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The Impact of Work Status and Age in Choosing Type of Abdominal Aortic Aneurysm Repair



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ABSTRACT

Introduction: The PReferences for Open Versus Endovascular Repair of Abdominal Aortic Aneurysm (PROVE-AAA) trial aimed to determine the efficacy of a validated decision aid to enable better alignment between patient preference and their ultimate repair. We sought to determine the key factors influencing the decision-making of veterans for endovascular repair of abdominal aortic aneurysm (EVAR) or open surgical repair (OSR).

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Methods: A total of 235 veterans in the PROVE-AAA trial were asked their information sources regarding repairs, employment status, and preferred intervention. Answers were coded and analyzed using conventional content analysis to generate nonoverlapping themes, then stratified by employment status.

Results: Forty-two patients (17.8% of enrollees) provided their source of information for OSR prior to using a decision aid. 81% of retired veterans were greater than 70 y old, while 58% of nonretired veterans were greater than 70 ($P = 0.003$). The most common information source was from a vascular surgeon/professional or unspecified MD/other health professionals (51.4%), while sources from outside this group made up the remaining 48.5%. The most preferred procedure was EVAR. However, nonretired individuals were more likely to prefer OSR. These data on information source and preferred procedure were similar in patients who provided their source for EVAR.

Conclusions: Veterans in the PROVE-AAA study were more likely to be retired and more likely to rely on information from an unspecified MD/other health professionals for EVAR. Although both retired and nonretired veterans preferred EVAR the most, nonretired veterans were more likely to prefer OSR despite being younger.

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Introduction

Abdominal aortic aneurysm (AAA) is a common condition among US veterans. Each year nearly 5000 patients undergo AAA repair in Veterans Affairs (VA) Hospitals.¹ The existing approaches for the treatment of abdominal aortic aneurysms include open surgical repair (OSR) and endovascular aneurysm repair (EVAR). Multiple randomized controlled trials demonstrate that EVAR is associated with reduced perioperative morbidity and mortality in the 30 d following surgery compared to the open approach.^{2–4} However, studies have also demonstrated that with longer follow-up, patients undergoing AAA repair with EVAR have a significantly higher risk of secondary intervention and late rupture.⁵ Moreover, those treated with EVAR will require lifetime surveillance of their endografts.^{6,7}

The difficulty in clearly identifying an optimal path for each patient's AAA repair requires a shared decision-making process in order to achieve high alignment of patient goals, medical outcomes, and general patient satisfaction.^{8,9} The Preferences for Open Versus Endovascular Repair of Abdominal Aortic Aneurysm (PROVE-AAA) trial aimed to determine the efficacy of a validated decision aid to enable better matching between patient preference and their ultimate repair.¹⁰ Importantly, this trial used validated surveys and open-ended questions to better identify factors and information sources that influenced each patient's preference between OSR and EVAR.

Using this trial data, we sought to better understand how patients ultimately decide on the method of AAA repair that would best suit their needs. Specifically, we were interested in learning more about patients' main sources of information regarding the types of AAA repair. We also wanted to better understand the impact of veterans' retirement status and age on their preference for repair type, as such a nuanced analysis has not been well characterized. This aim is to assess repair preference based on age and work status while identifying other factors and information sources that may help providers to frame a better process of shared decision-making.

Methods

PROVE-AAA trial

The PROVE-AAA trial is a multicenter, cluster randomized controlled trial that enrolled 235 veterans from 23 centers in the VA system. These veterans had abdominal aortic aneurysms that measured at least 5.0 cm in anterior-posterior diameter and were candidates for both open and endovascular aneurysm repair. The design of this trial has previously been described.¹⁰

This study was registered at [ClinicalTrials.gov](https://clinicaltrials.gov). The VA central institutional review board and the institutional review boards of each study site (<http://www.clinicaltrials.gov/NCT03115346>) approved this study, and informed consent was obtained for all enrolled patients. This study was funded by a Health Services Research and Development Merit Award from the Veterans Affairs (ID: VA HSR&D 015-085).

Collection of veteran survey data

Following enrollment in the trial, veterans were asked a series of questions eliciting their information sources regarding either OSR or EVAR. These open-ended questions asked were 'Before you looked at the information pack, who or what was your main source of information regarding Open Surgery?' and 'Before you looked at the information pack, who or what was your main source of information regarding EVAR?' Employment status, age, and their preferred procedural intervention type before exposure to the decision aid were also recorded as part of this PROVE-AAA survey. Survey answers were transcribed and imported into Microsoft Excel (Microsoft, WA) for subsequent coding, thematic generation, and data generation.

Generation of codes and themes

Analysis was conducted via three steps. First, veteran responses were individually and independently coded by three blinded researchers (YDH—medical student, JMJ—medical

student, CJS—college student). Regular, biweekly meetings were conducted by the researchers to review individual codes until agreement was reached. A single dataset of mutually agreed upon codes was then generated from these meetings. Second, utilizing patterns identified by each researcher within the dataset, conventional content analysis was conducted to generate common, mutually exclusive themes for each question. Finally, each researcher's list of themes was combined, and a mutually exclusive theme was generated for each participant using consensus agreement. Further meetings were held to assign each code a nonoverlapping theme. One additional researcher (MAE—general surgery resident) served as an arbitrator, responsible for providing necessary surgical context and solving disagreements via discussion should they arrive. Results were stratified by employment status and reported using a standard qualitative methodology (Fig. 1). Differences in age and work status were analyzed via a chi-square test using STATA 15 software (StataCorp; College Station, TX).

Results

Veteran population description

In our cohort of 235 veterans, 81% of retired veterans were over 70 y old, while a significantly lower proportion, 58%, of nonretired veterans were over the age of 70 ($P < 0.003$). For the specific respondents on the source of information regarding EVAR, the median nonretired age was 72.5 y (interquartile range of 5), and the median retired age was 73 y (interquartile range of 7). For the respondents to the source of information regarding OSR, the median nonretired age was 72.5 (interquartile range of 2.8) and the median retired age was 73 (interquartile range of 7.5); 81.0% of veterans who provided their source of open surgical repair information were retired, and 76.7% of veterans who provided their source of EVAR information were retired.

Veteran responses

Of the 235 veterans enrolled in the PROVE-AAA study, 42 veterans (17.9%) provided their source of information for open surgical repair prior to using a decision aid. Separately, 43 veterans (18.3%) provided their source of information for EVAR prior to using a decision aid. These answers were frequently single words or short phrases that described their source of information. For example, many subjects simply entered 'vascular surgeon', 'surgeon', or 'radiology technician'. Other subjects, however, utilized the open space to provide a more detailed explanation. For example, one participant entered, 'I have gotten information here and I got a second opinion from a vascular surgeon in Orem, Utah'.

The responses from both questions were then transformed into 21 codes for responses to the question 'Before you looked at the information pack, who or what was your main source of information regarding OSR' and 23 codes for responses to the question 'Before you looked at the information pack, who or what was your main source of information regarding EVAR'. Codes were then analyzed using conventional content analysis to yield seven common themes for both questions: (1) MD-

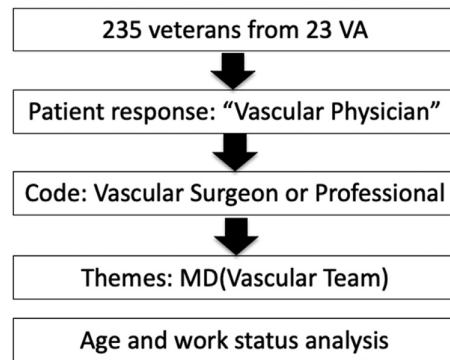


Fig. 1 – Flow diagram demonstrating workflow from patient response to code creation followed by thematic generation/analysis. 235 veterans from 23 VA sites across the country were recruited as part of PROVE AAA. These veterans provided responses to open-ended questions (e.g., Patient response: 'Vascular Physician'). This was then coded (e.g., Vascular Surgeon or Professional) before being further categorized into an overarching theme. Age and work status analysis was also conducted.

Vascular Team, (2) Non-MD Medical Staff, (3) Personal Research/Experiences, (4) Non-Medical Experience/Advice, (5) Non-VA Hospital, (6) VA Hospital, and (7) Wants More Information (Tables 1 and 2). These seven themes encompassed 68 codes from responses regarding OSR and 61 codes from responses regarding EVAR. It is important to note that many subjects responded with 'vascular surgeon' or with 'doctor' or 'dr'. Given the nature of these responses, we deemed it necessary to combine all codes similar to these into one theme (theme: MD) while detailing exactly how many responses specified information from a vascular surgeon or their team (subtheme: *Vascular Team*).

Thematic analysis

The most common source of information for veterans was an MD-level provider or their vascular team for information pertaining to both OSR (51.5%) and EVAR (52%). Nonetheless, we observed that nearly half of information sources for both OSR and EVAR came from sources outside an MD-level provider or their vascular team. For sources of information for open surgical repair, the second most common source of information was from non-MD medical staff (13.2%) (Table 1). For sources of information regarding EVAR, the second most common sources were non-MD medical staff (11.5%) and personal research/experience (11.5%) (Table 2).

Relationship of employment status and age with preference of repair type

We next sought to identify the patient factors that may be driving these veterans' preferences for AAA repair type. To do this, we stratified the entire cohort of 235 veterans by their age and employment status. We determined that for subjects who answered both questions, both retired and nonretired

Table 1 – Thematic categorization of responses to ‘Before you looked at the information pack, who or what was your main source of information regarding Open Surgery?’

Before you looked at the information pack, who or what was your main source of information regarding open surgery?

Total responses: 42

Themes	Code count
MD (vascular team)	35 (16)
Non-MD medical staff	9
Personal research/experience	6
Nonmedical experience/advice	2
Non-VA hospital	4
VA	4
Wants more information	1
Total	68

veterans most commonly preferred EVAR. However, non-retired veterans more frequently preferred OSR than their retired counterparts. For respondents to OSR information source, 38% of retired veterans preferred OSR compared to 18% of nonretired veterans (Fig. 2A). For respondents to the EVAR information source, 30% of retired veterans preferred OSR compared to 15.2% of nonretired veterans (Fig. 2B).

Discussion

In this study, we used open-ended survey responses gathered during the PROVE-AAA trial to perform a qualitative analysis of veterans’ information sources prior to abdominal aortic aneurysm repair. We demonstrate that the most common source of information for veterans prior to surgery was their ‘medical team/providers’ for both open surgical repair and endovascular aneurysm repair. Veterans drew half of their

Table 2 – Thematic categorization of responses to ‘Before you looked at the information pack, who or what was your main source of information regarding EVAR?’

Before you looked at the information pack, who or what was your main source of information regarding EVAR?

Total responses: 43

Themes	Code count
MD (vascular team)	32 (20)
Non-MD medical staff	7
Personal research/experience	7
Nonmedical experience/advice	1
Non-VA hospital	5
VA	5
Wants more information	4
Total	61

information from a diverse array of sources, including nonmedical staff, personal research/experience, nonmedical experience/advice, the VA, or a non-VA hospital system. Moreover, we found that while both retired and nonretired veterans tend to prefer EVAR over OSR, nonretired veterans were more likely to state a preference for open surgical repair of their abdominal aortic aneurysm.

Few studies in the vascular surgery literature have examined the sources from which patients in the United States derive their information prior to surgery. One recent publication by Ruske and colleagues notes that vascular surgery patients in a similar age group as this study were at risk of having poor comprehension of information needed for proper informed consent. Importantly, the authors note that an ethical conundrum is posed by a patient to feel supported and informed by their providers, while in fact, lacking an understanding of a surgery’s risks and benefits.¹³ Current literature also notes that vascular surgery patients usually have minimal understanding of their treatment options.^{12,13} It is important to note that while Anderson et al. drew their data from the same PROVE-AAA cohort, their analysis was conducted on a preliminary cohort of 99 patients and they did not conduct further analysis regarding the impact of age or retirement status on type of repair. We build on their conclusion of patients having little information prior to surgery by providing a more nuanced, qualitative analysis of veterans who provided answers in an open-ended format.¹² We have found that patients do tend to collect information, just not necessarily from a vascular-trained source.

The wide array of information sources for veterans prior to undergoing AAA repair reinforces the need for providers to be comprehensive and consistent in relaying information to their patients. Interestingly, we found that even among the ‘MD/vascular team’ information sources, patients frequently reported a nonvascular surgeon or a nonsurgeon as being a source of information. In fact, one patient even reported their urologist as being their primary source of information regarding AAA repair. These inconsistencies in how patients acquire their information prior to surgical consultation argue for patients to be provided with a standardized, validated decision aid (such as the one used in PROVE-AAA) to help inform their preferences for mode of AAA repair. Additionally, since physicians are the primary source of information, a physician’s biases would carry an outsized influence if the information is delivered improperly. Surgeons or members of the vascular team providing care should probe deeply for the sources of a patient’s information and clarify any existing misconceptions, when appropriate, in an unbiased manner. Through this process, the provider will be better able to help patients understand the choices available in order to reach a satisfactory shared decision.¹⁴

Furthermore, while both retired and nonretired VA subjects preferred EVAR in comparison to OSR, we show that nonretired VA subjects were more likely to prefer OSR than their retired counterparts. This is interesting because we originally hypothesized that nonretired subjects, because they were younger, would have preferred EVAR as such a procedure would have enabled their faster return to work due to the shorter length of stay associated with endovascular repair.¹⁵ However, given the data that we present and understanding

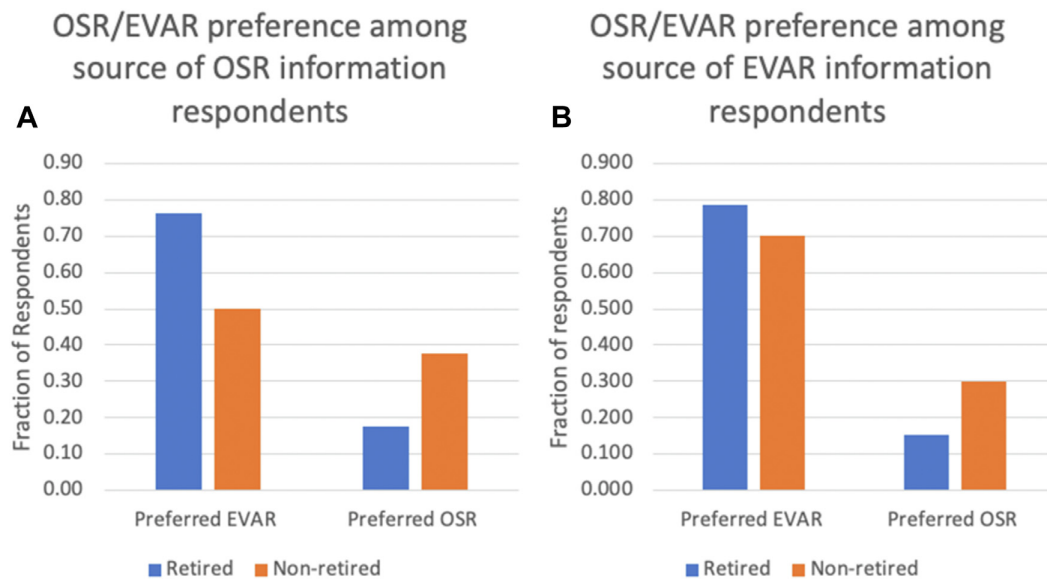


Fig. 2 – Analysis of OSR/EVAR preference among respondents to (A) source of OSR information and (B) source of EVAR information, stratified by work status. Nonretired and retired veterans who did not provide a preference for either EVAR or OSR were not included in this visualization for clarity.

that patient life experiences are heterogenous, we postulate that younger veterans were more likely to prefer open surgical repair because of the improved durability and reduced need for long-term follow-up. It is also important to note that these data could be the result of physician bias in explaining options to their patients. As older, more frail individuals may not be the most ideal open surgical repair candidates, they could be counseled toward EVAR. In comparison, younger patients, because they are generally less frail, might be counseled more toward OSR.

Through its qualitative nature, this study is able to identify veterans' information sources and factors impacting their AAA repair choice in a more nuanced fashion. This study is limited by the relatively small sample size and the self-reporting nature of the questionnaire. Additionally, as the questions lack specificity, we are unable to identify the exact quality of information that each patient received from their sources. The unequal and limited sample sizes between retired and nonretired groups preclude further statistical analysis. Despite its limitations, this study further suggests that deeper evaluation of preoperative information sources could subsequently be probed further using qualitative interview techniques.

Conclusion

A deep understanding of patient preferences in the context of abdominal aortic aneurysm repair modality is crucial to maximizing alignment and satisfaction. In this study, we demonstrate that the most common source of information for veterans prior to undergoing AAA repair is their medical provider. However, nearly half of all veterans appear to rely on information gleaned from a diverse collection of sources that

do not include their vascular team. Last, while both retired and nonretired veterans appeared to prefer endovascular repair, nonretired veterans were more likely to consider the open approach. This additional information regarding veteran's information sources and preferences can help vascular surgeons work with patients to reach a shared decision regarding the optimal modality of AAA repair.

Supplementary Materials

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jss.2021.12.036>.

Author Contributions

YDH and JMJ have contributed equally to this manuscript and share the first authorship. YDH, JMJ, MAE, and PPG have had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed to the concept and design of this study. All authors contributed to the acquisition, analysis, and interpretation of data, drafting of the manuscript, and critical revision of the manuscript. PPG obtained funding.

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Disclosure

None declared.

Meeting Presentation

An abstract of this manuscript was presented at the 2021 Academic Surgical Congress Meeting.

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