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Screening Programs for Abdominal Aortic Aneurysms: Luxury or Necessity?

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3 *Editorial*
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6 **Screening Programs for Abdominal Aortic Aneurysms:**
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8 **Luxury or Necessity?**
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3 In this issue of *Angiology*, Sprynger et al. discuss the pros and cons of screening
4 programs for abdominal aortic aneurysms (AAAs).¹ In their comprehensive review,
5 they analyze the benefits and cost-effectiveness of these programs, which are however
6 counterbalanced by the decrease in the prevalence of AAAs.¹ They attempt to answer
7 2 questions:
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- 13 i) Does population-based ultrasound screening for AAAs achieve its objective?
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15 ii) Are AAA screening programs cost-effective?
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20 In the present Editorial we consider some aspects of this topic.
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24 **Controversial issues regarding AAA screening programs**

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26 As the authors mention,¹ since January 1, 2007, provisions of the Screening
27 Abdominal Aortic Aneurysm Very Efficiently (SAAAVE) Act in the U.S. have
28 provided free, one-time, ultrasound AAA screening for qualified Medicare
29 beneficiaries as part of their Welcome to Medicare examination.² Men who have
30 smoked at least 100 cigarettes during their life, as well as both men and women with a
31 family history of AAA qualify.² The UK Multicenter Aneurysm Screening Study
32 (MASS) demonstrated that a one-time screening program for men lead to an
33 incremental cost-effectiveness ratio of £7,600 (roughly \$10,500) per quality-adjusted
34 life-year gained at 10 years.³ The long-term results of the MASS trial showed that 216
35 men need to be invited to screening to save 1 AAA-related death.⁴ Other studies have
36 also reported favorable cost-effectiveness of offering AAA screening to men.⁵⁻
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7 Despite the lower prevalence of AAAs in women, screening women for AAAs may
also be cost-effective because of the higher AAA rupture rate in women (and at
smaller AAA diameters).⁸ A single screening ultrasound for AAA in asymptomatic

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3 men aged >65 years has been shown to be cost-effective in the UK⁹ and through
4 Markov modeling.¹⁰ In the UK, the cost per life-year saved with screening men >50
5 years was \$1173, which is less than for breast, cervical, and colorectal cancer
6 screening programs.¹¹
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11 Despite the robust data on the benefit of AAA screening programs and their
12 cost-effectiveness,^{2,11} there is evidence that such screening programs are under-
13 utilized. Analysis of the Medicare data revealed that <10% of eligible patients
14 undergo screening with abdominal ultrasonography.^{12,13} Extrapolating screening
15 benefits from 2007-2012 through 2025 showed that an additional 291,000 life-years
16 can be saved by 2025 (or 131 life-years per 1,000 persons screened) if screening rates
17 increased from the 2007-2012 rates (<10%) to 80% by the end of 2018.¹³
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26 Despite this large body of evidence, others support that not only AAA
27 screening programs are not beneficial, but they also cause more harm than
28 good.¹⁴ According to this interpretation, ***“for every 10,000 people invited to
29 screening, 46 men avoid dying from a ruptured AAA. But for every avoided death, 4
30 men are diagnosed with an AAA that would never have been detected or caused
31 health problems in their lifetime without screening; they have been overdiagnosed,
32 which causes substantial physical and psychological harms for many of them”***.¹⁴
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41 Admittedly, this interpretation may apply to specific categories of patients,
42 such as those who are frail, who have several co-morbidities and/or who are at high
43 risk for surgery. In a recent report, 112 patients with AAA turned down for elective
44 repair were followed up for a minimum of 2 years.¹⁵ Within 2 years, 64/112 (57.1%)
45 had died. Of these, 30/64 had a recorded cause of death. Ruptured AAA was the cause
46 of death in only 11/30 (36.7%) patients.¹⁵ In other words, the majority this group of
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3 frail patients with an AAA who were turned down for elective repair because of their
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5 comorbidities, did not die of a ruptured AAA, but as a result of their co-morbidities.
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7 Another, independent study retrospectively analyzed 692 patients with AAA
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9 over a period of 20 years.¹⁶ Overall, 214 deaths were recorded. Only 25 (11.7%) were
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11 AAA-related, whereas 171 (80.3%) patients died from other causes while under
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13 surveillance, having never required AAA surgery.¹⁶ This report once again suggests
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15 that the majority of patients with AAA who die, do not die of a ruptured AAA.¹⁶
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17 Therefore, screening such frail patients for an AAA is not likely to change their
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19 prognosis dramatically.
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22 The current AAA diameter for intervention is 5.5 cm for men and 5.2 cm for
23
24 women.¹⁷ For such frail patients, it seems prudent to increase the threshold for
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26 intervention to 6.0 (or even to 6.5) cm.¹⁸ Alternatively, high-risk, frail patients who
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28 are not likely to be offered elective AAA repair can be discharged. For these patients,
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30 AAA screening is neither necessary nor recommended. For average-risk patients,
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32 however, AAA screening seems to have more advantages than disadvantages and this
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34 is why international guidelines strongly recommend AAA screening for specific
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36 patient subgroups (a strong recommendation for men or women 65-75 years old with
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38 a history of tobacco use and a weaker recommendation for first-degree relatives of
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40 patients with an AAA).¹⁷
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46 **Benefits associated with screening programs**

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48 Although detection of an AAA can be a psychological burden for some
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50 patients,¹⁴ the early identification of patients with AAAs by screening programs has
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52 some important implications, namely:
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3 i. **Early initiation of primary prevention measures:** According to the most
4 recent guidelines on the management of AAAs,¹⁷ it is strongly
5 recommended that these patients receive best medical treatment, which
6 includes smoking cessation, an antiplatelet agent and a statin. Statins in
7 particular are associated with several beneficial actions for AAA patients,
8 whether managed conservatively or undergoing open vascular or
9 endovascular surgery.¹⁹⁻²¹
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18 ii. **Planning elective repair reduces the incidence of ruptured AAAs:**
19 Identification of patients with small AAAs via screening programs makes
20 it possible to keep these patients under regular surveillance and plan an
21 elective procedure when the AAA diameter exceeds the threshold for
22 intervention.¹⁷ Some of the patients presenting in the Emergency
23 Departments of hospitals with a ruptured AAA were not aware of its
24 presence before the time of rupture. A study from Denmark found a 74%
25 reduction in the incidence of ruptured AAAs and a 68% reduction in
26 cause-specific mortality by AAA screening programs.²²
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37 iii. **Improved perioperative mortality rates:** The early identification of AAA
38 patients via screening programs allows for timely/earlier management. The
39 5-year results of the previously-mentioned study from Denmark verified a
40 75% reduction in the incidence of emergency operations for ruptured
41 AAAs in the screening group compared with controls, a 67% reduction in
42 AAA-specific mortality and an estimated cost per prevented death from
43 AAA of 16,050 Euros.²³
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Conclusions

Although the benefits and cost-effectiveness of AAA screening programs is an enduringly controversial topic, a growing body of evidence supports their use²⁻¹¹ and the article by Sprynger et al.¹ lends further support to this interpretation. A counterargument to those questioning the benefits and cost-effectiveness of AAA screening programs¹⁴ is the fact that every newborn child in the UK is routinely screened for several diseases, among others maple syrup urine disease (MSUD), isovaleric acidaemia and homocystinuria. However, MSUD affects only 1 in every 185,000 infants worldwide, isovaleric acidaemia about 1 in every 250,000 people in the U.S., and homocystinuria only 1 in every 200,000-335,000 people worldwide. Besides their much smaller prevalence an ultrasound scan costs much less than the genetic tests required for the diagnosis of these rare conditions.²⁴ AAA screening programs are not just useful, they are essential tools to reduce AAA-related deaths.

Conflicts of interest: None.

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