

CADTH Reference List

Abdominal Aortic Aneurysm Screening for Asymptomatic Adults

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Key Messages

- Four systematic reviews, 1 randomized controlled trial, and 3 non-randomized studies were identified regarding the clinical utility of abdominal aortic aneurysm screening versus no screening in asymptomatic adults aged 50 years and older.
- No evidence was identified regarding the clinical utility of abdominal aortic aneurysm screening with different screening methods, approaches, or intervals in asymptomatic adults aged 50 years and older.

Research Questions

1. What is the clinical utility of abdominal aortic aneurysm screening versus no screening in asymptomatic adults aged 50 years and older?
2. What is the clinical utility of abdominal aortic aneurysm screening with different screening methods, approaches, or intervals in asymptomatic adults aged 50 years and older?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Library, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were abdominal aortic aneurysm and screening. Search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses or network meta-analyses, randomized controlled trials, controlled clinical trials, or non-randomized studies. Comments, newspaper articles, editorials, and letters were excluded. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2015 and March 30, 2022.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in [Table 1](#). Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications.

Results

Four systematic reviews,¹⁻⁴ 1 randomized controlled trial,⁵ and 3 non-randomized studies⁶⁻⁸ were identified regarding the clinical utility of abdominal aortic aneurysm (AAA) screening

Table 1: Selection Criteria

| Criteria | Description |
|---------------|---|
| Population | Asymptomatic adults aged 50 years and older |
| Intervention | Abdominal aortic aneurysm screening using ultrasound (conventional or tomographic ultrasound), CT, or MRI with any approach (e.g., one-time screening) |
| Comparator | Q1: No screening for abdominal aortic aneurysm Q2: Abdominal aortic aneurysm screening using ultrasound (conventional or tomographic ultrasound), CT, or MRI with alternative screening methods, approaches, or intervals (e.g., one-time screening, screen and rescreen, repeated screening with various intervals of time between tests) |
| Outcomes | Clinical utility (e.g., incidence of abdominal aortic aneurysm, mortality [abdominal aortic aneurysm-related, all-cause], abdominal aortic aneurysm rupture rates, quality of life, safety, harms [e.g., rates of adverse events]) |
| Study designs | Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies |

versus no screening in asymptomatic adults aged 50 years and older. No evidence was identified regarding the clinical utility of AAA screening with different screening methods, approaches, or intervals in asymptomatic adults aged 50 years and older. No health technology assessments were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in [Appendix 1](#).

Overall Summary of Findings

Four systematic reviews,¹⁻⁴ 1 randomized controlled trial,⁵ and 3 non-randomized studies⁶⁻⁸ were identified regarding the clinical utility of AAA screening versus no screening in asymptomatic adults aged 50 years and older. Authors of 1 systematic review,³ the randomized controlled trial,⁵ and 2 non-randomized studies^{7,8} specified men as their population of interest. Further, 1 systematic review found no benefits of 1-time screening for AAA in women.⁴

All systematic reviews¹⁻⁴ and the randomized controlled trial⁵ concluded that AAA screening decreases AAA-related mortality in the population of interest. Authors of a retrospective cohort observed a similar but not statistically significant effect on men in Sweden.⁸ A systematic review also found that screening decreased all-cause mortality.² However, results of a systematic review by Ali et al. found the decrease in all-cause mortality to be significant in the long-term, but not in the short-term.³ Further, another systematic review found screening to have little-to-no effect,¹ and a non-randomized study observed that screening was associated with higher all-cause mortality.⁶

Lower rupture rates were found in screened adults compared to those not screened in 3 systematic reviews,^{1,3,4} the randomized controlled trial,⁵ and 1 non-randomized study.⁷ Screening was also associated with a higher rate or increased risk of elective surgeries in the randomized controlled trial,⁵ 1 non-randomized study,⁸ and in 2 systematic reviews.^{1,3} One non-randomized study observed an increase in AAA diagnosis in men screened when

compared to those not screened.⁸ Details on the clinical utility studies relevant to research question 1 are presented in [Table 2](#).

No relevant literature was found regarding the clinical utility of AAA screening with different methods, approaches, or intervals for asymptomatic adults aged 50 and older; therefore, no summary can be provided.

Table 2: Summary of Included Studies for Research Question 1

| Study citation | Study design, population | Intervention and comparator(s) | Relevant outcome(s) | Author's conclusions |
|---|--|--|---|--|
| Systematic reviews | | | | |
| Guirguis-Black et al. (2019) ¹ | RCTs and large cohort studies included in literature search Population: Primary care populations, including subpopulations of older adults, women, smokers, racial and ethnic groups, and those with a family history of AAA | Intervention: AAA screening Comparator: no AAA screening | AAA-related mortality, all-cause related mortality, AAA rupture rate, elective procedures, and emergency procedures | One-time AAA screening, decreased AAA-related mortality and rupture rates but had little-to-no effect in all-cause mortality for men aged ≥ 65 . Higher rates of elective surgeries were associated with screening. |
| Ying et al. (2019) ² | 5 studies [includes economic evaluation(s) and RCT(s)] Population: Adults 64 to 83 years old | Intervention: AAA screening Comparator: No AAA screening | All-cause mortality, AAA-related mortality, emergency AAA repairs | AAA screening demonstrated a significant reduction in all-cause mortality, emergent AAA repairs, and AAA-related mortality. |
| Ali et al. (2018) ³ | SR with 4 RCTs Population: Asymptomatic men aged ≥ 65 | Intervention: One-time AAA screening with ultrasound Comparator: No AAA screening | Short (3 to 5 years) and long-term (13 to 15 years) effect on AAA-related mortality, AAA rupture rates, AAA-related procedures, and 30-day post-operative mortality | One-time screening for AAA using ultrasound reduced long-term AAA-related mortality and AAA rupture rate in asymptomatic men aged ≥ 65 . |
| Ali et al. (2016) ⁴ | SR with 4 RCTs Population: Asymptomatic adults aged ≥ 65 | Intervention: One-time AAA screening with ultrasound Comparator: No AAA screening | All-cause mortality, AAA-related procedures, and 30-day post-operative mortality at 13 to 15 year follow-up | Screening with ultrasound reduced AAA-related mortality and ruptures in asymptomatic men aged ≥ 65 . No benefit was observed in screening women. |

| Study citation | Study design, population | Intervention and comparator(s) | Relevant outcome(s) | Author's conclusions |
|--------------------------------------|--|---|---|---|
| Randomized controlled trials | | | | |
| McCaul et al. (2016) ⁵ | Population: Adult men 64 to 83 years old in Western Australia N = 49,801 | Intervention: AAA screening with ultrasound Comparator: No AAA screening | AAA ruptures, AAA-related mortality, and AAA-related procedures | Screening was significantly associated with more elective surgeries and fewer ruptured AAAs compared to controls. Lower AAA-related mortality rate was observed in men aged 65 to 74 years old compared to the control group. |
| Non-randomized studies | | | | |
| Leach et al. (2022) ⁶ | Study design: Retrospective cohort Population: Subgroup analysis includes US veterans aged 65 years N = 1.6 M (unclear how many are in the subgroup analysis) | Intervention: Imaging-based AAA screening Comparator: No AAA screening | All-cause mortality from 2005 to 2015 | Screening was associated with higher all-cause mortality. |
| Hultgren et al. (2020) ⁷ | Study Design: Prospective cohort Population: 65-year-old men in Stockholm N = 909 | Intervention: AAA screening Comparator: No AAA screening | Long-term effect on AAA rupture rate | Higher rupture rate was observed in the comparator group. |
| Johansson et al. (2018) ⁸ | Study design: Retrospective cohort Population: men aged 65 years in Sweden N = NR | Intervention: AAA Screening Comparator: No AAA screening | Incidence of AAA, AAA-related mortality, and AAA-related surgeries after 6 years with screening | AAA screening in Sweden did not substantially contribute to large reductions in AAA-related mortality but was associated with increased AAA diagnosis and elective surgery. |

AAA = abdominal aortic aneurysm; M = million; NA = not applicable; NR = not reported; NRS = non-randomized study; RCT = randomized controlled trial; SR = systematic review.

References

Health Technology Assessments

No literature identified.

Systematic Reviews

1. Guirguis-Blake JM, Beil TL, Senger CA, Coppola EL. Primary care screening for abdominal aortic aneurysm: a systematic review for the U.S. Preventive Services Task Force. (*Evidence synthesis no. 184*). Rockville (MD): Agency for Healthcare Research and Quality; 12 2019. [PubMed](#)
2. Ying AJ, Affan ET. Abdominal aortic aneurysm screening: a systematic review and meta-analysis of efficacy and cost. *Ann Vasc Surg.* Jan 2019; 54: 298-303.e3. [PubMed](#)
3. Ali MU, Fitzpatrick-Lewis D, Kenny M, Miller J, Raina P, Sherifali D. A systematic review of short-term vs long-term effectiveness of one-time abdominal aortic aneurysm screening in men with ultrasound. *J Vasc Surg.* 08 2018; 68(2): 612-623. [PubMed](#)
4. Ali MU, Fitzpatrick-Lewis D, Miller J, et al. Screening for abdominal aortic aneurysm in asymptomatic adults. *J Vasc Surg.* Dec 2016; 64(6): 1855-1868. [PubMed](#)

Randomized Controlled Trials

5. McCaul KA, Lawrence-Brown M, Dickinson JA, Norman PE. Long-term outcomes of the Western Australian trial of screening for abdominal aortic aneurysms: secondary analysis of a randomized clinical trial. *JAMA Intern Med.* Dec 01 2016; 176(12): 1761-1767. [PubMed](#)

Non-Randomized Studies

6. Leach JR, Shen H, Huo E, et al. Impact of implicit abdominal aortic aneurysm screening in the Veterans Affairs health care system over 10 Years. *J Am Heart Assoc.* Mar 29 2022; 11(7): e024571. [PubMed](#)
7. Hultgren R, Elfstrom KM, Ohman D, Linne A. Long-term follow-up of men invited to participate in a population-based abdominal aortic aneurysm screening program. *Angiology.* 08 2020; 71(7): 641-649. [PubMed](#)
8. Johansson M, Zahl PH, Siersma V, Jorgensen KJ, Marklund B, Brodersen J. Benefits and harms of screening men for abdominal aortic aneurysm in Sweden: a registry-based cohort study. *Lancet.* 06 16 2018; 391(10138): 2441-2447. [PubMed](#)

Appendix 1: References of Potential Interest

Systematic Reviews — Unclear Methods

9. Takagi H, Ando T, Umemoto T, ALICE Group. Abdominal aortic aneurysm screening reduces all-cause mortality: make screening great again. *Angiology*. Mar 2018; 69(3): 205-211. [PubMed](#)

Non-Randomized Studies — Unclear Comparator

10. Wanhainen A, Hultgren R, Linne A, et al. Outcome of the Swedish Nationwide Abdominal Aortic Aneurysm Screening Program. *Circulation*. 10 18 2016; 134(16): 1141-1148. [PubMed](#)

Review Articles

11. Kapila V, Jetty P, Wooster D, Vucemilo V, Dubois L, Canadian Society for Vascular S. Screening for abdominal aortic aneurysms in Canada: 2020 review and position statement of the Canadian Society for Vascular Surgery. *Can J Surg*. 2021; 64(5): E461-E466. [PubMed](#)
12. Saucedo A. A contemporary review of non-invasive methods in diagnosing abdominal aortic aneurysms. *J Ultrason*. Nov 29 2021; 21(87): e332-e339. [PubMed](#)
13. Ericsson A, Kumlien C, Ching S, Carlson E, Molassiotis A. Impact on quality of life of men with screening-detected abdominal aortic aneurysms attending regular follow ups: a narrative literature review. *Eur J Vasc Endovasc. Surg*. Apr 2019; 57(4): 589-596. [PubMed](#)