funding for this protocol and systematic review is provided by the Public Health Agency of Canada. This funding will support the collection of the data, data management, analyses and writing of the protocol and the upcoming systematic review technical report and manuscript.

The funder will have no input on the interpretation or publication of the study results.

Section I. Purpose and Background

The Canadian Society for Vascular Surgery (CSVS) reports that in Canada, abdominal aortic aneurysm (AAA) is an important cause of death.¹ It is estimated that every year 20,000 Canadians are diagnosed with AAA, occurring most commonly in men over 65 years.² As the condition is often asymptomatic, ruptured AAA (with an 80% mortality rate) is often the first sign.² Without treatment, approximately 10% of the Canadians diagnosed each year in Canada have severe AAA that may become fatal.²

The aim of this systematic review is to examine the evidence on benefits and harms of AAA screening. The findings of this review will be used by the Canadian Task Force on Preventive Health Care (CTFPHC) to update its previous recommendation on AAA screening.

Section II. Previous CTFPHC Recommendations and Other Guidelines

The last CTFPHC recommendation on screening for AAA was made in 1991.³ The recommendation at that time was that screening through physical examination or ultrasonography for AAA neither be included in nor excluded from period health examinations due to “poor evidence”.³

In 2014 the USPSTF recommended one-time ultrasound screening for men aged 65-75 who have ever smoked.⁴ This recommendation is in keeping with a previous guideline (2005) from the American College of Cardiology/American Heart Association (ACC/AHA), that also recommended male relatives 60 years of age or older (siblings or children) of men and women with diagnosed AAA should undergo AAA screening.⁵

Section III. Scan of Changes in Clinical Practice since Previous Recommendation

In Canada, national and/or provincial screening programs do not currently exist, though their development has been recommended by the CSVS.¹

After an assessment of the randomized controlled trial (RCT) evidence from the UK as well as international evidence by the UK National Screening Committee⁶, the National Health Service (NHS) began implementation of an AAA Screening Programme in 2009 in the United Kingdom.⁷ By 2013, the screening programme had been implemented throughout England. At the age of 65, all men are invited for ultrasound screening; after the age of 65 those who have not been screened can self-refer.⁷

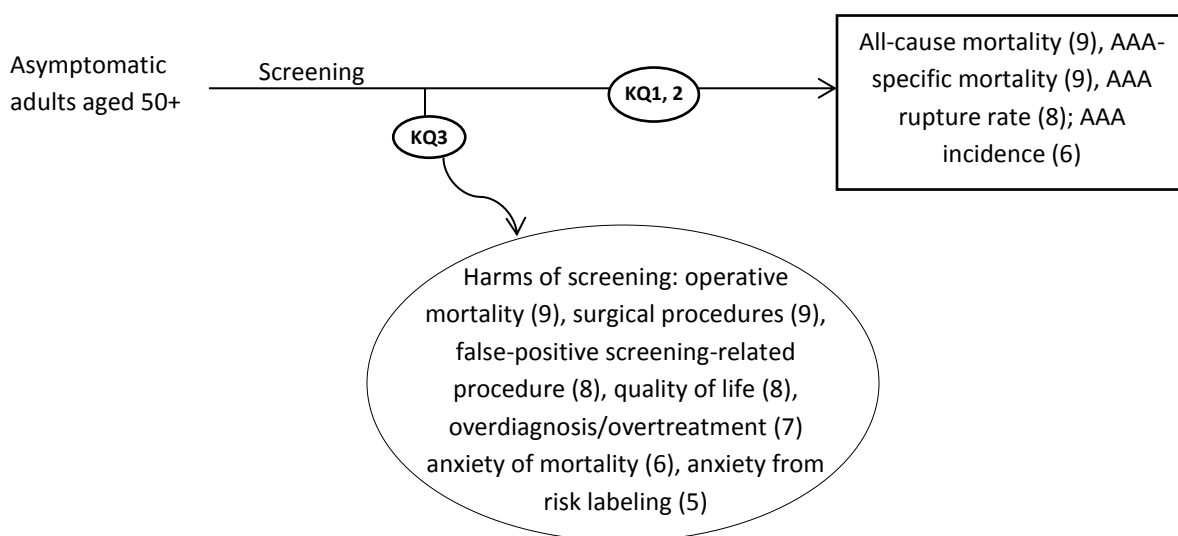
Section IV. Methods

The Evidence Review and Synthesis Centre (ERSC) at McMaster University will conduct a systematic literature search to address the effectiveness of screening for AAA using ultrasound. The United States Preventive Services Task Force (USPSTF) review⁴ was ranked by the ERSC as a high quality review with the AMSTAR⁸ assessment of 10/11 (Appendix A). It was unclear whether or not the USPSTF included grey literature search. As per the ‘search strategy’ section below this update will include a search of grey

literature. To conduct our review we will update the USPSTF’s search and adapt the USPSTF’s outcome list and inclusion/exclusion criteria. Specific methods are outlined below. This systematic review protocol was prepared in accordance with the PRISMA-P guidelines,⁹ and was registered with the International Prospective Register of Systematic Reviews (PROSPERO #CRD42015019047)

Analytic Framework

The analytic framework, presented below, includes screening of asymptomatic adults. The numbers in brackets indicate CTFPHC’s GRADE rankings for each outcome (7-9=critical; 4-6=important; 1-3 not important and therefore not included here).¹⁰



Key Questions

KQ1. What is the effect of one-time AAA screening using ultrasound on health outcomes in asymptomatic adults aged 50 years and older?

- a. Does the effect of one-time screening vary between men and women, smokers and nonsmokers, older (≥ 65 years) and younger (< 65 years) adults, adults with and without a family history of AAA, and adults of different races/ethnicities?
- b. Does the effect of one-time screening vary between different screening approaches (i.e. high risk vs low risk status)?

KQ2. What is the effect of rescreening for AAA using ultrasound on health outcomes including AAA incidence in previously screened asymptomatic adults aged 50 years and older?

- a. Does the effect of rescreening vary between men and women, smokers and nonsmokers, older (≥ 65 years) and younger (< 65 years) adults, adults with and without a family history of AAA, and adults of different races/ethnicities?
- b. Does the effect of rescreening vary between different time intervals?

KQ3. What are the harms associated with one-time and repeated AAA screening using ultrasound?

Contextual Questions

CQ1. What are patients' preferences and values regarding AAA screening?

CQ2. What is the cost-effectiveness of screening for AAA?

CQ3. How well does ultrasound administered in a general practice setting or which can be administered in a general practice setting compare to standard ultrasound in a clinic or hospital setting for the detection of AAA?

Review Approach

Literature Search

The literature search will update the search done for the 2014 USPSTF review on screening of AAA using the same search strategy. The USPSTF also searched for treatment; however, as our review does not include treatment we will only be updating their screening searches. Our librarian peer reviewed the search done by the USPSTF using the Peer Review Electronic Search Strategies (PRESS) methodology checklist¹¹ (Appendix B). We will search Medline, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL). We will also search PubMed for any relevant publisher-supplied non-indexed citations. The searches will cover the time period since the last update of the USPSTF search which was January 2013 and we will be searching for both English and French studies (Appendix C). We will also handsearch reference lists of on-topic systematic reviews in order to ensure all relevant articles have been captured by our electronic database search. Study authors may be contacted for missing or questionable data. We will be conducting a targeted search for evidence on over-treatment in Medline, EMBASE, Cochrane Central and Cochrane Database of Systematic Reviews from 2005-April 2015 (Appendix D).

As well, a separate search will be conducted for the contextual questions in MEDLINE and Embase for the time period of 2005-March 2015 (see Appendix E). A focused web-based grey literature search will be conducted for Canadian specific information which may help inform the contextual questions. A focused web-based grey literature search will also be undertaken using Google advanced search (limited to Canada) and the Canadian section of CADTH's Grey Matters¹² search to look for recent on-topic sources that provide Canadian specific information to help inform the contextual questions.

Citations will be managed through the web-based systematic review platform DistillerSR.¹³

Study Selection

Selecting studies for possible inclusion will be done independently by two reviewers. At the title and abstract level, any citation that is selected for inclusion by either reviewer will move to full text review. At that level any disagreement will be discussed between reviewers and a third party will be involved to help reach consensus, as necessary.

The same process will be followed for contextual questions.

Other Sources of Potential Evidence

Studies included in the USPSTF review will be included in our database and pass through the screening process with citations identified in our search.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria for this review are detailed in Table 1. Outcomes for screening focus on all-cause mortality, AAA-related mortality, AAA rupture rate and AAA incidence. Screening is limited to screening using ultrasound in a primary care setting.

Table 1: Inclusion and exclusion criteria

	Inclusion	Exclusion
Population	Asymptomatic adults aged 50 years and older	Adults experiencing symptoms related to AAA
Interventions	General or targeted screening with ultrasound	Physical examination, CT, MRI
Comparators	KQ1: no screening, comparison of different screening approaches (i.e. high risk vs. low risk groups) KQ2: no screening or one-time AAA screening using ultrasound, different repeated screening approaches, or no comparison/nonexposure KQ3: no comparison group required	
Outcomes	<i>Inclusion:</i> KQ1 and KQ2: All-cause mortality (9), AAA-related mortality (9), AAA rupture rate (8), AAA incidence (KQ2 only) (6)	

	KQ3: anxiety from risk labeling (5), anxiety of mortality (6), false-positive screening-related procedure (8), 30 day post-operative mortality (9), surgical procedures (9), quality of life (8), overdiagnosis/overtreatment (7)	
Study designs	KQ1 and 2: RCTs, CCTs, large cohort studies (n>1000, KQ2 only) KQ3: RCTs, cohort studies, case-control studies	KQ1 and 2: case-control and cross-sectional studies; editorial; letter; nonsystematic review; opinion; cost studies KQ3: editorial; letter; nonsystematic review; opinion, cost studies
Settings	Primary care or other settings with primary care-comparable populations Countries applicable to Canada (all countries listed as “very high” on the Human Development index)	
Language	English and French (for new search only)	

Data Extraction and Quality Assessments

Full data abstraction, including characteristics of included studies and risk of bias (RoB) (assessed using the Cochrane risk of bias framework), will be completed by one reviewer and verified by a second reviewer. Disagreements will be resolved through consensus between the two reviewers. In the case of disagreements that cannot be resolved, a third review team member will be asked to arbitrate.

For key questions, data extraction will be conducted using standardized forms by one person and independently verified by a second review member.

For outcomes ranked as critical, the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system¹⁴ will be used to assess the strength and the quality of evidence using GRADEPro software.¹⁵ The quality of outcome-based bodies of evidence will be assessed for risk of bias due to limitations in design, indirectness, inconsistency of findings, imprecision, and reporting bias (such as publication bias). Meta-analyses will be conducted where appropriate.

For contextual questions, data extraction will be conducted by one reviewer. There will be no assessment of the methodological quality of the studies used to answer the contextual questions.

Analysis Plan

The study designs will not be combined, i.e. RCTs and observational data will be meta-analyzed separately. The methodological, clinical and statistical heterogeneity will be assessed in GRADE domains (directness – PICO across studies, RoB and consistency). We will do a sensitivity analyses based on ROB (high, unclear and low) for primary outcomes of interest and number need to treat (NNT) will be calculated based on Cochrane’s recommended method.

KQ1. Benefits of one-time AAA screening (ultrasound)

We will present benefits of one-time AAA screening (ultrasound vs control group) for the outcomes of AAA-related mortality, AAA rupture and all-cause mortality. Extracted data will be meta-analyzed when appropriate. In order to complete GRADE assessment¹⁴ for critical outcomes of benefit, all studies will be assessed for risk of bias using the Cochrane RoB tool and the outcome-based bodies of evidence will be assessed for overall methodological limitations, indirectness, imprecision, inconsistency and reporting bias. For the important outcomes of benefit we will conduct risk of bias assessments Cochrane RoB for RCTs; no GRADE tables will be produced.

In addition, for critical outcomes information will be extracted on potential factors such as age (<65 years, ≥ 65 years), gender, smoking status, family history of AAA, race/ethnicities, length of follow-up and risk status; and subgroup analyses will be conducted where possible to evaluate the potential differences in outcomes across these subgroups.

KQ2. Benefits of rescreening for AAA

We will present benefits of repeat AAA screening for the outcomes of incidence of AAA, AAA-related mortality, AAA rupture, and all-cause mortality. Extracted data will be meta-analyzed when appropriate. In order to complete GRADE assessment for critical outcomes of benefit, all studies will be assessed for risk of bias using the Cochrane RoB tool, and then the outcome-based bodies of evidence will be assessed for overall methodological limitations, indirectness, imprecision, inconsistency and reporting bias. For the important outcomes of benefit we will conduct risk of bias (Cochrane RoB or Newcastle-Ottawa Scale); no GRADE tables will be produced.

In addition, for critical outcomes information will be extracted on potential factors such as age (<65 years, ≥ 65 years), gender, smoking status, family history of AAA, race/ethnicities, length of follow-up, screening interval and risk status, and subgroup analyses will be conducted where possible to evaluate the potential differences in outcomes across these subgroups.

KQ3. Harms of one-time and repeat screening for AAA (ultrasound)

For harms outcomes of one-time and repeat AAA screening such as increase in AAA-related procedures and 30-day post-operative mortality, the data will be extracted and meta-analyzed when appropriate. GRADE assessment including risk of bias, indirectness, imprecision, inconsistency and reporting bias will be performed for critical outcomes of harm, whereas for the important outcomes of harm we will conduct risk of bias (using Cochrane RoB tool for RCTs or the Newcastle Ottawa Scale for controlled observational studies); no GRADE tables will be produced. For uncontrolled observational studies since there is no standard tool to assess RoB these will be rated as “very low” quality for the RoB domain.

Data Analysis

For the binary outcomes of benefit of one-time AAA screening (i.e. AAA-related mortality, AAA rupture and all-cause mortality) and binary outcomes of harms (i.e. increase in AAA-related procedures, 30-day post-operative mortality) we will utilize the number of events, proportion or percentage data to generate the

summary measures of effect in the form of risk ratio (RR) using DerSimonian and Laird random effects models with inverse variance method.¹⁶ The estimates of absolute risk reduction (ARR), absolute risk increase (ARI) and number needed to treat (NNT) will be added. The NNTs will be calculated using the absolute numbers presented in the GRADE tables estimated using the control group event rate and risk ratio with the 95% confidence interval obtained from the meta-analysis.¹⁷

We will also analyze the benefits of repeat AAA screening for the outcomes of incidence of AAA, AAA-related mortality, AAA rupture, and all-cause mortality. As the data will primarily come from observational studies, the rates/proportion across studies will be pooled using the DerSimonian and Laird random effects models with inverse variance method to generate the summary measures of effect.¹⁶ The binomial confidence intervals for each proportion/rate will be calculated using “Wilson score interval” method.¹⁸

For continuous outcomes of harms such as quality of life, we will utilize immediate post-treatment data (means, standard deviations). The DerSimonian and Laird random effects models¹⁶ with inverse variance method will be utilized to generate the summary measures of effect in the form of mean difference (MD) or mean change score (MCS).

For outcomes of benefits of one-time and repeat AAA screening, further sub-group and sensitivity analyses based on potential factors such as age (<65 years, ≥ 65 years), gender, smoking status, family history of AAA), race/ethnicities, length of follow-up, risk status and study risk of bias will be conducted where possible to evaluate statistical stability and effect on statistical heterogeneity. The Cochran’s Q ($\alpha=0.05$) will be employed to detect statistical heterogeneity and I^2 statistic to quantify the magnitude of statistical heterogeneity between studies where $I^2 >50\%$ represents moderate and $I^2 >75\%$ represents substantial heterogeneity across studies.¹⁹

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Appendix A: AMSTAR Rating

<p>1. Was an ‘a priori’ design provided? The research question and inclusion criteria should be established before the conduct of the review.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.</p>	<p><input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>
<p>7. Was the scientific quality of the included studies assessed and documented? ‘A priori’ methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Can’t answer <input type="checkbox"/> Not applicable</p>

8. Was the scientific quality of the included studies used appropriately in formulating conclusions?

The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.

- Yes
- No
- Can't answer
- Not applicable

9. Were the methods used to combine the findings of studies appropriate?

For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).

- Yes
- No
- Can't answer
- Not applicable

10. Was the likelihood of publication bias assessed?

An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).

- Yes
- No
- Can't answer
- Not applicable

11. Was the conflict of interest stated?

Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.

- Yes
- No
- Can't answer
- Not applicable

Appendix C: Completed PRESS Checklist

Peer Review of Electronic Search Strategies (PRESS)

The following document is a peer review of the search strategy used by the USPSTF in their review Primary Care Screening for Abdominal Aortic Aneurysm: A Systematic Evidence Review for the U.S. Preventive Services Task Force.⁴ The assessment of this strategy is to evaluate whether or not it is suitable for the purposes of our update. As such, the detailed search strategy on the form is the relevant part of the strategy used by the USPSTF in their review while the key questions are those from our update. The evaluation on page 3 of the form is what changes/adaptations, if any, are necessary for the search to find the literature needed/required address our questions.

PRESS EBC Search Submission

Searcher's Name: USPSTF

E-mail:

Date submitted:

Date needed by:

Note to peer reviewers – please enter your information in the Peer Review Assessment area

Remember: this peer review only pertains to your MEDLINE search strategy.

Search question (Describe the purpose of the search)

KQ1. What is the effect of one-time AAA screening using ultrasound on health outcomes in asymptomatic adults aged 50 years and older?

- a. Does the effect of one-time screening vary between men and women, smokers and nonsmokers, older (≥ 65 years) and younger (< 65 years) adults, adults with and without a family history of AAA, and adults of different races/ethnicities.
- b. Does the effect of one-time screening vary between different screening approaches (i.e. high risk vs low risk status)?

KQ2. What is the effect of rescreening for AAA using ultrasound on health outcomes including AAA incidence in previously screened asymptomatic adults aged 50 years and older?

- a. Does the effect of rescreening vary between men and women, smokers and nonsmokers, older (≥ 65 years) and younger (< 65 years) adults, adults with and without a family history of AAA, and adults of different races/ethnicities.
- b. Does the effect of rescreening vary between different time intervals?

KQ3. What are the harms associated with one-time and repeated AAA screening using ultrasound?

PICO format (Outline the PICO for your question, i.e., the Patient, Intervention, Comparison and Outcome)

P: asymptomatic adults aged 50 years and older

I: General or targeted screening with ultrasound

C: KQ1: no screening, comparison of difference screening approaches (i.e. high risk vs low risk groups)

KQ2: no screening or one-time AAA screening using ultrasound, different repeated screening approaches, or no comparison/nonexposure

KQ3: no comparison group required

O: KQ1 and KQ2: All-cause mortality (9), AAA-related mortality (9), AAA rupture rate (8), AAA incidence (KQ2 only) (6)

KQ3: anxiety from risk labeling (5), anxiety of mortality (6), false-positive screening-related procedure (8), 30 day post-operative mortality (9), surgical procedure (9)s, and quality of life (8)

Inclusion criteria (List criteria such as age groups, study designs, to be included)

Exclusion criteria (List criteria such as study designs, to be excluded)

-case reports, comments, editorials

Was a search filter applied? (Remember this pertains only to the MEDLINE strategy)

Yes No

If yes, which one?

Cochrane hedge:

PUBMED clinical query:

Haynes/McKibbin et al:

SIGN (Scottish):

CRD (UK):

Robinson and Dickerson:

Other:

MEDLINE search interface used

EBSCO OVID PubMed Other _____

Has the search strategy been adapted (i.e., subject heading and terms reviewed) for other databases? Please check all that apply.

Ageline	<input type="checkbox"/>	PreMEDLINE	<input type="checkbox"/>
AMED	<input type="checkbox"/>	PsycINFO	<input type="checkbox"/>
C2-SPCTRE	<input type="checkbox"/>	Other PubMed (limited search)	<input checked="" type="checkbox"/>
CINAHL	<input type="checkbox"/>	Other	<input type="checkbox"/>
Cochrane Database of Systematic Reviews (CDSR ; Cochrane Reviews)	<input type="checkbox"/>		
Cochrane Central Register of Controlled Trials (CENTRAL; Clinical Trials)	<input checked="" type="checkbox"/>		
Cochrane Methodology Register (CMR; Methods Studies)	<input type="checkbox"/>		
Cochrane Library (all databases)	<input type="checkbox"/>		
Database of Abstracts of Reviews of Effects (DARE; Other Reviews)	<input type="checkbox"/>		
Embase	<input checked="" type="checkbox"/>		
ERIC	<input type="checkbox"/>		
ICTRP (International Clinical Trials Registry Platform)	<input type="checkbox"/>		
LILACS (Latin American and Caribbean Health Sciences Literature)	<input type="checkbox"/>		
MEDLINE	<input type="checkbox"/>		

Other notes or comments that you feel would be useful for the peer reviewer?

The PubMed search is for any relevant publisher-supplied non-indexed citations

Please paste your MEDLINE strategy here:

1. Aortic Aneurysm, Abdominal/
2. abdominal aortic aneurysm*.ti,ab.
3. 1 or 2
4. mass screening/
5. screen*.ti,ab.
6. 4 or 5
7. 3 and 6
8. limit 7 to (english or french)
9. limit 8 to ed=20130131-current
10. limit 9 to (case reports or comment or editorial)
11. 9 not 10

**Peer Review Assessment
[For peer reviewers only]**

Peer reviewer's name: Maureen Rice—(MERSC librarian)

E-mail:

Date completed: March 10, 2015

Please select the one most appropriate answer for each element

	Adequate	Adequate with revisions*	Needs revision*
1. Translation of the research question	x		
2. Boolean and proximity operators	x		
3. Subject headings	x		
4. Natural language / free-text	x		
5. Spelling, syntax and line numbers	x		
6. Limits and filters		x	
7. Search strategy adaptations	x		

* Provide an explanation or example for "Adequate with revisions" and "needs revision":

We will be including both French and English citations

Other Comments (please limit to 3-5 sentences):

Appendix C: Screening Search Strategy

Medline—Screening

January 6, 2015

1. Aortic Aneurysm, Abdominal/
2. abdominal aortic aneurysm*.ti,ab.
3. 1 or 2
4. mass screening/
5. screen*.ti,ab.
6. 4 or 5
7. 3 and 6
8. limit 7 to (english or french)
9. limit 8 to ed=20130131-current
10. limit 9 to (case reports or comment or editorial)
11. 9 not 10

Appendix D: Overdiagnosis Search Strategy

Medline-OVID

1. Aortic Aneurysm, Abdominal/
2. abdominal aortic aneurysm*.ti,ab.
3. 1 or 2
4. overdiagnos*.mp.
5. over diagnos*.mp.
6. False Positive Reactions/
7. false positive.mp.
8. ((over or unnecessary or excessive) adj (diagnosis or testing or procedures)).tw.
9. diagnostic error/
10. or/4-9
11. 3 and 10
12. animals/ not (animals/ and humans/)
13. 11 not 12
14. limit 13 to (english or french)
15. limit 14 to yr="2004 -Current"

Appendix E: Contextual Questions Search Strategies

Patient Preferences

Medline-OVID

1. "patient acceptance of health care"/
2. patient compliance/
3. exp patient participation/
4. patient satisfaction/
5. patient preference/

6. "treatment refusal"/
7. consumer satisfaction/
8. ((parent? or guardian*) adj3 (acceptance or preference? or satisfaction or experience?)).tw.
9. (consumer? adj3 (acceptance or preference? or satisfaction or experience?)).tw.
10. (patient? adj3 (acceptance or preference? or satisfaction or experience?)).tw.
11. willingness to pay.tw.
12. ((conjoint or contingent) adj3 (valuation or analysis)).tw.
13. Choice Behavior/
14. standard gamble.ti.
15. standard gamble.tw.
16. time trade off.tw.
17. choice model?ing.mp.
18. survey preferences.mp.
19. preference?.tw.
20. or/1-19
21. Aortic Aneurysm, Abdominal/
22. abdominal aortic aneurysm*.ti,ab.
23. 21 or 22
24. 20 and 23
25. limit 24 to (english)
26. limit 25 to yr="2004 - 2015"

Cost of Screening

Medline-OVID

1. Aortic Aneurysm, Abdominal/
2. abdominal aortic aneurysm*.ti,ab.
3. 1 or 2
4. mass screening/
5. screen*.ti,ab.
6. 4 or 5
7. 3 and 6
8. limit 7 to (english)
9. limit 8 to "costs (maximizes sensitivity)"
- 10.. limit 14 to yr="2004 - 2015"

EMBASE-OVID

1. abdominal aorta aneurysm/
2. abdominal aortic aneurysm*.ti,ab.
3. 1 or 2
4. screening/ or mass screening/ or screening test/
5. screen*.ti,ab.
6. 4 or 5
7. 3 and 6
8. limit 7 to (english or french)
9. limit 8 to em=201304-201444
10. limit 8 to (book or book series or conference paper or editorial or letter or note)
11. 8 not 10
12. limit 11 to yr=2004-Curent
13. limit 8 to "economics (best balance of sensitivity and specificity)"

Hand Held Ultra Sound

Medline-OVID

1. Aortic Aneurysm, Abdominal/us [Ultrasonography]
2. "Point-of-Care Systems"/
3. ((portable or hand held or office based or point of care) adj3 ultrasound).tw.
4. 2 or 3
5. 1 and 4
6. limit 5 to yr="2011 -Current"
7. limit 6 to (english)
8. limit 7 to (comment or editorial or letter or news)
9. 7 not 8