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SYSTEMATIC REVIEW

Impact on Quality of Life of Men with Screening-Detected Abdominal Aortic Aneurysms Attending Regular Follow ups: A Narrative Literature Review

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WHAT THIS PAPER ADDS

Screening for abdominal aortic aneurysm (AAA) is of importance to reduce the aneurysm mortality rate and has been introduced in several countries. Men with a diagnosed abdominal aortic aneurysm remain under continuous surveillance, but the knowledge of having an aneurysm may be worrying and burdensome. Therefore, quality of life has been an important outcome since the introduction of screening. This review summarises and assesses the available evidence regarding the impact on quality of life for men undergoing screening and attending follow ups.

Objective: This study aimed to review, summarise, and assess the available evidence regarding the impact on the quality of life (QoL) of men undergoing screening for abdominal aortic aneurysm (AAA) and attending regular follow ups.

Methods: PubMed, MEDLINE, CINAHL, and PsycINFO were used for searching. The search was performed from April to July 2016, with an update in February–March 2018. The quality of the studies was appraised with respective checklists from the Critical Appraisal Skills Programme. A narrative synthesis of the included studies was performed. The analysis included studies evaluating QoL in relation to one or more of the following concepts: physical function, psychological impact and social life in men undergoing AAA screening, but excluded studies evaluating QoL in AAA patients diagnosed outside a screening program.

Results: The initial results from the search were 128 articles. Duplicates were removed, titles and abstracts were screened, and 22 full text articles were collected. Based on the inclusion criteria, 11 quantitative studies were included. Inferior quality of life among men with detected AAA was identified compared to those without the diagnosis and the general population in the included studies. The self-perceived health decreased over time for the participants with AAA. Assessments after surgery showed that the participants returned to similar health as before the screening. A wide variety of factors regarding the methodologies, designs, measurements, sample sizes, and the time for the assessment were noted in the included studies.

Conclusion: Quality of life is an important outcome for AAA screening and studies have been conducted in an attempt to address the imbalance between benefits and harm. However, it is still difficult to draw clear conclusions, possibly due to the heterogeneity of the original studies. Nevertheless, it is important to identify men with an AAA who develop conditions influencing their health and QoL in order to understand their care needs to further support them and improve their situation.

Keywords: Abdominal aortic aneurysm, Quality of life, Screening
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INTRODUCTION

There is a significant link between abdominal aortic aneurysm (AAA), rupture, and death.[1,2] AAAs are often asymptomatic until they rupture.[3] The prevalence of AAAs increases with age and they are more common in men.[4] Approximately 1.5–1.8% of men aged >65 years in Sweden have an AAA,[5,6] and in Europe and the USA the

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prevalence among men the same age is 2–4%.[4,7] To reduce the AAA related mortality rate in a cost effective way, the main purpose of screening, screening with ultrasound (US) and elective preventive surgery have been introduced in several countries for men aged >65 years.[5,8,9] However, there are international and national variations between the screening programmes, although all offer an examination of the aorta with US.[10] Diagnosed aneurysms are followed up with regular US examinations, and the frequency of the surveillance depends on the size of the aneurysm.[4] Since the introduction of screening programmes for AAA, in addition to mortality rates and cost effectiveness, quality of life (QoL) has been another important outcome to evaluate.

The concept of QoL is multidimensional and has been characterised in many ways. The World Health Organisation defines QoL as "the individuals' perception of their position in life in the context of culture and value system and in relation to their goals, expectations, standards, and concerns. In a complex way it incorporates the individuals' physical health, psychological state, level of independence, social relationships, personal beliefs, and their relationships to salient features of the environment".[11] Although previous research has addressed whether the benefits of screening programmes for AAA outweigh the impact on QoL, the awareness of having an AAA and how this influences the individuals' QoL is still unclear, especially for men with a small aneurysm of <55 mm who are treated conservatively and are under surveillance. The knowledge of having an AAA may be controversial and mentally burdensome.[12,13] Thus, it highlights the importance of reviewing, summarising, and assessing existing evidence regarding the relationship between population based screening programmes and their impact on QoL in men undergoing screening for AAA and attending regular follow ups.

MATERIALS AND METHODS

Search strategy

The databases of PubMed, MEDLINE (1965+), Cumulative Index to Nursing and Allied Health Literature (CINAHL 1982+), and PsycINFO (1806+) were used for searching, and adjusted search strategies were used in the chosen databases. The Boolean search operators OR and AND were used to combine different search terms. The search was done from April to July 2016, with updated searches done in February and March 2018. The search terms combined free text and subject heading terms. The initial keywords were abdominal aortic aneurysm, aortic screening/mass screening/screening programme, and quality of life/psychosocial consequences/anxiety/depression/mental stress/effects on daily life/well-being. In addition to the electronic search, reference lists of the retrieved studies were screened for other relevant studies. There were no limitations on publication dates or language. Peer reviewed quantitative and mixed method studies were included with a focus on the impact of QoL in men undergoing AAA screening. The inclusion criteria for the outcome were the men's perceptions of QoL in relation to one or more of the following concepts: physical function, psychological impact, and social life. Studies that presented the impact on the QoL of participants diagnosed with an AAA through other examinations and not attending a screening programme were excluded. Initially, the results of the search ($n = 128$) were merged into the reference management software EndNote (X8). Duplicates were removed ($n = 24$), followed by a manual review of the remaining 104 titles and abstracts, resulting in 82 excluded articles. Subsequently, 22 full text articles were reviewed, of which 11 were excluded based on the inclusion and exclusion criteria (Fig. 1). Data extraction was carried out by the first author and checked by the rest of the authors. For the included quantitative studies, information was extracted and recorded as: (1) author, year of publication, and country of origin; (2) subjects and sample size; (3) study design; (4) assessment instruments used; (5) time for assessment and time for follow up; (6) outcomes; and (7) quality appraisal. A narrative synthesis provided a description and a summary of the similarities and differences of the content of the included studies.[14]

Quality appraisal

To assess the quality of the included studies, three different checklists from the Critical Appraisal Skills Programme (CASP) were used: the checklist for case control studies (including 11 questions), the checklist for Randomised Controlled Trials (RCTs; including 11 questions), and the checklist for cohort studies (including 12 questions). Three main areas are covered in all checklists, validity, results, and clinical relevance.[15] Two of the authors assessed the included articles, compared the scores, discussed any discrepancies, and agreed on a final score. Agreements between the authors were good overall. As the first and second author are also the authors of one of the included studies,[16] two external reviewers were invited to assess the quality of this study. The response options in the checklists were "Yes", "No", or "Can't tell". "Can't tell" responses were counted as a "No". Based on the number of "Yes" responses in the checklists, total scores <50% indicated poor study quality, scores of 50–75% indicated fair quality, and >75% indicated high quality studies. A summary of the quality appraisal is shown in Table S1 (Supplementary Material). No papers were excluded based on poor quality, as they were still relevant for the objective and synthesis of this review.

RESULTS

This review included 11 quantitative studies. One of the studies had a mixed method design, where the quantitative part was appropriate to the objective of this review, and was included in the review (Fig. 1).

Description of the studies and subjects

All of the included studies were conducted between 1997 and 2018, with the majority originating from Europe, including five from the UK,[17–21] three from Sweden,[16,22,23] one from Denmark,[24] and two from Australia (Table S1; Supplementary Material).[25,26]

A total of 2800 subjects were diagnosed with an AAA by US. The subjects' ages ranged from 65 to 83 years. The study

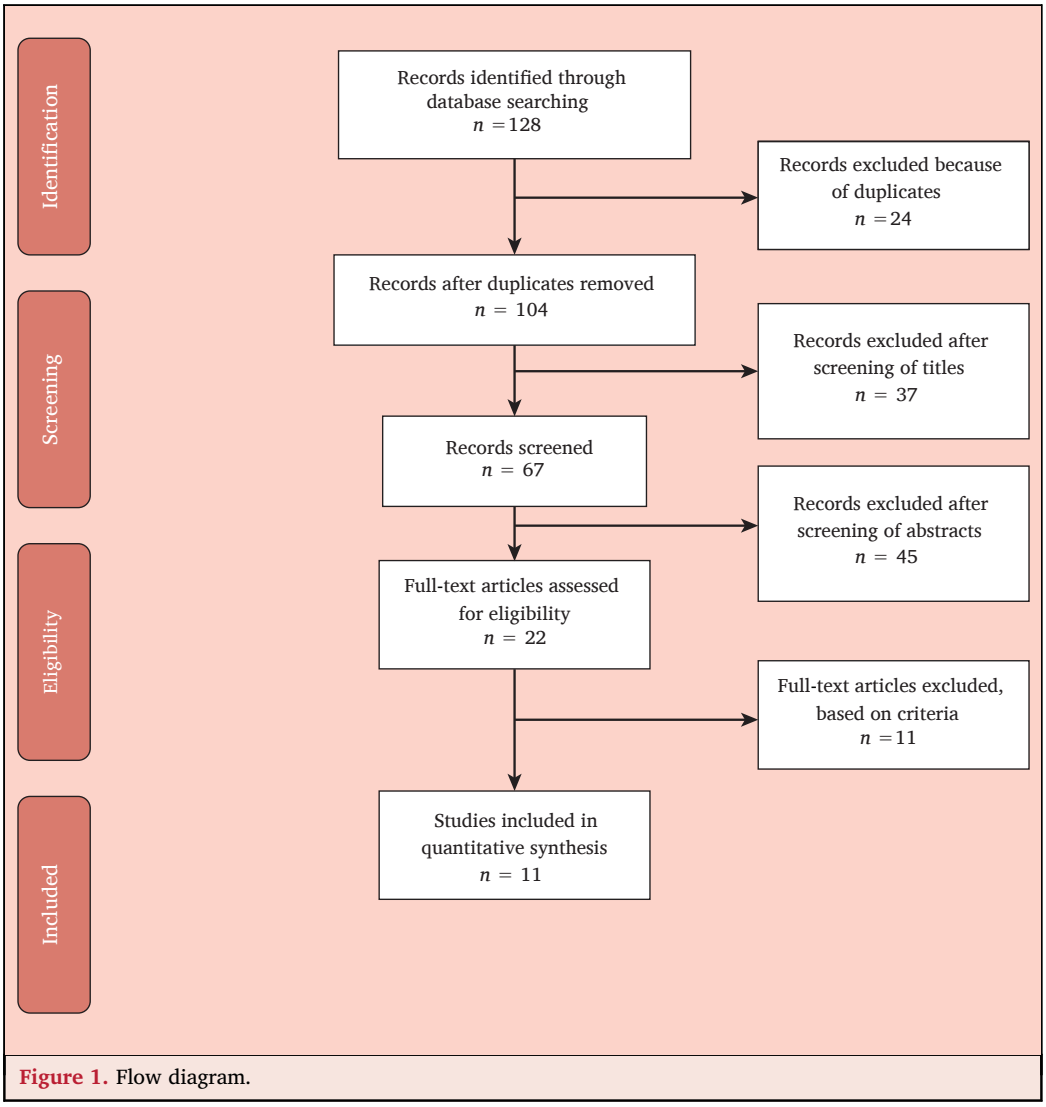

Figure 1. Flow diagram.

samples varied from 86 patients to a large population based RCT with 27,147 men. A small sample of women (four in the AAA group and 10 in the control group) was included in one of the studies and not separated from the results of male patients.[23] Questionnaires were sent to the partners of the included men in one study.[25] However, only findings from men with AAAs were included in this review.

Different designs were reported among the studies. The majority were observational studies, five were prospective studies,[16,17,21,23,26] two were reported to be case control studies,[20,24] one was a combination of cross sectional and case control,[25] and one was described as a RCT.[18] The quantitative part from the study using mixed methods was a cross sectional design.[22] One of the studies did not mention a design but was followed up as a prospective case control study.[19] In the case control studies, the patients diagnosed with an AAA were compared with matched controls who were not diagnosed with an AAA at the screening examination,[20,24,25] the Swedish SF-36 normative general population data;[23] patients on a waiting list for AAA surgery not diagnosed through screening;[19] patients not randomised for screening;[24] and men who underwent surgery for AAA.[18,24] In one study,[24] the AAA sample was compared with men who refused an invitation for screening. In the study by Pettersson *et al.*[22] the entire screening sample (men with AAA and without) was compared with an age and sex matched control group from the national general population normative database with regard to SF-36. For the prospective studies, all participants with an AAA were followed up and compared with randomised groups without AAA.[16,21,23,26] In a study by Marteau *et al.*,[17] only a subsample of both groups was followed up.

Assessment time

The time for assessing QoL in the reviewed studies varied (Table 1). Of the 11 studies, seven had baseline information measured in conjunction with the screening.[17,20,21,23–26] The first assessments of the participants in the remaining four studies were one to two weeks,[22] four weeks,[19] six weeks,[18] and up to 12 weeks[16] after the initial screening. The follow up assessments ranged from one month to four years. Studies that compared patients under conservative treatment attending follow ups with those who underwent surgery, followed the patients for up to one year after surgery.[18,24]

Table 1. Timing of quality of life assessments across 11 included studies

	Before screening	1–2 wk after screening	4–6 wk after screening	Between screening and up to 12 wk after screening	4–6 wk after screening	3 mo after screening	6 mo after screening	12 mo after screening	Annual/ after surgery
Lucarotti[20]	⦸				⊙				
Khaira[19]			⦸		⊙		⊙		
Lindholt[24]	⦸				⊙				⊙
MASS[18]			⦸		⊙	⊙		⊙	⊙
Spencer[25]	⦸							⊙	
Wanhainen[23]	⦸							⊙	
Marteau[17]	⦸				⊙				
Lesjak[26]	⦸						⊙		
Pettersson[22]		⦸							
Ericsson[16]				⦸			⊙*		
Bath[21]	⦸+							⊙	⊙#

⦸: first assessment; ⊙: follow up; +: at the initial screening appointment; *: six months after the first assessment; #: annually up to four years. MASS = Multicentre Aneurysm Screening Study.

QoL instruments

Different QoL instruments were used. The majority were generic instruments, often used in combination with each other. Eight studies used the generic instrument MOS 36-Item Short-Form Health Survey (SF-36).[16–18,21–23,25,26] From this instrument, Marteau *et al.*[17] and Spencer *et al.*[25] included five questions under the dimension of general health perception. The whole SF-36 scale was used at the follow up assessment in the study by Spencer *et al.*[25] SF-8, the short form of SF-36, was used in the study by Bath *et al.*[21] Furthermore, the standardised generic EuroQoL (EQ-5D) instrument was used in two of the reviewed studies.[18,25] Other generic instruments were used to capture psychological well being. The Hospital Anxiety and Depression Scale (HADS) is used to assess states of depression and anxiety and was used in six of the reviewed studies.[16,18,19,22,25,26] Anxiety was also assessed with the Spielberger State-Trait Anxiety Inventory (STAI) in combination with other instruments in one of the studies.[18] To identify minor psychiatric disorders in a general population, the General Health Questionnaire (GHQ) was an alternative tool used by Lucarotti *et al.*,[20] and the validated Screen Quality of Life Questionnaire (ScreenQL) was used in the Danish study.[24] Single instruments were used in some of the studies. Ten non-validated specific AAA questions were used in the studies by Wanhainen *et al.* and Ericsson *et al.*[16,23] A linear analogue scale for measuring anxiety was used by Lucarotti *et al.*[20] Bath *et al.*[21] used a Likert scale to ask how often the patients thought about their aneurysm, while Spencer *et al.*[25] used a few stand alone questions about QoL from two validated instruments, the STAI, and the Life Orientation Test.

Relationship between screening and QoL over time

Comparison between groups. Self assessed health from the dimension of general health (SF-36) indicated lower scores before the US examination among the men in whom an AAA was later detected compared with the participants not diagnosed with AAA.[17,23,25] Psychological and physical health was reported to be lower in the group diagnosed with AAA than in those without the diagnosis six weeks after the screening examination.[17,18] Physical health was reported to be significantly lower six months after the first QoL assessment,[16] and even reported lower 12 months after the screening examination,[25] and during a period of three years compared with those without the diagnosis.[21] Psychological health was significantly lower for men with a diagnosis within the first year after the screening examination compared with men without an AAA.[21] Lesjak *et al.*[26] found that the men with AAA reported significantly lower scores in the dimensions of social functioning, pain, and general health six months after the US examination compared with men without the diagnosis. A significantly higher level of stress in relation to disease was seen six months after the first QoL assessment in the study by Ericsson *et al.*[16] for the men with an AAA compared with those without (Table 2).

Comparison with the general population. Both men with and without AAA attending screening reported significantly better psychological and physical health 7–14 days after the screening examination compared with the SF-36 standard values of an age and sex matched Swedish population.[22] However, comparisons of the norms of the general Swedish SF-36 population and the AAA group indicated a significantly lower psychological and physical health status for the AAA group 12 months after the first screening examination.[23]

Changes within the groups. A significantly lower level of anxiety was noted four weeks after the screening examination in both the men not diagnosed and those diagnosed with an AAA at the screening appointment.[20] Marteau *et al.*[17] showed that the AAA group continued to report decreasing self perceived general health six weeks after the screening examination compared with before the US examination. A decreasing trend over time in psychological and physical health was shown in the men with an AAA.[21,23,24] Bath *et al.*[21] reported significantly lower psychological health for men with AAA during the first year after the initial screening but then returning to baseline levels. Furthermore, Wanhainen *et al.*[23] reported a

Table 2. Differences in quality of life in men with screening-detected abdominal aortic aneurysm (AAA) compared to men without AAA at the first follow up assessment. Assessed follow up periods varied from 4 weeks to 12 months across studies

Instrument	Lucarotti[20]	Khaira[19]	Lindholt[24]	MASS[18]	Marteau[17]	Lesjak[26]	Wanhainen[23]	Spencer[25]	Ericsson[16]	Bath[21]
Short Form 36 Health Survey							=			
Physical function							=	↓*	↓*	
Role limitation physical						=	=	↓	↓*	
Pain						↓*	=		↓	
General health					↓	↓*	=		↓	
Vitality							=	↓	↓	
Social functioning						↓*	=		=	
Role limitation emotional							=		=	
General mental health							=	↓	↓	
Physical Component Score				↓*			=		↓	↓*
Mental Component Score				↓*			=		↓	↓*
The Hospital Anxiety and Depression Scale		=		=		=		=	=	
General Health Questionnaire	=									
Health			↓*							
Quality of life			↓*							
EuroQoL 5 Dimensions				↓				=		
Stress due to disease									↓*	
Sense of coherence									=	

Table reports status of participants with screening-detected abdominal aortic aneurysm. * Reported as significant in the original studies. =: no differences reported; +: reported as significant reduction the first year after screening; ↑: better reported health status; ↓: worse reported health status. MASS = Multicentre Aneurysm Screening Study.

decreased score in social functioning after 12 months and Ericsson *et al.*[16] showed a decreasing score for emotional role functioning for the men with an AAA of six months' duration. Two studies showed that the impairment of psychological and physical health further continued until after surgery (Table 3).[18,24]

DISCUSSION

The results of this review show that the men with screening-detected AAA who attended follow ups reported a decreased self perceived QoL over time. However, the reported negative trend changed for those men who underwent AAA surgery for their aneurysm or after the initial

Table 3. Changes in quality of life over time among participants with screening-detected abdominal aortic aneurysm

Instrument	Lucarotti[20]	Khaira[19]	Lindholt[24]	MASS[8]	Marteau[17]	Lesjak[26]	Wanhainen[23]	Spencer[25]	Ericsson[16]
Short Form 36 Health Survey									
Physical function						↑	↓*		↓
Role limitation physical						↓	↓		↓*
Pain						↓	↑		↓
General health					↓	↑	↓	↑	↓
Vitality						↓	↓		↓
Social functioning						↓	↓*		=
Role limitation emotional						↓	=		↓*
General mental health						=	↓*		↑
Physical Component Score				↑			–		↓
Mental Component Score				↑			↓*		↓
The Hospital Anxiety and Depression Scale		=				=			=
General Health Questionnaire[a]	↓*								
Screen Quality of Life Questionnaire[b]									
Health			↓*						
Quality of life			↓*						
Emotional			↓						
Psychosomatic distress			↓						
EuroQoL 5 Dimensions				↑					
State anxiety				↓					
Stress due to disease									=

=: no difference; ↑: better health status; ↓: worse health status. * Reported as significant in the original studies. MASS = Multicentre Aneurysm Screening Study.

[a] Fall in anxiety level = better status.

[b] = Lower psychosomatic stress. worse status.

year of surveillance to a more positive trend of QoL. Furthermore, of the men with AAA diagnosed through screening, an inferior health status was identified compared with those without the diagnosis and a matched general population. Most of the included studies were case control or prospective studies with varying methodologies.

This review found that the men with AAA had a decline in their self assessed health six weeks after the screening examination compared with before the aortic US examination.[17,18] Similar results have been seen in qualitative studies where men with screening-detected AAA had increased worries and disappointment shortly after the US examination.[27,28] However, the result of one of the included studies showed a significant reduction of anxiety for men with an AAA at the follow up assessments four weeks after the screening compared with before US examination.[20] The timing for assessing QoL can be assumed to have an impact on the result in general. Feelings of relief after the screening examination, or trust and feelings of security in the health care and screening programmes may be another explanation. This was previously described in an interview study,[27] and studies about screening, in general, have concluded that screening does not have an emotional impact for more than four weeks after the examination.[29,30] However, an overall decreasing trend of self perceived health for men attending an AAA screening programme over time could be discerned, although with regained QoL levels after the aortic surgery.[18,24] Similar to these results, negative feelings were expressed in qualitative studies when the AAA continued to expand,[27,28] while the participants in another qualitative study who underwent aortic surgery for their aneurysms experienced a calmer attitude towards screening and the disease.[31] However, one of the included studies reported that men with an AAA had decreased values in mental health within the first year after the initial screening examination but then returned to baseline levels.[21] However, findings from other studies comparing functioning, wellness, general health, and QoL for patients with AAAs under surveillance not detected through screening with patients who had undergone surgery showed significantly worse health status in patients under surveillance.[32–34] Thus, assumptions can be drawn that living with the awareness of an AAA, both through screening and non-screening detection, has a negative impact on QoL with regard to functional well being, physical status, and self perceived well being.

In this current review, a decreased level of self perceived health was found in the AAA group compared with those without the diagnosis in the screening programme.[17,18,24] This may be due to many factors, but this is commonly a group with a higher risk of cardiovascular diseases and comorbidities that may impact their perceived QoL.[35]

There was wide variation in the quality of the included studies with different methodological issues. None of the included studies achieved full scores in the quality appraisal, based on the CASP appraisal. The majority of the studies presented clear objectives, except one,[19] and the designs of the studies were stated. For the case control studies, matched controls were recruited after the screening examination, where subsamples of the men without a diagnosis became controls. This led to consideration of what the studies considered to be the exposure, whether the authors' aimed to evaluate the associations between the screening and QoL, or the diagnosis (AAA) with the QoL. It can be assumed that the authors of the studies considered it to be rather similar or that they aimed to evaluate the awareness of the diagnosis detected and followed up through screening. The sample sizes and the dropout rates were described in all of the studies, but it can be questioned whether the numbers of cases were sufficient, as only one reported a sample size calculation.[18] Furthermore, only a few studies stated how they handled the dropout rates and incomplete questionnaires in their analysis.[19,25] Confounders were considered in three of the 11 studies,[16,21,24] and this needs to be considered as a limitation as, in general, patients with AAA have more comorbidities. Most of the QoL instruments used in the studies were validated instruments and well described in all of the studies. However, the ScreenQL was stated as validated and sensitive for the population, although it was difficult to verify as the citation was not included[24] and searches could not identify this tool. This study further aimed to measure the psychological consequences of screening, but the instrument used covered health in general, an issue similar to other studies. Lucarotti *et al*.[20] aimed to measure psychological morbidity but mostly focusing on the concept of anxiety. Most of the instruments in the included studies were generic and it can be questioned whether they were the most appropriate for evaluating the QoL among patients with screen detected AAA. Although SF-36 is proven to be the most valid and reliable instrument to measure QoL in patients with vascular disease,[36] generic instruments are often used in a general population without any particular disease, and SF-36 has previously been criticised for being too general in screening programmes for breast cancer.[37] It appeared in this review that more emphasis was on the physical impact of QoL in men with AAA. It might reflect outcomes not related to the AAA diagnosis as the majority of AAAs are asymptomatic.[38] However, screening makes the participants aware of the diagnosis and, according to a previous Cochrane review,[3] future focus should be on the psychosocial part of one's well being. Nevertheless, a non-validated instrument was used in combination with other instruments in two of the studies constructed for a specific population with a focus on the information and the screening process.[16,23] The definitions of what the original studies aimed to measure were generally not presented. A similar case was noticed in the cancer screening literature where it was concluded that emotional terminology is difficult to define.[38]

One central limitation of this review is the variation of the methodological quality of the included studies, the sample sizes, the research designs, and the different outcome measures used. Furthermore, the different screening programmes were not described in the studies.

This makes it difficult to summarise the results from the original studies. Strict definitions and better methodologies would have made the summary more reliable. Calculation of the effect size or minimal import difference was desirable, but due to the variation of the designs, lack of required information, such as standard deviation and reported range in some of the original studies, made this impossible, which is a limitation of the present study. Furthermore, although the search was extensive, relevant studies may have been missed. The yielded titles and abstracts from the search were screened only for inclusion by one author, although the included studies were later discussed in the process with the rest of the team.

CONCLUSION

It appears from these findings that patients with screening-detected AAA who are attending regular follow ups have a trend of decreased QoL and tend to have inferior QoL and health than those without a diagnosis of AAA. However, to conclude that this negative trend and poorer health depends on screening alone is hard to substantiate as the baseline information should have been assessed before the invitation. The trend of decreased QoL may also be associated with comorbidities, as patients with an AAA tend to suffer from other cardiovascular diseases. Furthermore, the timing of assessment may also have an impact on the outcome. Thus, it is necessary to assess QoL in more studies of patients who are under surveillance over a longer period and to identify men with screening-detected AAA who might have an increased risk of developing conditions that negatively influence their QoL. To identify these patients, there might be a need to develop a specific QoL life instrument for patients undergoing AAA screening.

CONFLICTS OF INTEREST

None.

FUNDING

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APPENDIX A. SUPPLEMENTARY DATA

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ejvs.2018.10.012.

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