GUIDELINE CPD

Recommendations on screening for abdominal aortic aneurysm in primary care

Canadian Task Force on Preventive Health Care*

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■ Cite as: *CMAJ* 2017 September 11;189:E1137-45. doi: 10.1503/cmaj.170118

CMAJ Podcasts: author interview at https://soundcloud.com/cmajpodcasts/170118-guide

An abdominal aortic aneurysm (AAA) results from a weakening in a section of the aortic wall in the abdomen, which bulges because of pressure from blood flow to form an aneurysm.[1] The aneurysm may grow and eventually rupture, causing death from hemorrhage.[1] It is estimated that each year, 20 000 Canadians receive a diagnosis of AAA, and that between 2009 and 2013, about 1244 people died each year from an AAA.[2,3] Because AAA is usually asymptomatic before rupture,[1] screening could provide an opportunity to identify, monitor and treat to prevent a rupture.

Treatments for AAA include surgery to insert a graft inside the aorta or an endovascular procedure in which a graft is inserted through a groin incision and expanded in the aorta. Long-term outcomes are similar, although endovascular repair is less invasive and has lower perioperative mortality than surgical repair.[4]

Male sex is an important risk factor and AAA prevalence among men aged 65 to 80 years is four to six times higher than in women of the same age.[5,6] Smoking is associated with formation, dilation and rupture of AAA.[7,8] Other risk factors for the development of an AAA include advanced age[9] and family history of AAA.[10,11] Coronary artery disease, atherosclerosis, hypercholesterolemia and hypertension have weaker associations with AAA.[8,12] Patients with diabetes appear less likely to develop AAA.[13]

KEY POINTS

- Pooled analyses from four population-based RCTs with men older than 65 years show that one-time screening with ultrasonography for AAA reduces the risk of aneurysm-related death, rupture and emergency repair.
- Screening leads to identification of aneurysms that would not dilate or rupture, and increases the likelihood of elective repair procedures for these patients.
- A weak recommendation in favour of screening suggests the importance of shared decision-making with the primary care provider and patient, with discussion of patient preferences for screening.
- The prevalence of AAA in screened populations has declined since the RCTs were conducted, reducing the absolute benefit of screening.
- Women have much lower rates of AAA than men, and there is no direct evidence that screening women has a positive impact on their health.
- Evidence on the impact of AAA screening on men older than 80 years of age is indirect, meaning any potential benefit is uncertain.

Scope

The previous Canadian Task Force on Preventive Health Care guideline on AAA screening, released in 1991, concluded that evidence was insufficient to recommend for or against screening.[14] Since that time, findings from four randomized controlled trials (RCTs)[15–18] on screening for AAA have been published. This guideline presents recommendations on AAA screening in asymptomatic adults for primary care providers.

Methods

The task force is an independent panel of clinicians and methodologists that makes recommendations on primary and secondary prevention in primary care (see www.canadiantaskforce.ca). These recommendations were developed by a workgroup of five members of the task force, with scientific support from staff at the Public Health Agency of Canada.[19]

The recommendations are based on a systematic review, conducted by the Evidence Review and Synthesis Centre at McMaster University (Hamilton, Ontario), which updated the 2014 review by the US Preventive Services Task Force[20] on outcomes of AAA screening with ultrasonography.[21,22] Outcomes addressed by the systematic review included AAA-related and all-cause mortality, AAA rupture, 30-day mortality following emergency and elective procedures, and the impact of screening on frequency of emergency and elective procedures. The peer-reviewed literature search was conducted in MEDLINE, Embase, PubMed and CENTRAL from January 2013 to April 2015 with additional review of topic lists of relevant systematic reviews. A search for evidence on overdiagnosis was conducted in MED-

Box I: Grading of recommendations

Recommendations are graded according to the Grading of Recommendations Assessment, Development and Evaluation system (GRADE).[28] GRADE offers two strengths of recommendation: strong and weak. The strength of recommendations is based on the balance between desirable and undesirable outcomes; the confidence in the magnitude of the estimates of effect of the intervention on outcomes; the confidence in values and preferences and their variability; and whether the intervention represents a wise use of resources.

Strong recommendations are those for which the task force is confident that the desirable effects of an intervention outweigh its undesirable effects (strong recommendation for an intervention) or that the undesirable effects of an intervention outweigh its desirable effects (strong recommendation against an intervention). A strong recommendation implies that most individuals will be best served by the recommended course of action and that the recommendation can be adopted in practice or as policy in most situations.

Strong recommendations are normally based on high-quality evidence (i.e., high confidence in the estimate of the effect of an intervention). Strong recommendations may recommend in favour of an intervention (when there is high confidence of benefit) or against an intervention (when there is high confidence of harm). However, there are five circumstances in which the task force may consider a strong recommendation based on low- or very low-quality evidence:[28]

- When low-quality evidence suggests benefit in a life-threatening situation (evidence regarding harms can be low or high)
- When low-quality evidence suggests benefit and high-quality evidence suggests harm or a very high cost
- When low-quality evidence suggests equivalence of two alternatives, but high-quality evidence of less harm for one of the competing alternatives
- When high-quality evidence suggests equivalence of two alternatives and low-quality evidence suggests harm in one alternative
- When high-quality evidence suggests modest benefits and low- or very low-quality evidence suggests possibility of catastrophic harm

Weak recommendations are those for which the desirable effects probably outweigh the undesirable effects (weak recommendation for an intervention) or undesirable effects probably outweigh the desirable effects (weak recommendation against an intervention), but appreciable uncertainty exists. Weak recommendations result when the balance between desirable and undesirable effects is small, the quality of evidence is lower, or there is more variability in the values and preferences of patients. Cases where the balance of cost and benefits is ambiguous, key stakeholders differ about the acceptability or feasibility of the implementation, and the effects on health equity are unclear are likely to result in a weak recommendation. A weak recommendation implies that most people would want the recommended course of action but that many would not. For clinicians, this means they must recognize that different choices will be appropriate for each individual, and they must help each person arrive at a management decision consistent with his or her values and preferences. Policy-making will require substantial debate and involvement of various stakeholders.

Evidence is graded as high, moderate, low or very low quality, based on how likely further research is to change the task force's confidence in the estimate of effect.

LINE, Embase and Cochrane Central from 2005 to 2015, as well as a search for contextual questions in MEDLINE, Embase and PsychInfo for the same period. Finally, a search of the web-based grey literature from 2005 to 2015 identified Canadian information to inform contextual questions.[22] The analytic framework for the review is available in Appendix 1 (see www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170118/-/DC1). The protocol[23] and systematic review[22] were reviewed by content experts and health care stakeholders.

Prepublication searches were conducted using the same databases in January 2017 and evidence updated accordingly.[24] The absolute effects for outcomes were also updated when some were identified as benefits rather than harms.[25]

Knowledge translation tools accompanying this guideline were developed by the Knowledge Translation Program at St. Michael's Hospital (Toronto, Ontario) and may be found on the task force website. All tools were informed by feedback from clinicians (n = 8) (for clinician and patient tools) and patients (n = 8) (for patient tools). Patient preferences were sought in developing recommendations. A focus group and survey (n = 19) of men and women aged 65 to 80 years was conducted by the Knowledge Translation Program at St. Michael's Hospital.[26]

The Feasibility, Acceptability, Cost and Equity (FACE) tool was used with stakeholders to gain their perspective on the priority, feasibility, acceptability, cost and equity of the recommendation[27] (see Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170118/-/DC1).

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) system was used to determine the quality of evidence and strength of recommendations (Box 1).[28] Appendix 3 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.170118/-/DC1) provides the GRADE tables for the recommendations. The recommendations were revised and approved by the entire task force, and the draft guideline underwent review by content experts and external stakeholders. More information about task force methods can be found elsewhere.[19]

Recommendations

Screening in men

We recommend one-time screening with ultrasonography for AAA of men aged 65 to 80 years (weak recommendation; moderate quality of evidence).

We recommend not screening men older than 80 years of age for AAA (weak recommendation; low quality of evidence).

Men aged 65 years and older

Four population-based RCTs[15–18] evaluated outcomes of one-time AAA screening of asymptomatic men aged 65 years or older with ultrasonography compared with usual care[21,22] (Table 1). One of these RCTs included women,[18] and these findings are presented in the section on screening in women. The 12.8-year follow-up of the trial from Western Australia[15] was published in 2016[34] after the systematic review[22] for the task force was completed; the evidence base used by the task force was updated to include these findings before the recommendations were drafted.[24]

Pooled results on outcomes of screening men aged 65 years and older for AAA with ultrasonography from the four RCTs at two points of follow-up — three to five years and 13 to 15 years — are reported in Table 2. Screening was associated with an absolute risk reduction of 1.3 fewer AAA-related deaths per 1000 men screened (0.8 to 1.6 fewer) at the three- to five-year follow-up and 3.2 fewer (0.6 to 6.0 fewer) at the 13- to 15-year follow-up.[21,24] The number needed to screen to prevent one AAA-related death was 796 (95% confidence interval [CI] 621–1242) at three- to five-year follow-up and 311 (95% CI 199–1595) at 13 to 15 years.[21,24]

There was no difference in all-cause mortality at the three- to five-year follow-up (p = 0.10) (low-quality evidence), whereas at 13 to 15 years, there was a very modest reduction among those screened (moderate-quality evidence).[21,24]

Screening resulted in reductions in AAA rupture, emergency AAA procedures and death within 30 days of an AAA procedure[21,24,25] (Table 2). Screening also resulted in significant increases in the overall risk of having a procedure to repair an AAA and the likelihood of undergoing an elective AAA repair among those screened.[21,24]

In stratified analysis, the difference between the screened and control group for 30-day mortality following an elective AAA procedure was minimal at three to five years of follow-up (moderate- quality evidence), with no difference at 13 to 15 years (low-quality evidence).[20,23] For emergency AAA procedures, there was no difference in 30-day mortality between the screened and control groups at either follow-up period (low-quality evidence).[21,25]

Four studies were identified that evaluated the effect of AAA screening on quality of life (very low-quality evidence) among men aged 65 years and older.[22] Three observational studies used standardized measures for quality of life and did not find statistically significant differences between patients who screened positive compared with the control group.[22] Postscreening data from the Multicentre Aneurysm Screening Study (MASS) trial also reported no difference in quality-of-life measures between screen-positive and control groups.[22]

With regard to overdiagnosis (identification of an AAA that would not have ruptured), an analysis of low-quality evidence from the 13-year follow-up of the MASS trial estimated the rate in the screen-positive group at 45% (95% CI 42%–47%).[22] The authors calculated that 17.6 (95% CI 15.0–20.2) patients would be overdiagnosed for every 1000 screened.[39]

Recent population-based screening studies of men older than 65 years of age conducted in England[40] and Sweden[41] show that prevalence of AAA is declining, with estimates ranging from 1.5% to 1.7%. The rates of AAA among the men in the RCTs ranged from 3.9% to 7.2%.[15–18] The reduced prevalence of AAA in recent years has been attributed to changes in smoking behaviour, as well as improved management of hypertension and hypercholesterolemia.[40,41]

Men older than 80 years

The ages of participants in the RCTs ranged from 64 to 83[22] (upper ages included were 73 years [Viborg],[16] 74 years [MASS],[17] 80 years [Chichester][18] and 83 years [Western Australia][15]). The quality of evidence for men older than 80 years was downgraded from moderate to low for indirectness, as the trials did not report separately on outcomes of screening for these men.[42] Even when invited to take part in screening, men older than 75 years were less likely to participate than younger men.[15,18]

Screening in women

We recommend not screening women for AAA (strong recommendation; very low quality of evidence).

Only one of the four RCTs identified in the systematic review[22] — the Chichester[18] trial — examined the benefits and harms of screening women for an AAA (n = 4682 screened; n = 4660 control). There was no difference in outcomes between the screened and control groups at the 5- and 10-year follow-up.[22] No observational studies were found on AAA screening for women. The quality of the evidence available for women was downgraded from moderate to very low because of insufficient sample size and wide confidence intervals, resulting in serious concerns about imprecision.[42]

In observational studies, AAA is four to six times less common among women aged 65 to 80 years than men of this age, which limits its potential benefit from screening.[5,6] A recent meta-analysis reported that women have a higher risk of death following procedures to repair an AAA, which may further reduce potential benefits.[43]

Table 1: Randomized controlled trials on outcomes of screening men aged 65 years and older for AAA with ultrasonography

Study	Location	Sample size	Intervention/control	Mean length of follow-up, yr
Multicentre Aneurysm Screening Study (MASS)[17,29–31]	Four sites in England	n = 67 700	Intervention, n = 33 883; Control, n = 33 887	13.1
Chichester[6,18,32,33]	England	n = 6433	Intervention, n = 3228; Control, n = 3205	15
Viborg[16,35–37]	Denmark	n = 12 639	Intervention, n = 6333; Control, n = 6306	14
Western Australia[15,34,38]	Australia	n = 38 704	Intervention, n = 19 249; Control, n = 19 231	12.8

Note: AAA = abdominal aortic aneurysm.

Table 2 (part 1 of 2): Outcomes of one-time screening for AAA using ultrasonography for men aged 65 years and older*

Outcome and follow-up period	No. of studies	Cases/ received procedure screened patients (%)	Cases/ received procedure control patients (%)	Risk ratio (95% CI)	Absolute per 1000	Absolute risk reduction, %	Absolute risk increase, %	Number needed to screen (95% CI)	Quality of evidence
AAA-related mortality 3–5 yr[22]	4	102/62 729 (0.16)	182/62 847 (0.29)	0.57 (0.44–0.72)	1.3 fewer (from 0.8 fewer to 1.6 fewer)	0.13		796 (621–1242)	⊕⊕⊕○ MODERATE†
AAA-related mortality 13–15 yr[22,24]	4	380/62 460 (0.61)	588/62 469 (0.94)	0.66 (0.47–0.93)	3.2 fewer (from 0.6 fewer to 5.0 fewer)	0.32		311 (199–1595)	⊕⊕⊕○ MODERATE†
All-cause mortality 3–5 yr[22]	4	7453/62 729 (11.9)	7953/62 847 (12.7)	0.95 (0.88–1.02)	7.0 fewer (from 15.7 fewer to 2.5 more)	NS		–	⊕⊕○○ LOW‡
All-cause mortality 13–15 yr[22,24]	4	28 474/62 460 (45.6)	28 899/62 469 (46.3)	0.99 (0.98–1.00)	6.1 fewer (from 0.7 fewer to 11.4 fewer)	0.61		164 (88–1441)	⊕⊕⊕○ MODERATE†
Rupture of an AAA 3–5 yr[22]	4	117/62 729 (0.19)	218/62 847 (0.35)	0.52 (0.35–0.79)	1.6 fewer (from 0.7 fewer to 2.3 fewer)	0.16		606 (442–1387)	⊕⊕⊕○ MODERATE†
Rupture of an AAA 13–15 yr[22,24]	4	415/62 460 (0.66)	674/62 469 (1.1)	0.65 (0.51–0.82)	3.8 fewer (from 1.9 fewer to 5.2 fewer)	0.38		264 (191–515)	⊕⊕⊕○ MODERATE†
AAA procedures 3–5 yr[22]	4	554/62 729 (0.88)	252/62 847 (0.4)	2.16 (1.82–2.57)	4.7 more (from 3.3 more to 6.3 more)		0.47	215 (159–305)	⊕⊕⊕○ MODERATE†
AAA procedures 13–15 yr[22,24]	4	1408/62 460 (2.3)	1029/62 469 (1.6)	1.35 (1.17–1.57)	5.9 more (from 2.8 more to 9.4 more)		0.58	171 (107–358)	⊕⊕⊕○ MODERATE†
Elective procedures 3–5 yr[22]	4	505/62 729 (0.81)	162/62 847 (0.26)	3.25 (2.13–4.96)	5.8 more (from 2.9 more to 10.2 more)		0.58	172 (98–342)	⊕⊕⊕○ MODERATE†
Elective procedures 13–15 yr[22,24]	4	1266/62 460 (2.0)	754/62 469 (1.2)	1.83 (1.29–2.59)	10.0 more (from 3.6 to 19.2 more)		1.00	100 (52–281)	⊕⊕⊕○ MODERATE†
Emergency procedures 3–5 yr[22,25]	4	44/62 729 (0.07)	90/62 847 (0.14)	0.50 (0.29–0.86)	0.7 fewer (from 0.2 fewer to 1.0 fewer)	0.07	–	1389 (980–4975)	⊕⊕⊕○ MODERATE†
Emergency procedures 13–15 yr[24,25]	4	142/62 460 (0.23)	275/62 469 (0.44)	0.52 (0.42–0.63)	2.1 fewer (from 1.6 fewer to 2.5 fewer)	0.21	–	471 (394–622)	⊕⊕⊕○ MODERATE†

Table 2 (part 2 of 2): Outcomes of one-time screening for AAA using ultrasonography for men aged 65 years and older*

Outcome and follow-up period	No. of studies	Cases/ received procedure screened patients (%)	Cases/ received procedure control patients (%)	Risk ratio (95% CI)	Absolute per 1000	Absolute risk reduction, %	Absolute risk increase, %	Number needed to screen (95% CI)	Quality of evidence
30-day mortality, after any AAA procedures 3–5 yr[22,25]	3	29/501 (5.8)	41/221 (18.6)	0.31 (0.20–0.48)	128.0 fewer (from 95.7 fewer to 149.0 fewer)	12.83	–	8 (7–10)	⊕⊕⊕○ MODERATE†
30-day mortality, after any AAA procedures 13–15 yr[24,25]	3	92/1,299 (7.1)	119/941 (12.6)	0.55 (0.39–0.80)	56.3 fewer (from 25.6 fewer to 77.7 fewer)	5.63	–	18 (13–39)	⊕⊕⊕○ MODERATE†

Note: AAA = abdominal aortic aneurysm, CI = confidence interval, NS = not significant.
*The estimated absolute risk reduction/increase is from pooled results of the trials on AAA screening. The prevalence of AAA in screened populations of men aged 65 years and older at the time of the trials was 3.9% to 7.2%, with more recent population-based estimates of prevalence in countries similar to Canada ranging from 1.5% to 1.7%, reducing the benefit of screening.
†Downgraded to moderate owing to serious risk of bias.
‡Downgraded to low owing to serious risk of bias and imprecision.

Patient values and preferences

In the focus group and survey of men and women aged 65 to 80 years (n = 19) to obtain patient preferences, participants were informed of the potential benefits and risks of AAA screening, including overdiagnosis. Most participants would choose to be screened if they felt that risk factors for an AAA applied to them, but there was less agreement on encouraging someone older than 80 years to be screened.[26]

Resource use

The systematic review[22] reported cost-effectiveness of screening for AAA from findings of two systematic reviews,[44,45] an RCT[33] and three modelling studies.[46–48] AAA screening was cost effective, with an incremental cost-efficiency ratio of less than US$30 000 per quality-adjusted life-year gained.[22] A recent report on outcomes of the Swedish nationwide screening program concluded that screening for AAA remains cost effective, despite declining prevalence and a shift to more expensive procedures.[49]

Feasibility, acceptability, cost and equity

Most stakeholder respondents (n = 5) to the FACE survey from health-related organizations indicated that the recommendations presented are feasible, acceptable, affordable, and would not negatively affect health equity. Stakeholders also reported a high intent to implement the recommendations (Appendix 2).

Rationale

Men aged 65 to 80 years

Moderate-quality evidence indicated that screening men aged 65 to 80 years will yield modest reductions in AAA-related mortality, AAA rupture and rates of emergency interventions.[22,24] Although some elective procedures will result from identification of an AAA that might never have ruptured, as a result of overdiagnosis, in the judgment of the task force, this possible harm is outweighed by the reduced risk of AAA-related mortality, rupture and emergency procedures with screening.[22,24] In balancing the overall benefits and harms of screening, the benefits of screening men aged 65 to 80 years outweigh the harms and, therefore, the recommendation is in favour of screening men in this age group.

The recommendation is weak (despite low variability in patient preferences for men of this age), because of uncertainty regarding the impact of declining rates of AAA, which reduces confidence in the degree of the benefit from screening. A weak recommendation in favour of screening highlights the need for shared decision-making with patients.[50,51] Knowledge translation tools are provided on the task force's website (www.canadiantaskforce.ca) to support this process.

Despite evidence showing increased risk of AAA among smokers,[8] the task force did not make a separate recommendation on screening this population, because there is no evidence on outcomes of screening smokers for AAA.[20]

Men older than 80 years

Although the prevalence of AAA increases with age,[9,52] in the judgment of the task force, the benefit of screening men older than 80 years would be lower than in those aged 80 years or younger, because older men are more likely to have medical conditions that increase their risk of adverse events from elective procedures to repair an AAA. In balancing the overall benefits and harms of screening for men older than 80 years, the benefits

likely do not outweigh the harms. Therefore, the task force recommended against screening men in this age group.

The recommendation is weak, because uncertainty remains owing to the low quality of evidence on the size of the effect of screening men older than 80 years. A weak recommendation suggests primary care providers should discuss patient preferences regarding screening with healthy men older than 80 years of age for whom an elective procedure to repair an AAA would pose less risk.

Women

Very low-quality evidence from an underpowered RCT reported that screening women for AAA does not result in improved health outcomes.[22,42] Even in the era when AAA was more common, women had lower rates of AAA, and when AAA occurred, it tended to happen later in their lives than for men; any potential for benefit is very small. Women also have greater risk of death following an AAA procedure.[43] In the judgment of the task force, when considering the balance between benefits and harms, there is very low-quality evidence suggesting that women do not benefit from screening, and death from an AAA procedure is a potential harm. Therefore, the recommendation is against screening women for AAA.

The recommendation is strong, as risk of developing an AAA is much lower for women, but AAA screening would harm some women and consume resources that could otherwise be used for interventions with demonstrated effectiveness.

Considerations for implementation

Male sex, family history and increasing age have all been associated with an increased risk of AAA.[5,6,9–11] A review of observational studies on the risk of AAA among smokers[53] indicated that smokers have a higher risk of AAA than never smokers; current smokers have a higher risk of developing AAA than former smokers; and those who smoke more than 20 cigarettes a day have a higher risk of AAA than those who smoke less. In relation to growth and rupture of an AAA, a meta-analysis conducted by the RESCAN collaboration[54] found that current smoking has a modest impact on growth of an AAA and doubles the risk of rupture. Clinicians could ask about smoking history during a discussion

Table 3: National and international guidelines on screening for abdominal aortic aneurysm

Organization	Recommendations
Canadian Task Force on Preventive Health Care (current guideline, 2017)	The task force has three recommendations on screening for AAA: • We recommend one-time screening with ultrasonography for AAA for men aged 65 to 80 years (weak recommendation; moderate quality of evidence). • We recommend not screening men older than 80 years for AAA (weak recommendation; low quality of evidence). • We recommend not screening women for AAA (strong recommendation; very low quality of evidence).
Canadian Task Force on Preventive Health Care (1991)[14]	In 1991, the task force concluded that the evidence on screening for AAA was insufficient to recommend for or against screening.
Canadian Society for Vascular Surgery (2008)[58]	The Canadian Society for Vascular Surgery recommends that national and provincial ministries of health develop a comprehensive population-based ultrasonography screening program for AAA detection and referral. This is an unrated recommendation. They further propose that all men aged 65 to 75 years be screened with ultrasonography for an AAA, with additional selective screening for those at high risk for AAA, including women older than 65 years at high risk owing to smoking, cardiovascular disease and family history; and men younger than 65 years with a family history of AAA. This is an unrated recommendation.
US Prevention Services Task Force (2014)[57]	The US Prevention Services Task Force recommends one-time screening for AAA with ultrasonography in men aged 65 to 75 years who have ever smoked. This is a grade B risk-based recommendation. The task force also recommends selectively screening for AAA in men of this age who have never smoked. This is a grade C risk-based recommendation. The task force concludes that current evidence is insufficient to assess the balance of benefits and harms of screening for AAA in women aged 65 to 75 years who have ever smoked. This is a grade I recommendation, meaning no recommendation is made. Finally, they recommend against screening for AAA in women who have never smoked. This is a grade D recommendation, because the harms of screening for AAA in these women may be greater than potential benefits.
American College of Preventive Medicine (2011)[59]	The American College of Preventive Medicine recommends that men aged 65 to 75 years who have ever smoked should be screened for an AAA, while it recommends against routine screening for women. This is an unrated risk-based recommendation.
American College of Cardiology and American Heart Association (2006)[60]	The American College of Cardiology and the American Heart Association recommend one-time screening for AAA in men aged 65 to 75 years who have ever smoked (Class I) and for men aged 60 years or older who have a family history of AAA (Class IIa). This is a grade B risk-based recommendation.
European Society for Vascular Surgery (2011)[61]	The European Society for Vascular Surgery recommends that men be screened for AAA at age 65 years. This is a grade A (level 1a) recommendation. Screening should be considered at an earlier age in men at higher risk — for example, those who smoke, have other cardiovascular disease, or have a family history of AAA. This is a grade C (level 4) risk-based recommendation.

Note: AAA = abdominal aortic aneurysm.

on screening for AAA, as patients who have ever smoked may be more interested in being screened.

There is some evidence that cardiac failure, renal impairment, chronic obstructive pulmonary disease, peripheral vascular disease, cerebrovascular disease, ischemic heart disease and diabetes are associated with greater risk of death following elective repair of an AAA.[55] It is important that men aged 65 to 80 years with chronic health conditions such as these are aware of their particular risks from elective repair of an AAA before they decide to be screened. In contrast, men older than 80 years who do not have these conditions may choose to be screened. Increasing age and female sex are also associated with increased risk of death following AAA repair.[55]

Ultrasonography was used to screen for AAA in the RCTs because of its relative ease of use and known sensitivity and specificity. A Canadian observational study indicated that, with training, providing AAA screening in a family physician setting was accurate and feasible.[56]

Endovascular repair is less invasive than conventional surgery and has lower perioperative mortality, although long-term outcomes are similar for the two methods.[4] No randomized trials have evaluated the benefits of screen-directed endovascular repair compared with no screening. However, in the judgment of the task force, it is reasonable to assume that benefits associated with screen-directed repair are comparable with endovascular and conventional techniques. Although the less invasive nature of endovascular repair might seem to encourage screening strategies that intervene at an earlier stage (e.g., smaller AAA size) as compared with conventional surgery, this practice is not supported by trial data.[20] Given the less invasive nature of endovascular procedures and lower rates of perioperative death, patients may be more inclined to choose screening where this type of repair is available.

Suggested performance measures for implementation

Suggested performance measures for implementation of the recommendations include the proportion of men aged 65 to 80 years with whom primary care providers discuss screening for AAA, the number who are screened and the outcomes of screening.

Other guidelines

The US Prevention Services Task Force recommends that men aged 65 to 75 years who have ever smoked be screened for AAA with ultrasonography.[57] The Canadian Society of Vascular Surgery's guideline recommends that men aged 65 to 75 years be screened.[58] Table 3 highlights recommendations from other guidelines.

Gaps in knowledge

Further work is required to assess whether screening has a differential impact on health outcomes on subgroups, including those who have ever smoked and adults with a family history of AAA, and whether there is value in rescreening all patients or rescreening specific sets within the population, such as by race or ethnicity. Future studies should also monitor the epidemiology of AAA as age-based screening may have less of a positive impact if the prevalence of AAA continues to decline in the general population. Ultimately, a more targeted approach to screening could be required.

Conclusion

Based on the systematic review of the evidence, the task force has revised its recommendation on screening for AAA since its last review in 1991. Pooled results of four population-based RCTs provide evidence that screening men aged 65 to 80 years has a sufficiently positive impact on reducing mortality, rupture and emergency procedures, which outweighs the risk of identification and unnecessary elective procedures of AAA that might never have ruptured.

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This article has been peer reviewed.

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Competing interests: James Dickinson reports grants from the Public Health Agency of Canada, during the conduct of the study, and is an author on a recent paper reporting the West Australian trial of aortic aneurysm screening. No other competing interests were declared.

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Funding: Funding for the Canadian Task Force on Preventive Health Care is provided by the Public Health Agency of Canada. The views of the funding body have not influenced the content of the guideline; competing interests have been recorded and addressed. The views expressed in this article are those of the task force and do not necessarily represent those of the Public Health Agency of Canada.

Acknowledgements: The authors acknowledge the authors of the evidence review that supported this guideline from McMaster University: Donna Fitzpatrick-Lewis, Rachel Warren, Muhammad Usman Ali, Meghan Kenny, Maureen Rice, Sharon Peck-Reid, Diana Sherifali and Parminder Raina. They also acknowledge the content experts who provided expert advice: Prasad Jetty, Ottawa Hospital and University of Ottawa; Bart Ferket, Icahn School of Medicine at Mount Sinai; and Paul Norman, The University of Western Australia. The authors would also like to thank the Knowledge Translation Program of St. Michael's Hospital, which developed knowledge translation tools for patients and clinicians, and also thank the stakeholders who reviewed the guidelines using the Feasibility, Acceptability, Cost and Equity tool who agreed to be acknowledged: Joni Boyd, Canadian Association of Schools of Nursing; Amanda Amero-Hubbard, Yarmouth Hospital; and Gilles Plourde, Health Canada. We also thank those who contributed comments but did not wish to be acknowledged.

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