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Factors Influencing Vascular Surgeons' Compliance with Elective Repair Guidelines for Abdominal Aortic Aneurysm: A Qualitative Study

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WHAT THIS PAPER ADDS

This is the first study to apply a behavioural science approach to explore factors influencing vascular surgeons' compliance with the intervention threshold for abdominal aortic aneurysm (AAA). It uncovered a complex interplay of factors that may play a role in early elective repair, including surgeons' interpersonal communication skills for reassuring anxious patients, their beliefs about the outcomes of surgery *vs.* watchful waiting, and inconsistencies in measurement approaches for assessing aneurysm size. Understanding and addressing these factors could enhance evidence based care aligning with clinical guidelines and support better patient centred care in AAA management.

Objective: Despite guideline recommendations to delay elective abdominal aortic aneurysm (AAA) repair until the diameter exceeds the intervention threshold, a notable proportion of repairs occur earlier. This study aimed to explore factors influencing vascular surgeons' compliance with the intervention threshold regarding AAA repair, adopting a behavioural science perspective.

Methods: This qualitative study employed semi-structured interviews with vascular surgeons. Twelve vascular surgeons, randomly selected from 30 Dutch hospitals, participated in face to face interviews between January and May 2024. The study was guided by a behavioural science approach, using the Theoretical Domains Framework (TDF), which incorporates 14 theoretical domains that can be organised into three overarching categories of the COM-B model: capability, opportunity, and motivation. Together, these domains provide a comprehensive overview of factors influencing compliance with clinical guidelines. Data analysis involved thematic analysis using ATLAS.ti, with codes inductively and deductively derived based on the TDF.

Results: Surgeons exhibited varying perspectives on early AAA repair. Some justified early intervention for patient centred reasons, while others regarded it as poor practice. Key factors influencing compliance included: surgeons' interpersonal communication skills in reassuring patients; surgeons' knowledge about measurement methods; environmental constraints, such as limited consultation time; social influences, such as patient pressure; surgeons' beliefs about the risks associated with early repair; incentives related to the reimbursement system; and surgeons' perceived capabilities in proposing a watchful waiting approach slightly below the intervention threshold. Suggestions to reduce early repair included tools for accurate rupture risk prediction, updated research on intervention thresholds, and additional consultation time and enhanced psychological support for patients.

Conclusion: Vascular surgeons' behaviour regarding AAA repair near the intervention threshold is shaped by a complex interplay of factors within the TDF domains of capability, opportunity, and motivation. Addressing these factors could enhance adherence to evidence based guidelines, leading to more consistent practices that prioritise patient outcomes.

Keywords: Abdominal aortic aneurysm, Behaviour change, Healthcare provider behaviour, Vascular surgeon
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INTRODUCTION

Due to the risk of rupture, larger abdominal aortic aneurysms (AAAs) warrant surgical repair,[1,2] although surgery itself carries risks, including death[3] or (temporary) reductions in health related quality of life and functional status,[4–6] especially after open repair.[7] In contrast, routine monitoring of smaller AAAs has no negative impact on health related quality of life.[8] The risks and costs associated with surgery for smaller aneurysms often outweigh the benefits, as several trials have shown no advantage to early repair.[9,10] Current guidelines for the management of elective AAA repair therefore recommend considering surgery for AAAs measuring $\geq$ 55 mm by ultrasound in men and possibly $\geq$ 50 mm in women, while advising against repair below these thresholds.[1]

Despite these guidelines, many aneurysms are repaired below the recommended threshold. A large US study investigating 17 269 elective repairs found a median diameter of 54 mm,[11] while registry data in the Netherlands reported that of the 9 039 elective procedures, 15% occurred below the threshold of 55 mm for men.[12] It is likely that this proportion reflects an underestimation, as it was found, in a nationwide Dutch study, that 86% of repairs were scheduled below 55 mm.[13] Most of these size estimates were based on computed tomography (CT) (not ultrasound), suggesting that registry data and possibly surgeons do not distinguish between size estimation methods, and thus reflect CT rather than ultrasound based size readings.[14] While some early repairs are justified, this high percentage suggests other contributing factors beyond valid reasons. Although clinical guidelines provide clear recommendations, the observed high incidence of early repair indicates that their publication alone does not guarantee adherence.[15,16] However, compliance with the consensus intervention threshold has benefits such as cost savings, reduced health risks, and preserved quality of life and functional status.[4–7,9,10,17]

To promote compliance with the consensus intervention, it is necessary to have a clear understanding of the behavioural factors that play a role in this context. At this point, however, factors driving early repair remain unclear. In conducting such an exploration, it is important to adopt a behavioural science informed approach, as healthcare professional behaviour is often determined by factors beyond the usual suspects of time or knowledge. Instead, factors such as interpersonal dynamics within medical teams and physicians' beliefs about the risks associated with different treatment options could also play a role.[18,19]

This study aimed to explore vascular surgeons' reasons for performing early AAA repair (i.e., below 55 mm for men and below 50 mm for women) and to investigate the behavioural factors influencing compliance with the consensus threshold. A behavioural science perspective was adopted, and the Theoretical Domains Framework (TDF),[20] a comprehensive model designed to examine healthcare practitioners' behaviours particularly regarding the implementation of evidence based guidelines, was applied.[20–22] The TDF has widely been used to understand factors driving surgeons' behaviours[15,23,24] and to explore factors explaining compliance with clinical evidence based guidelines.[25,26] However, its application to aneurysm surgery specifically is a novel approach, offering new insights into the behavioural determinants in this context.

METHODS

Study design, participants, and procedure

This study employed a qualitative design, utilising semi-structured interviews with vascular surgeons involved in AAA treatment. Firstly, 25 Dutch hospitals performing AAA procedures were randomly selected using an online random number generator. The random number generator was again applied to select and invite one vascular surgeon from each centre for participation. Invitations, including an information letter, were sent by email or letter, followed by a phone call to schedule single face to face interviews at the participant's department. This random selection approach aimed to minimise selection bias and ensure diverse perspectives, avoiding recruitment based on specific opinions on early or late intervention. Two behavioural scientists (M.B. [female, senior researcher] and L.C.G. [male, assistant professor]) conducted the interviews between January and May 2024. To prepare, they reviewed AAA management literature, familiarised themselves with key terminology, and attended outpatient clinics and multidisciplinary team meetings to deepen their understanding of AAA care. This preparation ensured productive interactions with participants. Interviews continued until no new insights emerged in two consecutive interviews, indicating reaching data saturation.[27,28] Of the initial 25 invited surgeons, ten participated in the interviews. As saturation was not yet reached, five additional hospitals and vascular surgeons were randomly selected, leading to two more interviews, after which data saturation was achieved. This study was approved by the non-WMO committee of the Leiden University Medical Centre (no. 2024-034). The 32 item COREQ checklist is reported in Supplementary Table S1.

Theoretical framework

The TDF[20] was used to explore factors influencing compliance with the intervention threshold. Originally developed by Michie *et al.*,[21] the TDF was specifically designed to identify domains relevant to healthcare practitioners' behaviour, particularly regarding the implementation of evidence based guidelines. This makes the framework highly relevant for understanding vascular surgeons' behaviour related to compliance with the intervention threshold in AAA repair.[15,22] Initially comprising 12 domains derived from behaviour theories,[21] the TDF was later expanded to 14 theoretical domains that provide a more comprehensive understanding of healthcare practitioners' behaviour.[22,29] These 14 domains were subsequently integrated into the more recent COM-B model,[22,29] which conceptualises behaviour as driven by three components: capability, opportunity, and motivation.[29] Capability refers to whether someone has the knowledge, skills, and abilities to engage in a behaviour,[29] encompassing the TDF domains *knowledge*, *cognitive and interpersonal skills*, *memory, attention, and decision processes*, and *behavioural regulation*. Opportunity refers to

external factors enabling behaviour,[29] including the domains *social influences* and *environmental context and resources*. Motivation refers to internal processes influencing behaviour,[29] encompassing *reinforcement*, *emotion*, *social/professional role and identity*, *beliefs about capabilities*, *optimism*, *intentions*, *goals*, and *beliefs about consequences*. Further details on each domain are provided in Supplementary Table S2.

Interview guide

The interview guide was developed by behavioural scientists (M.B., L.C.G., and M.A.A.) in collaboration with researchers in vascular surgery (J.H.L. and J.F.H.). It included open ended questions on factors that could influence vascular surgeons' behaviour, followed by in depth questions on the TDF domains. Pilot interviews with two surgeons were conducted to test and refine the interview guide, resulting in minor refinements. These pilot interviews were not included in the analysed interviews. The final guide is available in Supplementary Material S1.

To minimise socially desirable responses, such as claiming to never perform early repair, techniques from Bergen and Labonté[30] were applied, ensuring confidentiality, using indirect questioning, providing context on early repair prevalence, and prompting specific examples.

Analysis

The semi-structured interviews were analysed using ATLAS.ti (v. 23.2.1) through thematic analysis.[31] Interviews were audio recorded and transcribed verbatim, and were coded deductively, based on the TDF,[20–22] and inductively.[31] Codes were then grouped into overarching themes, which were the overall TDF domains in the case of the deductive codes. For result presentation purposes, the TDF codes and themes were categorised into the three categories of the COM-B model.[29] M.B. and L.C.G. independently coded one transcript, compared results and discussed differences, and reached consensus on the final codes. They then coded another transcript separately, after which they again reached consensus on the final code set. M.B. applied this final code set to the remaining interviews. Any uncertainties were resolved through discussion. Additionally, it was checked whether data saturation was reached when no new codes emerged in two consecutive interviews.[27,28]

RESULTS

Of the 30 invited vascular surgeons, 12 participated in the interviews. Their characteristics are outlined in Table 1. The interviews lasted on average 53 minutes, ranging 40 – 77 minutes.

Overall, opinions regarding the practice of early repair varied. Most surgeons believed that it was extremely rare without valid medical reason, with some doubting that any surgeon would intentionally operate on smaller aneurysms. As stated by participant 1, "No, it is just poor care. It is against the guidelines." Initially, all surgeons stated that they never operated below the intervention threshold; however, upon further discussion, some surgeons explained that early repair might occur, although they believed that was rare and typically justified by either medical justifying reasons or patient anxiety. Participant 9 explained: "There are still people who can't sleep at night because they feel the aneurysm pulsing and believe it could rupture any moment. For those with extreme anxiety, we sometimes operate between 5 and 5.5 centimetres (for male patients)." In such cases, some surgeons considered early repair to be good care as it addressed the patient's distress, despite deviating from guidelines.

Table 1. Characteristics of vascular surgeons (n = 12) participating in interviews on compliance with consensus thresholds for abdominal aortic aneurysm repair.

Characteristic	Participants (n = 12)
Sex, male	100
Age – y	46.6 (37–55)
Ethnicity, Dutch	92
Professional experience – y	12.4 (3–19)
Type of hospital working in	
Peripheral	75
University	25

Data are presented as % or mean (range).

The analysis of factors influencing compliance with the consensus threshold identified several codes and themes corresponding to the domains of the TDF, which were categorised into the categories of the COM-B model. An overview of all codes is provided in Supplementary Table S3. The most significant codes and themes under each overall category of the COM-B model are presented in Figure 1 and discussed below.

Capability

Within capability, codes related to the TDF domain *skills* were particularly found to underlie the decision-making of vascular surgeons. A key expressed skill was the skill to reassure anxious patients, especially those very fearful of aneurysm rupture. This reassurance was critical in preventing surgeons from opting for surgery before the AAA reached the threshold diameter, as explained by participant 7: "I always reassure people and explain to them, 'Listen, if we propose a treatment, it's to address a longterm risk'. I completely talk people out of the idea, the concept of a ticking time bomb." Surgeons mentioned that they sometimes could not reassure certain patients, leading them to sometimes perform surgery earlier than usual for the sake of the patient's peace of mind. As participant 12 noted, "Some patients feel like they have a time bomb in their stomach and experience psychological distress because of it. It's hard to change that mindset."

Strong communication skills also played a crucial role in avoiding early surgery. Surgeons emphasised that clearly explaining the risks of both waiting and surgery helped patients to make informed decisions. As participant 6 explained: "If you can explain it well, the patient will go along. Most people don't want surgery, especially if you can convince them it's unnecessary."

Empathising with patients and understanding their fears was another skill that was relevant for avoiding early surgery. This was highlighted by participant 10, who remarked,

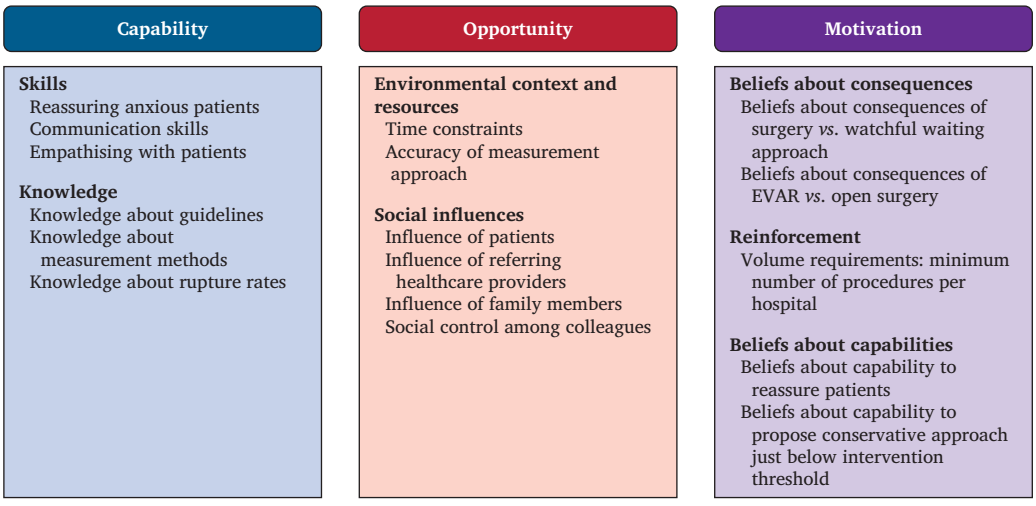

Figure 1. Factors influencing compliance with consensus intervention thresholds for abdominal aortic aneurysm repair among vascular surgeons, corresponding to the domains of the Theoretical Domains Framework (TDF), categorised into the three overall categories of capability, opportunity, and motivation of the COM-B model. Capability refers to whether the individual has the knowledge, skills, and abilities to engage in behaviour; opportunity refers to external factors enabling behaviour; and motivation refers to internal processes influencing behaviour.[20] EVAR = endovascular aneurysm repair.

"I think it's important to connect with the patient's world, to understand their thoughts, wishes, and ideas during the consultation, and to engage with them on that level."

Next to skills, another code related to the TDF domain *knowledge* emerged. All interviewed vascular surgeons had sufficient knowledge about the guidelines. However, some reported relying on the threshold diameter from a CT scan as the threshold for surgery, despite clinical guidelines recommending ultrasound measurements,[1] indicating a knowledge gap at the individual surgeon level. This threshold is derived from studies using ultrasound, whereas CT measurements typically result in larger size estimates.[1,14] For example, participant 5 explained how he uses the CT scan diameter: "If you measure 5.3 centimetres on an ultrasound, the diameter is always more than 5.5 on the CT scan. So, there's a bit of a difference in the measurement methods, and technically, you're still adhering to the guidelines."

Lastly, surgeons mentioned that a lack of precise data knowledge on rupture rates at different diameters, especially those just below the intervention threshold, hinders making fully evidence informed decisions and using this information to show to patients. As one participant stated, "We know it's about 5% per year at 5.5 cm, but we don't have solid data on whether it's 2% or 3% at 53 mm."

Opportunity

Several codes within the category opportunity influenced surgeons' behaviour. One key factor, related to the domain *environmental context and resources*, was limited time per patient. Some surgeons noted that time constraints made it more challenging to fully reassure patients about the safety of watchful waiting. Effectively communicating this approach often required multiple consultations, as patients and their family often need time to understand and feel comfortable with not operating. As participant 5 noted, "Sometimes you need three consultations to reassure them. Multiply that by 30 minutes." This suggests that limited time may contribute to challenges in fully supporting a watchful waiting approach, particularly for anxious patients.

Another code related to *environmental context and resources* was the lack of accurate measurement approaches for precisely assessing aneurysm size, with variations of a few millimetres depending on who takes the measurement and how it is done. As participant 4 explained: "Because I don't believe we can measure with millimetre precision, it's an illusion. There's at least a margin of half a centimetre." Consequently, surgeons felt hesitant to recommend a watchful waiting approach when the diameter was just below the intervention threshold, suspecting that the actual size might already exceed it.

Codes related to the TDF domain *social influences* also emerged. The influence of the patient played an important role, for example the patient really insists on surgery. As participant 2 explained: "The push towards surgery mostly comes from the patient. I wouldn't, for almost anyone with an aneurysm just under 55 millimetres, recommend treatment. But if the patient insists [...] then we sometimes go ahead with it." Despite deviating from the guidelines, some surgeons considered early repair as a consequence of shared decision-making as "good" care. Another social factor was that surgeons sometimes felt pressure from referring physicians who had already discussed surgical options with the patient, often creating the expectation of surgery. Participant 4 described: "Yes, and the doctor from the other hospital had already said, 'They're going to fix this for you.' [...] This often prevents the information you want to convey from getting through." Family pressure was another social influence, as patients' families often had strong opinions about the best

course of action, especially when anxious about potential rupture risks. Finally, social influences also involve the role of direct colleagues. Participants explained that multidisciplinary team meetings (MDT) primarily provided technical advice on the feasibility of surgery rather than co-deciding on whether to perform surgery, which remained the treating surgeon's responsibility. Still, participants described that MDTs helped prevent early surgery by requiring justifications for decisions and ensuring operations only when clinically necessary. Most surgeons noted that the regular norm among their colleagues was to not perform surgery under the threshold diameter. This is illustrated by participant 4: "Everyone finds it perfectly logical and standard to adopt a watchful waiting approach and to continue with that. So, it's more of a general consensus that everyone does it this way. I think it would be more noticeable if you don't adhere to it."

Motivation

Several codes emerged in the motivation category. Related to the TDF domain *beliefs about consequences*, surgeons who more strongly believed in the risks and negative outcomes of surgery were more resistant to early repair. Conversely, those who believed that surgery had become safer over time were more positive towards early repair. These beliefs were also influenced by scepticism toward the literature underpinning the consensus threshold, with some surgeons questioning the age of the evidence or the variability in reported rupture risks. Those who doubted the likelihood of an aneurysm rupturing at around 55 mm (for male patients) were more positive towards delaying surgery until the aneurysm reached a larger diameter. Surgeons were more open to early repair if endovascular aneurysm repair was an option, considering it as less risky compared with open surgery. As participant 4 noted: "If it's a straightforward aneurysm treatable endovascularly with a less than 1% complication risk, I don't see it as a wrong decision to repair."

Related to the TDF domain *reinforcement*, surgeons recognised that volume requirements set by Dutch healthcare authorities, which mandate a minimum number of operations per hospital to maintain accreditation, may reinforce early repair. However, all surgeons denied that this affected their own decisions, although they believed that it might impact other hospitals. Participant 9 illustrated this, stating: "We have no need to operate just to meet quotas, we have plenty of aneurysms. But I'm sure some hospitals do that, just not us."

Regarding the TDF domain *beliefs about capabilities*, most surgeons felt confident in their ability to reassure patients and advocate waiting until the aneurysm reached the intervention threshold. However, if the aneurysm was slightly smaller, some found it difficult to explain why a patient should wait. As participant 8 shared, "Justifying that extra millimetre is always difficult. The patient says, 'Why wait at 54?' […] I personally find it quite difficult to explain sometimes."

Suggested solutions to existing barriers

Next to factors influencing compliance with the intervention threshold that were deductively coded based on the TDF, participants also suggested several solutions that could help to reduce the frequency of early repair. These insights were derived through inductive coding. Many surgeons expressed a strong desire for a prediction tool that could provide more accurate estimates of rupture risks *vs.* surgical risks. Such a tool would assist them in demonstrating to patients why waiting longer for repair might be the safer option. Additionally, participants highlighted the need for updated research on the threshold diameter for surgery, as some believed that current guidelines are based on outdated data. They also called for better insights into the broader consequences of surgery, beyond peri-operative death, including the psychosocial impact on patients. Lastly, surgeons emphasised the importance of enhanced psychological support for anxious patients to help alleviate fears. This support could make it easier to advocate a more conservative approach when appropriate.

DISCUSSION

Despite a uniform consensus intervention threshold, a proportion of elective repairs occur before this threshold is reached.[11–14,32] This pilot study offers an initial exploration of behavioural factors influencing vascular surgeons' compliance with the recommended consensus diameter for AAA repair. The findings reveal an important role of several domains derived from the TDF.[20] Emerging key factors for considering early repair included skills regarding interpersonal communication and patient reassurance, knowledge related to variation in the interpretation of size estimates, environmental constraints, such as limited time for reassuring patients, social influences including pressure from patients, families or referring healthcare providers, beliefs about consequences of different treatment options that vary among surgeons, reinforcement through volume requirements set by the Dutch government, and beliefs about capabilities in advocating a watchful waiting approach just below the intervention threshold.

This study revealed variation in surgeons' perceptions of rupture risks and the risks and benefits of early repair *vs.* watchful waiting. Some considered early repair unnecessary or even poor practice, while others saw it as beneficial for some patients. These findings align with previous research highlighting the important role of healthcare providers' beliefs on clinical decision-making and adherence to guidelines.[33,34] Limited robust data, in general and especially for women, on rupture risks near the threshold further complicates decisions.[35,36] Despite difficulties in providing such data, this underscores that surgeons are still in need of updated rupture risk data and clearer insights into how elective repair impacts patient outcomes. However, Dale *et al.*[37] found that even experienced vascular surgeons may be influenced by recent negative events, such as unexpected ruptures, despite having readily available statistical risk information. This underscores a need for not only evidence based data but also strategies to address the cognitive and emotional factors affecting decision-making.

The study also found variability in interpreting size estimates. While most surgeons considered early repair to be rare, this

contrasts with higher rates reported in the literature and observations from a large Dutch study.[13] This discrepancy may stem from differences in measurement protocols and the systematic difference between ultrasound and CT based readings.[14] While the conclusions of the UK Small Aneurysm Trial (UKSAT) are based on a conservative size estimation protocol (e.g., inner to inner, maximum anterior—posterior size),[38] and guidelines advise that decisions for intervention should be based on ultrasound,[1] most surgeons do not discriminate between the different size estimation methodologies. Many decisions for repair are based on CT readings.[13] Considering the systematic 5 mm size difference between ultrasound and CT based readings,[14] the indiscriminatory use of CT and ultrasound based estimates may potentially lead to overtreatment and distorted perceptions of early repair prevalence.

This study further found that most surgeons felt confident recommending watchful waiting when the aneurysm had not yet reached the intervention threshold, even for initially anxious patients. This aligns with research showing that Dutch patients under monitoring trusted their surgeons without experiencing rupture anxiety.[39] However, some surgeons noted difficulties in reassuring highly fearful patients, occasionally opting for surgery to ease their concerns. This supports a hypothesis from a study investigating US repairs, which suggested that, next to legitimate factors such as rapid aneurysm growth and being female, patient preference may also have contributed to early repair.[11] This reflects a shift from evidence based care to patient centred reassurance, a common phenomenon in healthcare because patients often equate more treatment with better care.[40,41] These findings highlight the need for sufficient consultation time and psychological support to build trust and address anxiety.[42] Training in communication and empathy skills is essential to effectively reassure anxious patients and avoid overtreatment. The surgeon can overlook the consequences of an intervention by understanding the psychological and social context of the patient; such understanding also takes time to get to know the patient.

Several limitations must be considered. While the findings provide valuable insights, they should be interpreted within the context of qualitative research. Future studies, particularly quantitative research, are necessary to validate these findings. This pilot study only included Dutch vascular surgeons, consequently the findings may be specific to the Dutch healthcare system and may not fully apply to other countries, as there might be differences in culture and reimbursement incentives. Future research should explore whether similar factors influence guideline compliance in other healthcare settings. A further limitation is the lack of diversity. While this partly reflects the rather homogeneous composition of the vascular surgery community, the random selection process included two female surgeons, but both were unavailable, resulting in a sample composed entirely of male. Existing sex differences in traits and communication styles[43,44] may affect decision making, and consequently observations from this study may not fully apply to female surgeons or other cultures. Additionally, the relatively small sample size of 12 vascular surgeons may be perceived as a limitation, but a large systematic review suggested that data saturation is typically reached within 12 to 13 interviews, particularly in studies with relatively homogeneous participant groups, such as the current one.[28] Lastly, reliance on self reported interview data could introduce social desirability bias,[45] despite efforts to minimise this.[30] Surgeons may have hesitated to fully disclose deviations from guidelines, highlighting the value of anonymous surveys to provide deeper insights into decision-making.

This study highlights several implications. Firstly, multifaceted strategies are needed to support evidence based decision-making on early repair. Given the influence of patient anxiety, enhancing communication and empathy training for surgeons and additional support for anxious patients would be beneficial. Clear, accurate rupture risk data and predictive tools that integrate personalised risk data could help surgeons convey the benefits of watchful waiting and make data driven decisions. To address the time demands of explaining watchful waiting, structured consultations with psychological support or improved patient education materials could be useful. Also, since systematic differences between ultrasound and CT size readings are often overlooked, guidelines could include distinct thresholds for each method or reinforce training to prioritise ultrasound based readings. Finally, these exploratory results provide a proof of concept for using the TDF to design targeted interventions. According to Michie *et al.*'s behaviour change wheel,[29] identified TDF factors could be linked to behaviour change techniques, such as "behavioural rehearsal and practice" for improving interpersonal communication or "pros and cons" for addressing beliefs about treatment consequences.

This exploratory study highlights the complex interplay of factors that could play a role in vascular surgeons' compliance with evidence based guidelines related to AAA management. Key factors include interpersonal communication skills, beliefs about the consequences of treatment opportunities, and inconsistencies in measurement approaches for assessing aneurysm size. The findings could be used to design an intervention study in the future. Explicitly addressing these factors in the guidelines, coupled with the provision of improved patient information and psychological support, and promoting multidisciplinary collaboration, may help facilitate a more balanced approach that aligns with clinical guidelines and individual patient needs.

CONFLICTS OF INTEREST

All authors of the manuscript declare no financial and personal relationships with other people or organisations that could inappropriately influence the work. One of the authors (P.W.H.E.V.) was also randomly selected to participate in an interview but had no role in data analysis or the representation of the data.

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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.2025.07.018.

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