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Prerehabilitation Intervention in Abdominal Aortic Aneurysm (AAA) Patients with Elective Repair: Literature Review

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ABSTRACT
Introduction : Abdominal Aortic Aneurysm (AAA) is a life-threatening vascular condition requiring surgical intervention. Prehabilitation, particularly exercise training, has emerged as a strategy to optimize patients' physical and mental readiness for surgery, potentially improving postoperative outcomes. This review examines the efficacy of prehabilitation programs in enhancing survival, reducing complications, and shortening hospital stays for elective AAA repair patients.
Method: A literature review search was conducted using Scopus, PubMed, and ProQuest (2020–2025) with keywords: exercise training, prehabilitation, and elective AAA repair. Four studies (two RCTs, two cohort studies) from Sweden, the Netherlands, and the UK were selected. The PICO framework guided data extraction, focusing on interventions like supervised exercise (SEP), multimodal prehabilitation, and community-based programs. Variables included survival rates, postoperative delirium, and hospital stay. Data were analyzed descriptively.
Results: Based on the results of the article search, it was found that there are several types of prerehabilitation interventions in Abdominal Aortic Aneurysm (AAA) patients, namely supervised exercise (SEP), multimodal prehabilitation, and community-based programs.
Conclusion: Prehabilitation with exercise training interventions has great potential in improving surgical outcomes in vascular surgery patients. Exercise training can improve the patient's functional capacity, reduce inflammation, improve immune function, and improve psychological well-being.

Keyword: Abdominal aortic aneurysm, elective surgery, exercise training, postoperative outcomes, prehabilitation.

INTRODUCTION
Peripheral Artery Disease (PAD), aortic aneurysm, and carotid stenosis are some examples of vascular conditions that require surgical intervention (1). Vascular surgery patients often have risk factors such as smoking, lack of physical activity, and inadequate nutrition, which can worsen their condition and increase the risk of postoperative complications (2). The main problem faced in vascular surgery is the high prevalence of cardiovascular comorbidities in

patients, which can significantly affect surgical outcomes.

Abdominal Aortic Aneurysm (AAA) is a condition when the aortic dilatation is 1.5 times its normal diameter (3). Globally Abdominal Aortic Aneurysm (AAA) has a higher prevalence in western countries, such as the United States (4). The prevalence in Asia is relatively low, at 1.3% of the overall Asian population.a (5). Meanwhile, in Indonesia, there has been no study that discusses the prevalence of AAA nationally.

AAA often occurs in men aged >65 years with a prevalence of 4-8% of sufferers (6). AAA risk factors are genetic, lifestyle, medical conditions, ethnicity, and gender (7). Where AAA often occurs in men aged >65 years with a prevalence of 4-8% of sufferers (6). In addition, the incidence of Abdominal Aortic Aneurysm (AAA) is associated with the level of individual smoking habit (8). Abdominal Aortic Aneurysm (AAA) can lead to infection, aorto-enteric fistula, pseudoaneurysm aorto-caval fistula, thrombotic occlusion of the branching vessels and compression of adjacent structures if not given proper management (9). One of the treatments for AAA is through surgical procedures and effective strategies are needed to improve surgical outcomes. Currently, the concept of prerehabilitation which aims to increase the functional capacity of patients before surgery is also receiving attention. Because prerehabilitation is a preoperative intervention that aims to minimize the incidence of perioperative complications through optimizing physical activity and avoiding the possibility of a decrease in the patient's functional level (10). However, there is currently no literature review that discusses prerehabilitation interventions in Abdominal Aortic Aneurysm (AAA) patients.

One form of rehabilitation is exercise training which can reduce inflammation, improve immune function, and improve psychological well-being (1). The integration of a comprehensive prerehabilitation program can be implemented through exercise training, into the standard of care for vascular surgery patients. The program should be tailored to the patient's individual needs and abilities, taking into account their comorbidities, fitness level, and surgical goals. Through the application of exercise training as a form of rehabilitation, surgical outcomes and quality of life of vascular surgery patients will be increased, thereby reducing health care costs. This literature review aims to criticize and find out more about the impact of prerehabilitation, especially exercise training on Abdominal Aortic Aneurysm (AAA) patients.

METHOD

Article searches were conducted using Scopus, Pubmed, and Proquest databases. The search was conducted using keywords in the form of "exercise training OR exercise therapy OR prehabilitation" AND "preoperative" AND "elective surgery OR elective repair OR endovascular aneurysm repair OR open surgery". The selection of literature was carried out by identifying articles that meet the inclusion criteria, namely published in 2020-2025, in English, full text, and are original articles.

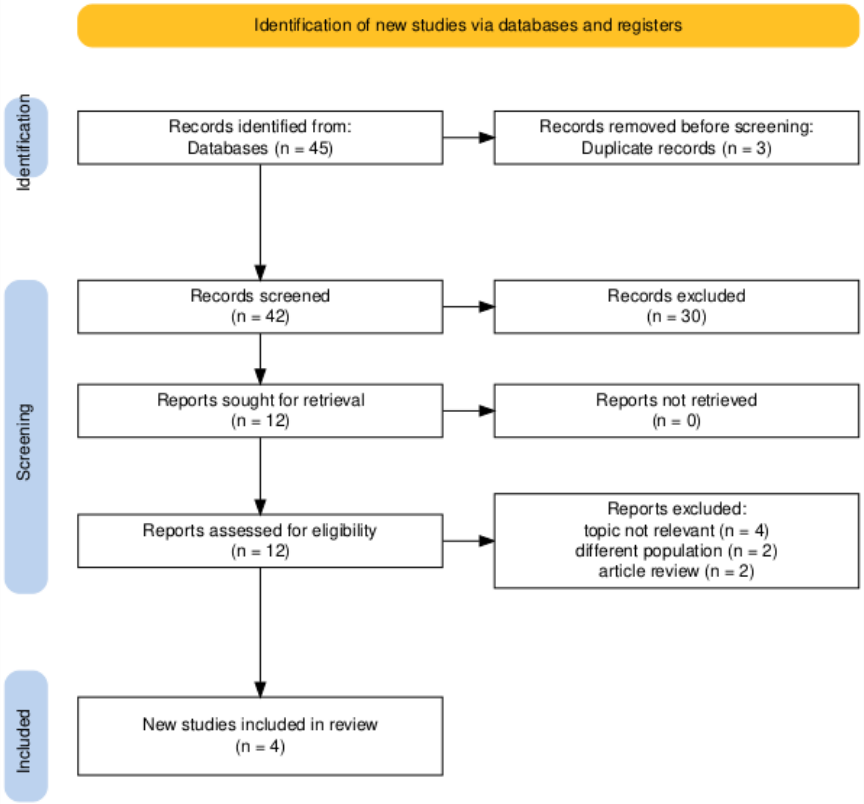

Figure 1. Literature Search Flowchart (11)

Article selection was carried out using inclusion and exclusion criteria based on PICO analysis to search for articles relevant to the topic of review. Then, the data was extracted by identifying the title and author of the article, year of publication, country, design, sample, intervention, and results.

Table 1. PICO Analysis

Category	Inklusi	Eksklusi
P (Population)	Abdominal Aortic Aneurysm (AAA) patients with elective repair, Adult patients	In addition to Abdominal Aortic Aneurysm (AAA) patients with elective repair
I (Intervention)	Prerehabilitation such as exercise training	In addition to prehabilitation interventions
C (Comparison)	Patients who receive regular interventions	-
O (Outcome)	Improved patient survival, decreased rate of postoperative complications, decreased LOS (Length of Stay)),	Doesn't address outcomes that include inclusion criteria

RESULT

Based on the results of the analysis and selection of articles based on the inclusion and exclusion criteria of the research, 4 (four) relevant articles were obtained, the articles reviewed were articles that were researched in Sweden (n=1), the Netherlands (n=2), and the United Kingdom (n=1). Two of the four articles were studies with a Randomized Control Trial (RCT) design and the other two had a single-center study design. All articles discuss interventions in patients with Abdominal Aortic Aneurysm (AAA) with elective repair (Patients who have been scheduled for AAA repair surgery)

Table 2. Data Extraction

Article Title	Country	Design	Sample	Intervention	Result
A preoperative supervised exercise program potentially improves long-term survival after elective abdominal aortic aneurysm repair (Stethi et al., 2024) (12)	Swedia	Randomized controlled trial	124 pasien Abdominalis Aorta Aneurysm (AAA) dengan elective repair (open surgery dan endovascular aortic repair)	Supervised Exercise Program (SEP)	1. There was a significant difference in the survival of the SEP group compared to the control group 2. There was no significant difference in CPET and QoL results
The Potential Value of Prehabilitation for Preventing Delirium in Elective Surgery for Aneurysms of the Abdominal Aorta (Meulenbroek et al., 2024) (13)	Belanda	Single-centre cohort study	204 pasien Abdominalis Aorta Aneurysm (AAA) dengan elective repair (open surgery dan endovascular aortic repair)	Multimodal Prehabilitation	1. There was a difference in the level of delirium in the intervention group (4.9%) and the control group (11%) 2. There was a significant difference in length of hospitalization, especially in patients with EVAR
Long-term Outcomes of Major Abdominal Surgery and Postoperative Delirium after Multimodal Prehabilitation of Older Patients (Janssen et al., 2020) (14),	Belanda	Single-centre study	627 Abdominalized Aortic Aneurysm (AAA) patients or colorectal cancer patients who will undergo elective surgery	Multimodal Prehabilitation	There was no significant effect on patient survival
The Abdominal Aortic Aneurysm Get Fit Trial: A Randomised Controlled Trial of Exercise to Improve Fitness in Patients with Abdominal Aortic Aneurysm (Haque et al., 2022) (15).	United Kingdom	Randomised Controlled Trial	56 elective AAA repair patients (open or EVAR)	Community Exercise Programme (CEP)	There was a significantincrease in peak VO2 (a measure of cardiorespiratory fitness) compared to the control group.

Based on the results of the analysis, it is shown that there are several types of prerehabilitation for Abdominal Aortic Anerysm (AAA) patients with elective repair, namely the Supervised Exercise Program (SEP) (12), Multimodal Prehabilitation (13); (14), Community Exercise Programme (CEP) (15). These interventions mostly showed

effects in Abdominal Aortic Anerysm (AAA) patients undergoing elective repair such as an impact on improved survival, lower levels of delirium, and a significant increase in peak VO2. However, one of the results of the implementation of multimodal prerehabilitation did not have a significant effect on survival (14).

DISCUSSION

Pre-operative training plays an important role to increase an individual's functional capacity before surgery to improve postoperative outcomes (16). The literature review that has been conducted shows that there is a significant influence even if it does not have an effect from prerehabilitation interventions. This difference in outcome can be influenced by variations in the provision of prerehabilitation protocols or influenced by patient characteristic factors such as the severity of AAA experienced (17). The Supervised Exercise Program (SEP) has shown significant results on patient survival. Other studies have also shown that SEP has a significant impact on postoperative complication rates and shorter length of hospitalization (18). SEP includes aerobic exercise and intensive resistance training, where structured exercises performed pre-operatively can increase physiological reserve and reduce surgical stress to speed up recovery (19). However, SEP did not show a significant impact on QoL (Quality of Life) and CEPT (Cardiopulmonary Exercise Testing) (12). This could be influenced by the sensitivity of the parameters used to assess the benefits of SEP and allow SEP to have more influence on long-term parameters such as mortality rates.

In addition to physical exercise, prerehabilitation also combines optimal nutritional fulfillment and stress management which can reduce the incidence of postoperative complications such as delirium with an incidence of 4.9% and reduce LOS (Length of Stay) (13). The findings show that a holistic approach to rehabilitation plays a role in protecting patients' cognitive function (20). Because regular physical exercise can improve memory function in patients with high vascular risk (21). Then psychological support and stress management are needed to help overcome psychological problems that are commonly experienced by AAA patients such as anxiety (22). In addition, dietary interventions can also affect the improvement of the patient's cognitive function (23). However, on the other hand, there are findings that multimodal prerehabilitation does not have a significant impact on survival (14). This difference in findings may be due to long-term factors of cardiovascular disease and the lack of integration of multimodal prerehabilitation with long-term rehabilitation of postoperative patients.

Community Exercise Programme (CEP) based on prehabilitation programs also have an impact on increasing peak VO_2 which indicates improved karyorespiratory fitness (15). The increase in peak VO_2 is influenced by cardiovascular adaptations in physical exercise such as aerobic latiha which can increase stroke volume (heart efficiency) and peripheral blood flow (24). In addition, any increase of 1 mL/kg/min of peak VO_2 is associated with a 10–15% decrease in the risk of cardiovascular death (25). Therefore, CEP can be used as an option in sustainable programs because CEP is conducted on a community-based basis and has a higher accessibility opportunity than SEP so that it can improve long-term patient compliance.

Based on existing findings, it is known that SEP can support improved survival, multimodal prerehabilitation can reduce the incidence of postoperative complications, and CEP can be implemented as a long-term maintenance intervention. However, there are still no findings comparing the three approaches, so large-scale randomized trials are needed to evaluate the impact of the three approaches on long-term outcomes so that prerehabilitation can be a key component in the management of AAA in optimizing clinical and functional outcomes for patients.

CONCLUSION

Based on the review of scientific evidence

that has been carried out, it can be concluded that prerehabilitation with exercise training interventions has great potential in improving surgical outcomes in vascular surgery patients. Exercise training can improve the patient's functional capacity, reduce inflammation, improve immune function, and improve psychological well-being. By preparing patients physically and mentally for surgery, prerehabilitation can help reduce postoperative complications, speed recovery, and improve long-term outcomes.

Conflicts of interest

The authors stated that there was no conflict of interest in the preparation and publication of this literature review. No financial or personal relationship with any individual or organization affects the content, analysis, or conclusions in this work.

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REFERENCES

1. Sandra, Ennimay, Handra D, Rahmanisa TA. Edukasi Perioperatif. Yogyakarta: Zahir Publishing; 2023.
2. Sembiring YE. Unairnews. 2024 [cited 2025 Feb 25]. Peran Protokol ERAS (Enhanced Recovery After Surgery) dalam Pembedahan Vaskular. Available from: https://unair.ac.id/peran-protokol-eras-enhanced-recovery-after-surgery-dalam-pembedahan-vaskular/
3. Kumar V, Abbas AK, Aster JC. Robbins & Cotran Pathologic Basis of Disease. 10th ed. 2020.
4. Guirguis-Blake JM, Beil TL, Senger CA, Coppola EL. Primary Care Screening for Abdominal Aortic Aneurysm. JAMA. 2019 Dec 10;322(22):2219.
5. Chan WK, Yong E, Hong Q, Zhang L, Lingam P, Tan GWL, et al. Systematic review and meta-analysis of the prevalence of abdominal aortic aneurysm in Asian populations. J Vasc Surg. 2021 Mar;73(3):1069-1074.e1.
6. Sampson UKA, Norman PE, Fowkes FGR, Aboyans V, Song Y, Harrell Jr. FE, et al. Global and Regional Burden of Aortic Dissection and Aneurysms: Mortality Trends in 21 World Regions, 1990 to 2010. Glob Heart. 2014 Mar 1;9(1):171.
7. National Heart L and BI. NIH. 2022 [cited 2025 Apr 27]. Causes and Risk Factors Aortic Aneurysm. Available from: https://www.nhlbi.nih.gov/health/aortic-aneurysm/causes
8. van Beek SC, Conijn AP, Koelemay MJ, Balm R. Editor's Choice – Endovascular Aneurysm Repair Versus Open Repair for Patients with a Ruptured Abdominal Aortic Aneurysm: A Systematic Review and Meta-analysis of Short-term Survival. European Journal of Vascular and Endovascular Surgery. 2014 Jun;47(6):593–602.
9. Kumar Y, Hooda K, Li S, Goyal P, Gupta N, Adeb M. Abdominal aortic aneurysm: pictorial review of common appearances and complications. Ann Transl Med. 2017 Jul;5(12):256–256.
10. Rejo R, Arradini D, Darmayanti AT, Widiyanto A, Atmojo JT. Dampak Prehabilitasi Pada Pasien Praoperasi. Avicenna : Journal of Health Research. 2020 Oct 31;3(2).
11. Haddaway NR, Page MJ, Pritchard CC, McGuinness LA. PRISMA2020 : An R package and Shiny app for producing PRISMA 2020-compliant flow diagrams, with interactivity for optimised digital transparency and Open Synthesis. Campbell Systematic Reviews. 2022 Jun 27;18(2).
12. Sethi S, Ravindhran B, Long J, Gurung R, Huang C, Smith GE, et al. A preoperative supervised exercise program potentially improves long-term survival after elective abdominal aortic aneurysm repair. In: Journal of Vascular Surgery. Elsevier Inc.; 2024. p. 15-23.e3.
13. Meulenbroek AL, Steyerberg EW,

Janssen TL, van Mil SR, Faes MC, van der Laan L. The Potential Value of Prehabilitation for Preventing Delirium in Elective Surgery for Aneurysms of the Abdominal Aorta. Clin Interv Aging. 2024;19:51–5.
14. Janssen TL, Steyerberg EW, van Hoof-de Lepper CCHA, Seerden TCJ, de Lange DC, Wijsman JH, et al. Long-term outcomes of major abdominal surgery and postoperative delirium after multimodal prehabilitation of older patients. Surg Today. 2020 Nov 1;50(11):1461–70.
15. Haque A, Wisely N, McCollum C. Editor's Choice – The Abdominal Aortic Aneurysm Get Fit Trial: A Randomised Controlled Trial of Exercise to Improve Fitness in Patients with Abdominal Aortic Aneurysm. European Journal of Vascular and Endovascular Surgery. 2022 Oct 1;64(4):309–19.
16. Fenton C, Tan AR, Abaraogu UO, McCaslin JE. Prehabilitation exercise therapy before elective abdominal aortic aneurysm repair. Cochrane Database of Systematic Reviews. 2021 Jul 8;2021(7).
17. Wanhainen A, Verzini F, Van Herzeele I, Allaire E, Bown M, Cohnert T, et al. Editor's Choice – European Society for Vascular Surgery (ESVS) 2019 Clinical Practice Guidelines on the Management of Abdominal Aorto-iliac Artery Aneurysms. European Journal of Vascular and Endovascular Surgery. 2019 Jan;57(1):8–93.
18. Barakat HM, Shahin Y, Khan JA, McCollum PT, Chetter IC. Preoperative Supervised Exercise Improves Outcomes After Elective Abdominal Aortic Aneurysm Repair. Ann Surg. 2016 Jul;264(1):47–53.
19. Carli F, Bousquet-Dion G, Awasthi R, Elsherbini N, Liberman S, Boutros M, et al. Effect of Multimodal Prehabilitation vs Postoperative Rehabilitation on 30-Day Postoperative Complications for Frail Patients Undergoing Resection of Colorectal Cancer. JAMA Surg. 2020 Mar 1;155(3):233.
20. Hshieh TT, Yue J, Oh E, Puelle M, Dowal S, Travison T, et al. Effectiveness of Multicomponent Nonpharmacological Delirium Interventions. JAMA Intern Med. 2015 Apr 1;175(4):512.
21. Barnes JN, Corkery AT. Exercise Improves Vascular Function, but does this Translate to the Brain? Brain Plasticity. 2018 Dec 12;4(1):65–79.
22. Hughes J, Lumley E, Elstone A, Hall J, Michaels J, Nasim A, et al. Psychosocial problems caused by abdominal aortic aneurysm surveillance: A cross-sectional survey. J Med Screen. 2025 Apr 15;
23. Wesselman LMP, van Lent DM, Schröder A, van de Rest O, Peters O, Menne F, et al. Dietary patterns are related to cognitive functioning in elderly enriched with individuals at increased risk for Alzheimer's disease. Eur J Nutr. 2021 Mar 29;60(2):849–60.
24. van den Houten MML, Hageman D, Gommans LNM, Kleijnen J, Scheltinga MRM, Teijink JAW. The Effect of Supervised Exercise, Home Based Exercise and Endovascular Revascularisation on Physical Activity in Patients With Intermittent Claudication: A Network Meta-analysis. European Journal of Vascular and Endovascular Surgery. 2019 Sep;58(3):383–92.
25. Kokkinos P, Faselis C, Samuel IBH, Pittaras A, Doumas M, Murphy R, et al. Cardiorespiratory Fitness and Mortality Risk Across the Spectra of Age, Race, and Sex. J Am Coll Cardiol. 2022 Aug;80(6):598–609.