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Editor's foreword

Welcome to May 2025 edition of the *JVSGBI*.

This issue contains 3 articles addressing the important issue of the well being of early year vascular consultants. This time in young surgeons careers is well recognised as being challenging and stressful, leading not infrequently to adverse outcomes. A survey by Sritharan *et al*, identifies common contributing factors and two editorials outline potential ways to address these factors and provide support.

Other original articles in this edition include an assessment of the quality of guidelines for thromboprophylaxis following endovenous intervention for superficial venous incompetence and a survey of the management of acute limb ischaemia highlighting substantial variation.

Also in this edition is a protocol for a systematic review of the effectiveness of antimicrobial dressings to prevent surgical site infection in open surgical wounds.

An interesting case report of a post traumatic pseudoaneurysm of the superficial temporal artery, a letter to the editor highlighting the important topic of psychological well being of patients undergoing major lower limb amputation, and the Rouleaux Club Winning essays from 2024 are also presented

Finally there are updates from several vascular societies.

I would like to take this opportunity to encourage authors to continue to submit high quality research papers and to thank reviewers, administration & editorial staff for their ongoing hard work.

Ian Chetter
Editor in Chief JVSGBI
Vascular Society GBI President

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EDITORIAL

How do we best support our early year consultant vascular surgeons?

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The first few years of your consultant career can be a lonely space place, with the pressure to prove yourself in an NHS which is struggling for resources and demanding ever more from its workforce. The data from the survey published in this issue of the *JVSGBI* highlight the urgent need to place the well-being of our younger colleagues centre stage and to produce tangible, sustainable long-term solutions. The factors contributing to burnout, post-traumatic syndrome disorder (PTSD) and imposter syndrome are complex and multifactorial, but supporting our colleagues through complaints and complications, tackling bullying, undermining and harassment (BUH) and improving the shortfalls in our working environment, such as poor staffing and the burgeoning waiting lists, will go a long way to alleviate the distress described in this survey.

There are no easy fixes or a single solution, but inaction has significant consequences not only for the future vascular workforce but also the individual and, ultimately, the care we can offer our patients. If we can save at least one doctor from suicide, stop one doctor from drowning in the despairs of burnout and depression, stop one vascular surgeon from leaving the profession, then we are making progress. It would be unfair to say that nothing has been done, but the fact that these issues persist implies that it is still not enough. In a vocation where so much of your life is given to the job, it is time for the job to start giving back.

The naysayers amongst us will say that it is impossible to fix the woes of the NHS, that the workforce issues are deep rooted and extend across specialties and addressing these issues requires an unattainable shift in both culture and mind set. However, small changes at grass roots, within our own teams and specialty, are achievable.

This survey is an alarm bell which should not be silenced until we can show measurable improvement. This editorial examines some of the possible solutions – a few are quick wins whilst others will take years to realise their full benefit, but tackling the distress clearly revealed in this survey must be a priority.

Complications

"Every surgeon carries within himself a small cemetery, where from time to time he goes to pray…" (René Leriche). This certainly rings true for vascular surgeons. Our patients are often co-morbid and undergo complex operations and, unfortunately, despite our best intentions, complications will occur for all of us, without exception. Any complication can take an emotional toll, resulting in the surgeon then becoming the 'second victim'.[1] Complications clearly contribute to burnout, PTSD, feelings of imposter syndrome and concerns about career choice.

There are methods to combat these symptoms. How we share our experience matters, and formally organised Schwartz rounds could allow an insight into the vulnerability of ourselves and colleagues and enable us to explore and reflect on the emotional burden we carry. Their implementation has been shown to positively influence staff well-being, empathy and compassion for patients and colleagues.[2] However, for Schwartz rounds to be effective there needs to be strong senior leadership and a culture that allows open discussion without the fear of reprimand.

Mentorship, counselling and peer support are

Key words: burnout, mentoring, bullying, undermining and harassment, BUH, imposter syndrome

also recognised to be useful support mechanisms,[1] and when an adverse event is identified, this should trigger systematic damage preventing and ameliorating actions which are tailored to the individual's needs and may include some or all of the above.

Complaints

Twenty-five per cent of respondents in this study had experienced a complaint, investigation or other regulatory process as a consultant. Complaints also contribute to burnout, PTSD, feelings of imposter syndrome, concerns about career choice and consideration of leaving the NHS. Responses to complaints are usually delegated to the consultant involved to answer in isolation and often present as an unsolicited email communication. In our healthcare system we promote a 'no-blame culture', therefore we need to consider how we can change our approach in the event of a complaint to best support our colleagues. Responses could be drafted in collaboration with a named colleague, departmental manager with or without the support of trust legal teams. There should also be an acknowledgement that responding to complaints requires a significant amount of time, which is often not factored into individual job plans. Many colleagues develop personal support networks where they can reflect on how a complaint may have affected them. However, some have not, and a formal debrief following any complaint should be the considered norm, with counselling offered to some individuals as seen appropriate.

Bullying, undermining and harassment

We cannot tolerate a workplace where BUH is common. It is crucial that perpetrators are made aware and their actions addressed. Disappointingly, most episodes of BUH were not effectively managed, with only a minority of those experiencing BUH feeling adequately supported. The impact of BUH is far-reaching and should not be tolerated. Consider how you would act if you witnessed a trainee, a colleague or an allied health professional being the subject of BUH. It takes courage to speak up, but the standards we walk past are those that we are prepared to tolerate.

Imposter syndrome

Imposter syndrome is not an uncommon phenomenon in medicine and typically occurs among high performers who are unable to internalise and accept their success.[3] It is worrying that we train highly qualified professionals but are unable to imbibe them to have confidence in their own ability. We should celebrate and reinforce success in our colleagues, not simply focus on their deficiencies which, over time, can demotivate individuals and lead to the emotional burden this survey has described. Moreover, we should challenge the view that doctors are invincible and that seeking help is a sign of weakness.[3]

Mentorship

The positive impact of mentorship is well described but only 43% of respondents in our survey had a mentor. The clear benefits of mentorship affirm the need for all young consultants to have a mentor. It is, however, essential that any mentorship programme is formalised with appropriate structure, administration, training and job planned time.

Although this survey focuses on the early year consultant (EYC) cohort, mentorship could potentially benefit all consultants. Moreover, whilst most mentoring relationships in this survey were established locally, the benefits of a national programme merit investigation, noting that many other specialties in the UK and vascular surgeons internationally have adopted such schemes. The VSGBI is developing such a programme.

Job plan and work–life balance

EYC vascular surgeons with an ideal job plan/correct work–life balance are in the minority, the negative implications of which are significant. The issues here are complex, with an ideal job plan not automatically improving work–life balance. Empathetic and considered job planning, mentorship/coaching and reflection help create the space for individuals to better understand and prioritise the various aspects of their life.[4] Continuing work on the ASPIRE programme, particularly the ASPIRE EYC course, also aims to address some of these issues.

In summary, the findings of this survey are shocking and threaten the viability of the future vascular surgical workforce. Inactivity is not an option; we cannot afford to be passive observers. Changes must be made to overcome the highlighted problems and challenges. Compassionate leadership, formal mentorship, colleague support and empathy all have a role in changing culture. Each of us has a part to play and it is imperative that we take up the baton.

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EDITORIAL

Saving vascular surgeons: a personal view of embracing vulnerability through coaching and mentorship

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**Trigger warning – this article contains mention of surgical trauma.*

I would like to congratulate the authors on conducting the survey of Early Year Consultants in this edition of the *JVSGBI* and thank the respondents for their honesty in answering the questions.[1]

The results are worrying but, I am afraid to say, not surprising. As a former consultant vascular surgeon of 11 years standing, I have experienced first-hand the rewards but also the immense pressures and challenges that come with the role. If I had been asked to complete this survey during my first 5 years of practice I would have, unfortunately, been a statistic under every category.

During my second year of consultant practice I was diagnosed with post-traumatic stress disorder (PTSD) following a tragic trauma case. I suffered in silence for almost 6 months until one morning I was sat in clinic and it all came flooding out. I had fantastic support from my colleagues and treatment with Eye Movement Desensitisation and Reprocessing (EMDR) therapy. I made it back to work and slowly learned to love my job again. At that time I was still a general and vascular surgeon and, having spent many of my training years in the district general hospital to which I was appointed, I felt like I knew almost everyone. I felt safe. I had experienced some challenging complications, a complaint and low-level undermining by non-vascular colleagues, but the initial sense of loneliness and isolation as a new consultant quickly waned and I felt a sense of comradery, a sense that I could talk to my colleagues and share my experiences, receiving ad hoc advice in corridors and through theatre coffee room conversations. What might have been described as informal mentoring.

This was in contrast to my specific experience around the trauma case, which occurred in the trust for which I undertook vascular on call. Even though I called for support from a more senior vascular consultant colleague, I had not worked regularly with the other healthcare professionals in the operating room. Following the case, there was no immediate or delayed debrief. I was not in and around the staff and the hospital where it had taken place. Whilst I spoke to my local colleagues, the unique circumstances meant that I did not process my experiences and was never directed to someone who could offer support, and I felt shame, judgement and guilt about what I was feeling. In hindsight there were clear hooks or barbs which made it harder for me to self-process my experience. These are often parallels with one's own life or the challenge of the stark juxtaposition of emotions, even though what I was embodying were normal responses to abnormal situations.

Having suffered once before, I was acutely aware of the risk of developing PTSD again after a tragic maternity case I attended during the Covid pandemic. I did know many of the colleagues in theatre with me that day and we did, in fact, have a debrief that afternoon, which was helpful in piecing together the events from different people's perspective. I was feeling pretty good, reassuring other people and giving them advice about where they could go if they were struggling. That evening was the first NHS clapping and that highlighted the juxtaposition of emotions.

What might have changed my experience?

How many times have you been involved in a

Key words: coaching, mentoring, vulnerability, burnout, post-traumatic stress disorder

traumatic case where everyone has left the theatre afterwards and no words are spoken? Wouldn't it be better to acknowledge and share our vulnerabilities in the moment. As senior clinicians and even as residents, speaking up and saying, "That was hard, wasn't it?" offers an opportunity for reflection and role-models vulnerability. I encourage residents, consultants and, in fact, anyone involved in a traumatic event to undertake an immediate informal debrief. By this I mean the simple recognition of one's immediate emotions and experience, shared with those involved with the case.

Formal debriefs at a later date can then be facilitated to gain clinical learning. The Royal College of Surgeons of England is piloting the SUrgeon Peer-led POst-Incident Response Teams (SUPPORT) improvement collaborative, a programme which aims to improve the support systems provided to surgeons after adverse events across the UK.[2,3]

My experience of an attempt at this was helpful, but unfortunately did not close the loop as there was no follow-up after the initial debrief. Instead, I sought psychological support immediately and was reminded of techniques I could use such as meditation, gratitude practice and journalling. "80% of people are fine", they said. A month later I was not OK. The isolation and fear around Covid, the self-doubt and the shame of "How could this be happening again?" was raw. I sought support from NHS Practitioner Health, had EMDR therapy through my local staff psychology department and started having coaching.

The coaching was incredible. It gave me insights and tools which empowered me to be clear on my boundaries, clear on my vision and purpose and a recognition that I couldn't help others if my well of energy was empty. I was supported in my decision to stop on calls and eventually stopped vascular surgery altogether having found a new passion and purpose developing our local NHS@Home (Virtual ward service), for which I am now clinical director, and established my own coaching business for heart-led healthcare professionals.

My own experiences and the lack of ongoing regular support in my consultant life have driven my mission to support others facing similar challenges. As a professional coach and mentor, I regularly work with individuals struggling with burnout and imposter syndrome. I have seen and experienced first-hand the transformative power of coaching in helping individuals navigate their professional and personal challenges and opportunities.

I believe that the integration of coaching into the training and life of early years consultant vascular surgeons would create a healthier and more supportive environment. This would not only improve the well-being of surgeons but also ensure the sustainability and effectiveness of the vascular surgery workforce and the wider multidisciplinary team. In addition, patient safety would be enhanced as we know that there are clear links between burnout and surgical outcomes.[4]

Coaching often goes hand-in-hand with mentorship, providing a safe space for surgeons to share their experiences and seek guidance. Mentoring fosters a sense of belonging and support, and it inspires growth and transforms careers,[5] which is crucial in a demanding field like vascular surgery. I believe we have a real opportunity to shape the experience of future residents and consultants in vascular surgery. The transition from resident to consultant is a critical period that can be fraught with difficulties. I strongly believe that leading debriefs, coaching and mentoring should be integral components of vascular training and consultant life and not seen as a remedial solution reserved for crisis points.

In view of the findings of this survey and those completed by the Rouleaux Club, I believe the Vascular Society of Great Britain and Ireland has a duty to its members to support a shift in the cultural paradigm.

In conclusion, the findings described in this paper and my personal experiences emphasise the critical need for coaching and mentoring in vascular surgery. By integrating these support systems into training and consultant life, we can create a healthier, more supportive environment for vascular surgeons and the ripple effect will be seen across the wider multidisciplinary team.

Conflict of Interest: Founder of Becs Winterborn Coaching.

Funding: None.

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ORIGINAL RESEARCH

A survey of early year consultant vascular surgeons in the UK to assess well-being, support and the availability of mentoring

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Plain English Summary

Why we undertook the work: The transition from resident doctor into consultant life is recognised to be a challenging period. The aim of this survey is to understand the support available to newly appointed consultant vascular surgeons following a complication or complaint; to explore the incidence of bullying, undermining and harassment (BUH), burnout and imposter syndrome; and to understand the attitudes towards mentoring within this group.

What we did: UK consultant vascular surgeons in the first 5 years since their appointment were surveyed online over a 6-week period in 2023. The responses were collected using the survey server (SurveyMonkey) and analysed.

What we found: Almost half of all consultant vascular surgeons (45%) experienced BUH. In most cases the perpetrator(s) was a consultant colleague (63%), a colleague from a different specialty (41%) or a manager (30%). Most cases (70%) were not effectively managed by the employer and only one in three of those bullied were provided with the support they required; 39% of consultant vascular surgeons witnessed BUH in the workplace. Following a serious complication, one in four consultant vascular surgeons said that they did not receive any support, and almost one in three (31%) did not feel supported after a complaint, investigation or other regulatory process. Almost half (47%) of consultant vascular surgeons in the early stages of their career encountered a significant life event, with a third (34%) stating that they did not receive the support they required during this period. 16% reported symptoms related to post-traumatic stress disorder (PTSD) and 38% experienced burnout, with 68% feeling at risk of burnout. 55% reported imposter syndrome. Only one in three consultant vascular surgeons (34%) were working their ideal job plan, with the majority (58%) feeling unable to negotiate something better. Half of all consultant vascular surgeons (48%) surveyed had considered leaving the NHS and almost one in three (32%) regretted vascular surgery as a career choice. Only 43% had access to a mentor, with most (86%) believing that all newly appointed consultant vascular surgeons should have a mentor.

What this means: The survey reveals unacceptable levels of BUH in the workplace and failures to provide consultants with the necessary support following a complaint, complication or significant life event. The high self-reported rates of PTSD and burnout and the considerable number of consultants who have considered leaving the NHS is incredibly concerning. Unless the factors contributing to this are urgently addressed there will be a significant impact on recruiting and retaining future vascular specialists.

Abstract

Objectives: To explore the support available to newly appointed consultant vascular surgeons following a complication or complaint; to evaluate the incidence of bullying, undermining and harassment (BUH), burnout and imposter syndrome; and to understand the attitudes towards mentoring within this group.

Methods: A validated 59-question online survey was distributed by the Vascular Society of Great Britain and Ireland (VSGBI), British Society of Endovascular Therapy (BSET), and the Rouleaux Club through their national mailing lists between October and November 2023. Responses were collated using the survey server (SurveyMonkey). The results were summarised using descriptive statistics.

Results: Sixty-five consultant vascular surgeons responded, representing 54% of the target population. Eighteen (28%) were female and 47 (72%) were male. Forty (62%) had experienced a serious complication, with 25% not receiving any support. Sixteen (25%) had faced a complaint, investigation or other regulatory process, following which 31% (n=5) did not receive any support. Support when received was effective in 87% and 91% following a

complication and complaint, respectively. Twenty-seven (45%) experienced BUH, the perpetrator(s) in 17 cases (63%) being a vascular surgeon colleague, in eleven cases (41%) a consultant colleague from another specialty and in eight (30%) a manager. Most cases (n=19, 70%) were not effectively managed. Support was provided in only nine cases (33%) and was effective in six (67%) of these. Twenty-three (39%) witnessed others being bullied; the subject of BUH in 83% of cases was a vascular surgeon colleague and in 52% (n=12) a trainee. Only one case (4%) was effectively managed. Twenty-seven (47%) had encountered a significant life event since becoming a consultant, with only 18 (64%) receiving support. Nine (16%) reported post-traumatic stress disorder (PTSD), with 43% describing symptoms suggestive of PTSD including: re-experiencing of events (24%), avoidance of reminders of events (21%), negative emotions related to an event (35%) and chronic hyper-arousal syndrome (14%). Twenty-one (38%) experienced burnout and 38 (68%) felt at risk of burnout. Thirty-one (55%) reported imposter syndrome. Only 19 (34%) worked their ideal job plan, with the majority (58%, n=18) not feeling in a position to negotiate a better job plan. 48% (n=27) had considered leaving the NHS and 32% (n=18) felt they had made the wrong career choice. Only 24 (43%) had a mentor. All of those who had a mentor reported the relationship to be beneficial. Forty-eight (86%) believed that all newly appointed consultants should have a mentor.

Conclusions: This survey is concerning and reveals significant distress amongst early-stage consultant vascular surgeons. Unless the areas highlighted are urgently addressed there will be a significant impact on recruitment and retention in vascular surgery in the future.

Key words: burnout, mentoring, bullying, undermining and harassment, BUH, imposter syndrome

Background

The transition from resident doctor to consultant surgeon is regarded to be a period that can be extremely challenging for clinicians.[1] Over the past decade the UK surgical workspace has become more testing due to a reduction in clinical experience as a result of both the European Working Time Directive and the 'modernising medical careers' initiative.[1] These, amongst other factors, have been associated with increasing complaints and litigation, which promotes defensive management strategies and can have negative personal consequences.[2] In addition, vascular surgery is a unique specialty in that more than 70% of the workload is emergent, dealing with frequent life and limb threatening emergencies in a co-morbid patient population. Adverse outcomes including patient death are therefore, unfortunately, not uncommon.

In the future there is predicted to be a critical shortage in the vascular surgery workforce. Protecting the workforce and addressing the factors which affect recruitment and retention into vascular surgery has therefore never been more important.

The aim of this survey is to explore the support available to early year consultant (EYC) vascular surgeons, to understand the incidence of bullying, undermining and harassment (BUH), burnout and imposter syndrome in this cohort and their attitudes towards mentoring.

Methods

The Checklist for Reporting of Survey Studies (CROSS)[3] was used to compile this report. This online cross-sectional survey was aimed at UK consultant vascular surgeons in the first five years of independent practice. The questionnaire was designed and developed by five consultant vascular surgeons at varying stages of their career. Following multiple consensus meetings regarding important topics and questions, a survey was developed of 59 questions divided across 10 broad areas: demography; complications and complaints; bullying, undermining and harassment (BUH); sexual harassment; significant life events; PTSD; burnout; imposter syndrome; job plans and work-life balance; and the availability of mentorship (see Appendix 1 online at www.jvsgbi.com). Following inception, the survey was validated by a group of independent consultant vascular surgeons. Questions were a mixture of open and closed questions, and all closed questions were mandatory. All responses were anonymised and confidential.

There are an estimated 120 consultant vascular surgeons in their first 5 years of consultant practice. This figure is based on the numbers that were invited and/or have attended the ASPIRE 8 consultant preparation course over the last 5 years. The survey was distributed via email by the Vascular Society of Great Britain and Ireland (VSGBI), British Society of Endovascular Therapy (BSET) and the Rouleaux Club through their national mailing lists. Eligible participants within the first 5 years of their consultant practice were invited to complete the survey. The survey was administered and the responses collated by the survey server (SurveyMonkey) over a 6-week period from October 2023 to November 2023. There were no set exclusion criteria, and all responses were analysed using descriptive statistics and the appropriate tests. Incomplete responses were included in the analysis and participants were not excluded; however, the denominator is clearly adjusted in the results section to account for any missing data fields. Ethical approval was not sought due to the nature of the survey and not meeting the criteria set for research as described by the Health

Research Authority (https://www.hra-decisiontools.org.uk/research/). The principles of Good Clinical Practice were adhered to (https://www.nihr.ac.uk/career-development/clinical-research-courses-and-support/good-clinical-practice).

Results

Background

There were 65 respondents, giving an estimated response rate of 54%. Eighteen (28%) were female and 47 (72%) were male. One respondent (1.5%) was aged 30–34 years, 22 (34%) were aged 35–40 years, 30 (46%) were aged 41–44 years and 12 (19%) were aged 45–49 years. Twelve (18%) had been a consultant for one year or less, 17 (26%) for 1–2 years, 12 (18%) for 3–4 years and 15 (23%) for 4–5 years. Fifty-four (83%) held a permanent consultant post and 11 (17%) were in a locum or temporary consultant position.

Complications

Forty respondents (62%) had experienced a serious complication and 25 (38%) had not. Serious complications were defined and included: unexpected death (83%; n=33); unexpected amputation (2.5%; n=1); stroke (10%; n=4); major amputation (15%; n=6); paraplegia (7.5%; n=3) and other (13%; n=5). Thirty respondents (75%) had received support during this period and 10 (25%) had not. Of those who received support, 86% (n=25) felt it was effective whilst 14% (n=4) did not; one person did not answer this question. The free-text comments are shown in Figure 1. In terms of the support that they would have liked to receive, 13 (43%) gave a response, of which 23% (n=3) would have liked a timely formal debrief; 69% (n=9) a timely informal debrief; 62% (n=8) for the vascular clinical director/lead to reach out; 38% (n=5) counselling; and 15% (n=2) recommendation or referral to attend a course.

Figure 1 Comments regarding effectiveness of support given following a complication

- Senior colleague experience supported me in navigating these complications
- Multiple senior consultants confirmed my competency and reassured that it was not a human error
- Support from colleagues rather than at trust level
- Limited helpfulness. I sought help and support from other mentors and a lot was working through it by myself
- Good colleagues to discuss and reflect
- Peer support including increased operating experience
- Management support - I had a second consultant on call to support decision-making while I regained confidence
- Appropriate processes in place to review
- It provided some reassurance. Being able to talk to colleagues takes off some of the emotional/mental burden
- Non-judgmental and helpful in planning corrective steps
- Partially as although colleagues are very supportive, [there was a] lack of emotional/psychological professionals support; lack of information on how to write a death certificate and report to the coroner; and lack of explanation of the legal implications and possible risks and legal protection
- Respected colleagues shared their own experiences to assure me that they understand how difficult it is to experience complications
- Empathy and support from senior colleagues
- Helped me to go through the case
- Good support from team, good M&M and mentoring discussions. Thorough debrief and assessments. Peer support outside of unit too
- Senior mentor.

Complaints

Sixteen respondents (25%) had experienced a complaint, investigation or other regulatory process since becoming a consultant, 46 (71%) had not and three (4.6%) did not provide an answer to this question. Of those who had experienced a complaint, 11 (69%) received the support they required and five (31%) did not. In most cases (91%, n=10) the support when received was effective but in one case (9.1%) it was not. Of the 31% who felt unsupported, 40% would have liked management support in responding to the complaint; 60% support from the Trust medicolegal team on how to respond to the complaint; 40% a timely both formal and informal debrief; 40% the offer of time away from work for themselves; 40% dedicated administration time to address the complaint; and 20% would have liked counselling.

Bullying, undermining and harassment (BUH)

Of those that answered the question (92%), 45% (n=27) reported having experienced BUH and 55% (n=33) had not. Of those that had experienced BUH, the perpetrator(s) in 63% of cases (n=17) was a vascular surgeon colleague, in eleven cases (41%) a consultant colleague from another specialty and in eight cases (30%) it was a manager. In most cases (70%, n=19) the BUH episode(s) was not effectively managed and in 30% (n=8) it was effectively managed. Only in nine cases (33%) was support provided. This support when available was reported to be effective by 67% (n=6). The free-text comments on the support respondents would have liked to have received are given in Figure 2. Of those that answered the question (91%), 39% (n=23) reported witnessing others being bullied and 61% (n=36) did not. The subject of BUH included vascular surgeon colleagues in 83% of cases (n=19), trainees in 52% (n=12), colleagues from other specialties in 9% (n=2) and management in 4% of cases (n=1). Only in one case (4%) was the episode managed effectively by the Trust; 14 cases (61%) were not effectively managed and the outcome was unknown in eight (35%).

Sexual harassment

Of the 23 (35%) who responded to this question, two (9%) reported experiencing sexual harassment in the workplace. One was male and the other female. In half of the cases reported, the episode(s) was managed effectively. No support was given to the victim of sexual harassment in either case. A further three respondents (13%) had witnessed sexual harassment in the

Figure 2 Comments regarding the support which they would have liked to have received following a BUH episode

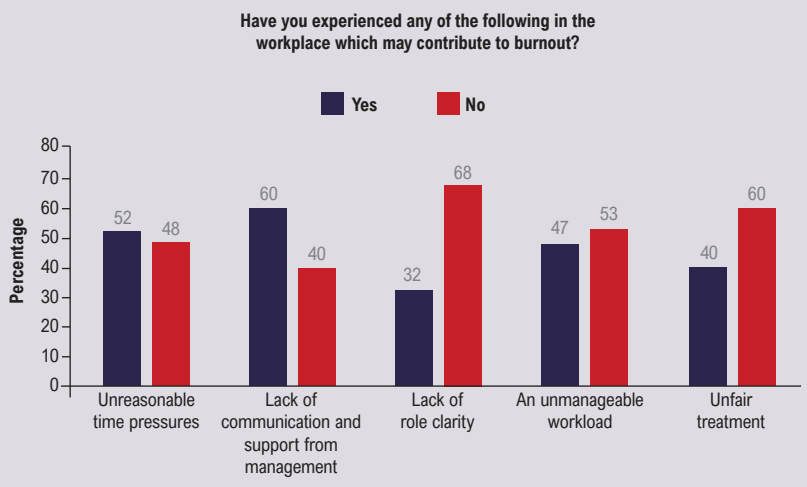
- Acknowledgement and reassurance to rectify the pattern of behaviour.
- Not bullied or undermined. No support but things got better with time
- My rights and escalation plan
- Talk to someone who understands me
- Informal debriefs
- Recognition of the unacceptability of the behaviour
- Be listened to and have an honest, open discussion. Every meeting had a pre-determined agenda, and the discussion had already taken place without me. My voice was therefore irrelevant to their already formed opinion
- Listening and acting upon by the other colleagues and manager. Instead, the actions were minimised and I was kindly asked to not make a big fuss about it.
- I would have like to see the perpetrator disciplined
- Less undermining
- How to deal with BUH from substantive consultants
- Independent investigation - an external one
- Guidance on MDU, regional mentors
- Face to face discussions
- An idea that my situation is being taken seriously by someone.

workplace, of which only one (33%) was managed effectively by the employer.

Significant life events

Of the 58 (89%) who responded to this question, 27 (47%) reported that they had experienced a significant life event since starting their consultant post. Of those who had a significant life event, 18 (64%) had received the support they required but 10 (36%) had not. Significant life events were not defined in this survey.

Figure 3 Exposure to factors which may contribute to burnout.



PTSD, burnout and imposter syndrome

Of the 58 (89%) who responded to this question, nine (16%) reported having experienced PTSD, 76% did not and 8.6% did not know if they had. Twenty-five (43%) reported experiencing symptoms suggestive of PTSD which included re-experiencing of events (24%), avoidance of reminders of events (21%), negative emotions related to an event (35%) and chronic hyper-arousal syndrome (14%). Of those who responded (87%, n=57), 16% (n=9) reported experiencing workplace PTSD, 77% did not and 7.0% did not know if they had.

Of the 86% (n=56) that responded, 38% (n=21) had experienced burnout as a consultant, 46% (n=26) had not and 16% (9) did not know. Moreover, 68% (n=38) had experienced emotional exhaustion, 30% depersonalisation/cynicism and 50% (n=28) a decreased sense of accomplishment and professional efficacy, which are aspects suggestive of burnout. Thirty-eight (68%) felt that they were at risk of burnout, 11 (20%) did not feel they were and seven (13%) did not know. Figure 3 shows the exposure to factors which may contribute to burnout.

Of the 56 (86%) who responded, 31 (55%) had experienced imposter syndrome, 23 (41%) had not and two (4%) did not know.

Job plan and work-life balance

Of the 56 (86%) who responded to this question, only 19 (34%) reported that they were working their ideal job plan, with the majority (55%, n=31) reporting that they were not and 11% (n=6) did not know. Of those not working their ideal job plan, the majority (58%, n=18) did not feel in a position to negotiate a better job plan with only 32% (n=10) feeling that they could.

Concerningly, 48% (n=27) of consultant vascular surgeons in this study had considered leaving the NHS and 32% (n=18) felt that they had made the wrong career choice of vascular surgery since becoming a consultant vascular surgeon. The reasons given are shown in Figure 4. Only 30% (n=17) believed that they had achieved the correct work-life balance, the majority did not (55%, n=31) and 14% (n=8) did not know.

Mentoring

Of the 56 respondents (86%), only 24 (43%) had a mentor. Most mentorship relationships (79%) were informal with 79% of mentors originating from the same department and 9.5% outside of the mentee's usual place of work. All of those who had a mentor reported that the relationship was beneficial. Nineteen (58%) of those who did not have a mentor did not know how to access one. Forty-eight (86%) believed that all newly appointed consultants should have a mentor with 3.6% not sure. The majority (73%) believed that consultant mentors should be job-planned for this commitment.

Figure 4 Reasons given for considering leaving the NHS

- [Family abroad], thought of joining them in Australia
- Political opposition to the role / NHS institution that has been ongoing for over a decade and shows no signs of abating
- Certain moments have made me more motivated to commence private practice
- I think the balance of Military and NHS work means that I feel rewarded in both sides of my work, for different reasons. Furthermore, although balancing the 2 can be difficult, I see the benefit of having the "escape" from the NHS (and vice versa!)
- General deterioration of NHS and system
- Job is tough and it takes a toil but that is the nature of the job, reasonable accommodations can be made but the job is never going to be easy
- Stress
- I have left
- It has collapsed. Centralisation of vascular services failed and caused more problems. The pressures of the NHS failure due to lack of funding have been piled onto the staff to cope
- You have expectations as a consultant - your aspirations for patient care, your hopes for a better work-life balance. The NHS is so chronically understaffed / resourced that you are CONSTANTLY being expected to deliver more for less. Overbooked clinics / theatre lists overrunning. Expectations to cover additional duties for no extra pay. i.e. Trust blanket rule on 12 PA's irrespective of the extra i.e. additional management roles / educational supervisor / teaching / research etc.
- Burnout & depression
- The service is stretched to the point of breaking. I believe the strikes relate much more to long hours, workload and lack of proper rest rather than actual levels of pay.
- Better salary and better organizations [elsewhere]
- [Poor] pay and conditions

Discussion

Complications

Surgical complications form an inherent part of surgical practice. Unsurprisingly, given the co-morbid nature of vascular surgical patients and the complexity of many of the procedures performed, almost two-thirds (62%) of EYC vascular surgeons in our survey experienced a serious complication. Surgical complications can have a profound impact not only on the patient and their family but also on the surgeon, over time resulting in feelings of guilt, shame, embarrassment, anxiety, sleep disturbances, professional self-doubt, depression, burnout, PTSD and reduced job satisfaction.[4–6] The surgeon then becomes the 'second victim'.[6,7] The lack of institutional support after an adverse event is recognised to be a major contributor to becoming a second victim,[8] yet one in four EYC vascular surgeons in our survey reported not receiving any support following their complication. It is unknown whether a service was available but not accessed; regardless, a structured peer-support system should be provided by the employer and appropriately sign-posted.

Complaints

One in four EYC vascular surgeons in our survey were involved in a complaint, investigation or other regulatory process. Complaints in the UK NHS are common and, in one study of 10,930 UK doctors, over 6,000 had experienced a complaint with 42% of those facing a complaint reporting emotional distress as a result.[2] In other studies, complaints have been linked to burnout and depression.[4,8] In our survey, support was not provided to the individual in almost one in three cases (31%), even though in most cases when support was received it was regarded as being effective.

Physician burnout

Burnout is a work-related syndrome involving emotional exhaustion, depersonalisation and a sense of reduced personal accomplishment. In this survey, 38% experienced burnout as an EYC and 68% felt at risk of burnout, with 40–60% of respondents experiencing factors which are known to contribute to physician burnout such as unreasonable time pressures, lack of communication or support from management, lack of role clarity, unimaginable workloads and unfair treatment. The incidence of burnout reported in our study is similar to that seen in a large survey of US vascular surgeons conducted by the Society of Vascular Surgery in 2021.[9] Physician burnout is recognised to influence quality of patient care, patient safety and patient satisfaction and, for the physician, contributes to relationship failures, alcoholism, decreased career longevity, depression and physician suicide.[9,10] It is therefore imperative that this is addressed. One way of reducing the risk of burnout is to offer professional coaching. A randomised clinical trial published in 2019 found a significant reduction in emotional exhaustion and overall symptoms of burnout, as well as improvements in overall quality of life and resilience in the group who received coaching.[11]

Work-life balance

Worryingly, nearly half of all consultants in this survey had considered leaving the NHS with 32% feeling they had made the wrong career choice. The general deterioration of the NHS, the tough nature of the job, the lack of work-life balance, increasing workload, stress, burnout and poor pay and conditions were cited as the reasons for wanting to leave. Poor work-life balance is also implicated as a cause of UK trainees resigning from their training post in vascular surgery[12] and, in a study of US trainees in vascular surgery, those in the highest quartile of burnout, as assessed using the Oldenburg Burnout Inventory, were less likely to reconsider vascular surgery as a career if given the chance to do it over again.[10]

Imposter syndrome

Imposter syndrome can have a significant impact on physical, psychological and professional well-being and is often linked to burnout, suicidal ideation, compromised wellness, low self-esteem and a lack of professional fulfilment.[13] In our study, 55% reported experiencing imposter syndrome, and this is not surprising as the transition from trainee to consultant is often associated with

increased responsibilities and stress. In one study of young consultants and resident doctors in neurosurgery, level of education, female sex and academic achievements were identified as factors predictive of developing imposter syndrome[14] and, when comparing junior and senior consultants, junior faculty reported more anxiety and self-doubt compared with their senior counterparts.[15]

BUH

BUH has been put under the spotlight over the past few years. Despite this, 45% experienced BUH in this survey with the perpetrator in most cases being a consultant vascular surgeon colleague, a consultant colleague from another specialty and/or a manager. The incidence of bullying experienced in our cohort is similar to other studies[16–18] and suggests that little has changed over the past few years. Disappointingly, most episodes of BUH were not effectively managed by the employer and only a minority of those experiencing BUH felt supported. More needs to be done to address BUH in vascular surgery, with clearer lines of accountability and safe spaces created for victims.

Only 9% reported being the subject of sexual harassment in our survey, which is far below the 63% reported by a recent study looking at the incidence of sexual harassment in the UK surgical workforce.[19] Of note, only 35% of our survey participants completed this question and therefore the actual figure is likely to be much higher.

Mentoring

Those who had a mentor in our survey found it extremely useful and most respondents felt that all newly appointed consultants should have a mentor. Moreover, it has been shown that vascular surgical resident doctors who have a self-identified mentor have lower burnout scores.[10] It could reasonably be assumed that this advantage would also be conferred to EYC surgeons.

Limitations and generalisability

Although the message of our survey is powerful and concerning, there are obvious limitations that must be recognised. First, the viewpoints of the participants are only representative of around half of the target population. It is possible that those who did not complete the survey had not experienced the problems described in our cohort; this would represent selection bias. However, the converse may also be true. Second, this survey was cross-sectional and can only represent the views and opinions of those participants at the specific time the survey was conducted. In addition, some of the survey component responses were lower than others, particularly in segments related to more personal and sensitive issues, suggesting that, even though anonymised, participants were reluctant to answer questions relating to their home or personal life and therefore these responses may be under or overestimated. Thirdly, the surveyed population practised vascular surgery in the UK and Ireland with the proportion of male and female respondents (72% and 28%, respectively) similar to those reported in the recent VSGBI Provision of Vascular Services for People with Vascular Diseases 2024 report.[20] The data are therefore likely to be generalisable to other EYC vascular surgeons in the UK, but not necessarily similar cohorts in other countries or healthcare systems. Finally, validated questionnaires or tools were not used to assess burnout, imposter syndrome and PTSD. The incidences of burnout, imposter syndrome and PTSD reported were instead established on the perception by the respondents that they suffered these conditions based on the descriptors provided in the questionnaire. The true incidence of these conditions may therefore be lower than reported in this survey, although they are in line with other studies where validated tools were used.

KEY MESSAGES

- The transition from resident doctor to consultant vascular surgeon is a challenging period with concerning self-reported levels of burnout and PTSD
- The rates of bullying, undermining and harassment (BUH) reported in this cohort is unacceptable and needs to be addressed
- The support afforded to early year consultants following a complaint or complication is inadequate and more formal structures should be developed to mitigate the risk of creating a 'second victim'
- Less than half of early year consultant vascular surgeons had a mentor despite the majority believing that they would benefit from mentorship.

Conclusion

This survey is concerning and reveals significant distress amongst EYC vascular surgeons. Unless the areas highlighted are urgently addressed, there will be a significant impact on future recruitment and retention in vascular surgery.

What this paper adds: The paper provides an important insight into the NHS workplace environment and its impact on newly appointed consultant vascular surgeons in their first 5 years of consultant practice. It highlights factors which will likely influence recruitment and retention in vascular surgery and areas for improvement which could potentially positively impact on the work-life balance of early year consultant vascular surgeons.

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ORIGINAL RESEARCH

An appraisal of global clinical practice guidelines in thromboprophylaxis for superficial endovenous treatment

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Plain English Summary

Why we undertook the work: Doctors are unsure about how to prevent blood clots in patients having treatment for varicose veins as there are differences in the clinical guidelines that doctors use. Conflicting guidelines can make it hard for doctors to decide on the best treatments, which can lead to worse patient outcomes and higher costs for healthcare. We wanted to examine the quality of these guidelines to identify their strengths and weaknesses.

What we did: We searched medical databases and other resources to find guidelines about preventing blood clots in varicose vein treatments. Four reviewers assessed these guidelines using a tool called AGREE II, which looks at the quality of guidelines in six areas, such as clarity, involvement of key contributors and how easy they are to apply in practice. We also checked how consistent the reviewers were in their evaluations and how different quality aspects relate to each other.

What we found: We found 10 guidelines published between 2014 and 2024 that met our criteria. Four of these guidelines were rated as high quality while six were low quality. There was a lot of variation in what these guidelines recommended for preventing blood clots. The scores showed that the guidelines were particularly weak in practical applicability. Our analysis showed that the reviewers agreed well on their ratings. We also found strong links between how clear the guidelines were, how involved stakeholders were and their overall quality.

What this means: The guidelines we looked at for preventing blood clots in varicose vein treatments have many inconsistencies and are based on low-quality evidence, making them less useful for doctors. By improving the quality and practical applicability of these guidelines, we can make them clearer and more effective. Future research should explore how the quality of these guidelines affects patient outcomes and gather feedback from doctors about how guideline inconsistencies influence their treatment choices.

Abstract

Introduction: Variability in clinical practice for pharmacological thromboprophylaxis in superficial endovenous interventions may reflect inconsistencies and ambiguities present in clinical practice guidelines (CPGs) for this patient cohort. Conflicting recommendations not only complicate clinical decision-making but can also negatively impact patient outcomes and impose unnecessary costs on healthcare providers. This study aimed to assess the quality of these guidelines using the Appraisal of Guidelines for REsearch & Evaluation II (AGREE II) instrument, highlighting strengths, weaknesses and areas for improvement.

Methods: A systematic search of Ovid Medline, Embase and grey literature was conducted to identify CPGs addressing pharmacological thromboprophylaxis in superficial endovenous interventions. Four independent assessors evaluated each guideline using the AGREE II tool across six domains: Scope and Purpose, Stakeholder Involvement, Rigour of Development, Clarity of Presentation, Applicability and Editorial Independence. Inter-reviewer reliability was calculated using the intraclass correlation coefficient (ICC) and a Pearson correlation analysis assessed associations among the domains.

Results: Ten guidelines published between 2014 and 2024 met the eligibility criteria. Among these, four (40%) were classified as high quality, specifically those from the National Institute for Health and Care Excellence (NICE), European Society for Vascular Surgery (ESVS), Scottish Intercollegiate Guidelines Network (SIGN) and the joint American Venous Forum (AVF), American Vein and Lymphatic Society (AVLS) and Society for Vascular Surgery (SVS).

The remaining six guidelines were rated as low quality, with the Royal Society of Medicine (RSM) guideline scoring the lowest. Notable variability was observed in the scores, particularly within the Rigour of Development and Applicability domains, with the Applicability domain achieving the lowest mean score (33.4±26.0%). ICC values indicated good inter-reviewer reliability (ICC=0.81), with excellent agreement observed in the Stakeholder Involvement and Rigour of Development domains. Strong correlations between the Scope and Purpose, Stakeholder Involvement and Rigour of Development domains suggest that these aspects of guideline quality are interrelated.

Conclusions: The assessed guidelines for pharmacological thromboprophylaxis in superficial endovenous interventions exhibit considerable inconsistencies and a reliance on low-quality evidence, which limits their applicability in clinical practice. Targeted improvements in the Rigour of Development and Applicability domains could enhance the clarity, quality and practical utility of these guidelines. Future research could focus on evaluating the impact of guideline quality on clinical outcomes and explore clinicians' perspectives on guideline inconsistencies to better understand their influence on decision-making in this area.

Key words: endovenous intervention, venous thromboembolism, clinical practice guidelines

Introduction

Clinical practice guidelines (CPGs) are systematically developed recommendations that aim to assist clinicians and patients in making informed decisions for specific clinical situations by evaluating the benefits and risks of various treatment options based on comprehensive evidence.[1–3] To standardise clinical practices and ensure effective and consistent patient care, CPGs must be of high quality and regularly updated. Developing reliable and applicable recommendations requires rigorous methodologies and well-defined development strategies.[4–7] However, the process behind guideline development can vary significantly, resulting in considerable differences in guideline quality, with some failing to meet basic standards.[8–11] Lower-quality guidelines risk contributing to inconsistencies in clinical practice and potentially leading to suboptimal patient outcomes.[9–12] Additionally, conflicts of interest in CPG development, including instances of pharmaceutical industry funding, raise concerns about the impartiality of recommendations,[13] with financial conflicts sometimes inadequately disclosed and guidelines occasionally published without thorough peer review. Such issues can undermine the credibility and integrity of CPGs.

In the context of pharmacological thromboprophylaxis for superficial endovenous interventions, several CPGs have been published by key bodies, including the National Institute for Health and Care Excellence (NICE), the Scottish Intercollegiate Guideline Network (SIGN) and the European Society for Vascular Surgery (ESVS).[14–16] Despite the availability of these guidelines, considerable variability in clinical practice persists globally,[17,18] reflecting potential contradictions and ambiguities within the recommendations and creating challenges for clinicians making treatment decisions. Furthermore, high-quality evidence to guide patient selection, drug choice (eg, low-molecular-weight heparin or direct oral anticoagulants), dosing and treatment duration in superficial endovenous interventions remains limited. Although pharmacological thromboprophylaxis may reduce the incidence of deep vein thrombosis (DVT) in this patient population,[19] its practical utility requires further examination – particularly considering the potential cost savings and reduction of adverse effects if it is found to be unnecessary.[20–22]

Previous studies have used the Appraisal of Guidelines for REsearch & Evaluation II (AGREE II) tool, a validated instrument for evaluating the methodological quality and reporting standards of CPGs.[8,23,24] These assessments have highlighted persistent weaknesses in key areas, including stakeholder involvement and clinical applicability,[8] emphasising the value of systematic appraisal approaches. AGREE II provides a standardised quantitative method for assessing guidelines and identifying areas where transparency or methodological rigour may be lacking, potentially limiting the clinical utility of CPGs.[25–29] This study therefore aims to critically appraise CPGs for pharmacological thromboprophylaxis in superficial endovenous interventions using the AGREE II tool.

Methods

Search strategy and CPG identification

To identify relevant CPGs, a systematic search strategy was developed using the keywords: (*Guideline**) AND (*Varicose veins or superficial venous incompetence or venous insufficiency or chronic venous disease**). The search was conducted on Ovid Medline and Embase databases on 8 April 2024. The results were exported to Covidence software for screening.[30]

Two independent reviewers (SW and MS) conducted the title and abstract screening using pre-defined eligibility criteria (Table 1). These criteria aimed to capture not only guidelines meeting the Institute of Medicine's definition,[3] but also those widely used by clinicians, even if they fell outside this strict definition. Articles that met the initial screening requirements underwent full-text review by the same two reviewers to confirm their eligibility, with reasons for

Table 1 Eligibility criteria for clinical practice guideline (CPG) identification.

Inclusion criteria	Exclusion criteria
• Explicitly identified as a guideline or issued by a recognised medical society or organisation providing professional advice on clinical practice • Available in the English language • Published between 1994 and 2024 • Includes recommendations for pharmacological thromboprophylaxis	• Not available in the English language • Published earlier than 1994 • CPG summary, consensus document or expert opinion, unless issued by a recognised medical society or national professional body and/or widely used and accepted by healthcare professionals • Does not provide recommendations for pharmacological thromboprophylaxis • Superseded versions of a guideline or recommendation • Pertaining to paediatric patients • Only accessible by request or through purchase

exclusion documented. Any conflicts between reviewers were resolved through discussion. Eligible guidelines were subsequently extracted for appraisal. The methods for CPG identification were reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[31] To ensure comprehensive identification of relevant CPGs, a grey literature search was also conducted on official websites of relevant organisations and societies, including NICE and the Royal Society of Medicine (RSM).[32,33] These guidelines were screened separately using the same eligibility criteria.

Critical appraisal of eligible CPGs

The methodological quality of eligible CPGs was assessed using the AGREE II tool, a validated 23-item instrument organised into six domains that each evaluate different aspects of guideline quality.[25] The AGREE II is widely recognised and has been approved by NICE, with previous applications in appraisals of guidelines related to vascular surgery and venous disease.[23,24,32,34] The six domains are as follows: Domain 1 (Scope and Purpose) evaluates the overall aim of the guideline, the specific health questions addressed and the target population; Domain 2 (Stakeholder Involvement) assesses whether the guideline development involved appropriate stakeholders and represented the views of its intended users; Domain 3 (Rigour of Development) focuses on the methods used to gather and synthesise evidence, formulate recommendations and plan for updates; Domain 4 (Clarity of Presentation) reviews the language, structure and format of the guideline; Domain 5 (Applicability) considers the potential barriers and facilitators to implementation, strategies to improve uptake and resource implications of applying the guideline; and Domain 6 (Editorial Independence) ensures that the recommendation is not unduly biased by competing interests.[7,25,27,28] An 'overall assessment' section is also included to rate the overall quality of each guideline and determine whether the reviewer would recommend it for use in clinical practice (Table 2).

Table 2 The 23-item AGREE II tool.[7,25,27,28]

Domain	Statement
1. Scope and Purpose	1. The overall objective(s) of the guideline is (are) specifically described 2. The health question(s) covered by the guideline is (are) specifically described 3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described
2. Stakeholder Involvement	4. The guideline development group includes individuals from all the relevant professional groups 5. The views and preferences of the target population (patients, public, etc) have been sought 6. The target users of the guideline are clearly defined
3. Rigour of Development	7. Systematic methods were used to search for evidence 8. The criteria for selecting the evidence are clearly described 9. The strengths and limitations of the body of evidence are clearly described 10. The methods for formulating the recommendations are clearly described 11. The health benefits, side effects and risks have been considered in formulating the recommendations 12. There is an explicit link between the recommendations and the supporting evidence 13. The guideline has been externally reviewed by experts prior to its publication 14. A procedure for updating the guideline is provided
4. Clarity of Presentation	15. The recommendations are specific and unambiguous 16. The different options for management of the condition are clearly presented 17. Key recommendations are easily identifiable
5. Applicability	18. The guideline describes facilitators and barriers to its application 19. The guideline provides advice and/or tools on how the recommendations can be put into practice 20. The potential resource implications of applying the recommendations have been considered 21. The guideline presents monitoring and/or auditing criteria
6. Editorial Independence	22. The views of the funding body have not influenced the content of the guideline 23. Competing interests of guideline development group members have been recorded and addressed
Overall assessment	

Four reviewers (SW, MW, JB and MJ) were provided with a User Manual detailing how to assess and rate each item using the AGREE II instrument.7 Each reviewer independently assessed each guideline and rated each item on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The lead reviewer (SW) served as the primary contact for any reviewer queries.

Scores were entered into an Excel template provided by the lead reviewer, and statistical analysis was performed using R Statistical Software. Overall domain scores were calculated following standard AGREE II methodology.[7]

The minimum possible domain score was calculated as follows: *(number of items in the domain) x ('strongly disagree' score [=1]) x (number of reviewers [=4])*

While the maximum possible domain score was calculated by: *(number of items in the domain) x ('strongly agree' score [=7]) x (number of reviewers [=4])*

These minimum and maximum possible domain scores are presented in Table 3. To generate scaled domain scores, the following formula was used:

$$\frac{\textit{(obtained score - minimum possible score)}}{\textit{(maximum possible score - minimum possible score)}} \times 100$$

Table 3 Minimum and maximum possible scores for each domain based on evaluations by four independent assessors.

Domain	Minimum possible domain score	Maximum possible domain score
1	12	84
2	12	84
3	32	224
4	12	84
5	16	112
6	8	56

Since AGREE II does not provide specific thresholds to differentiate guideline quality, cut-off values from similar appraisals were used to classify guidelines as high or low quality.[23,35] Guidelines were classified as high quality if they met one of the following criteria: ≥50% in all six domains; ≥60% in five domains; ≥6% in Domain 3 and two other domains. Guidelines that did not meet any of these cut-offs were classified as low quality (Table 4).

Table 4 High quality domain cut-offs. Clinical practice guidelines (CPGs) not meeting the above cut-offs would otherwise be classed as low quality.

≥50% in all domains
≥60% in five domains
≥60% in domain 3 + two other domains

Inter-reviewer reliability

Inter-reviewer reliability was assessed by calculating intraclass correlation (ICC) coefficients using R. A two-way random-effects model was used, given that the same four assessors rated all 10 guidelines. Absolute agreement was measured to evaluate consistency of ratings across reviewers. ICC interpretation was as follows: <0.5 indicated poor reliability, between 0.5 and 0.75 indicated moderate reliability, between 0.75 and 0.9 indicated good reliability and >0.9 indicated excellent reliability.[36]

Correlation analysis

To evaluate relationships between domain scores, Pearson correlation coefficients were calculated using scaled scores for each domain across the CPGs. A Pearson correlation coefficient ranges from –1 to +1, indicating the strength and direction of association between two variables, where +1 denotes a perfect positive relationship and –1 denotes a perfect negative one. Correlations were assessed at a significance level of $p<0.05$.

Results

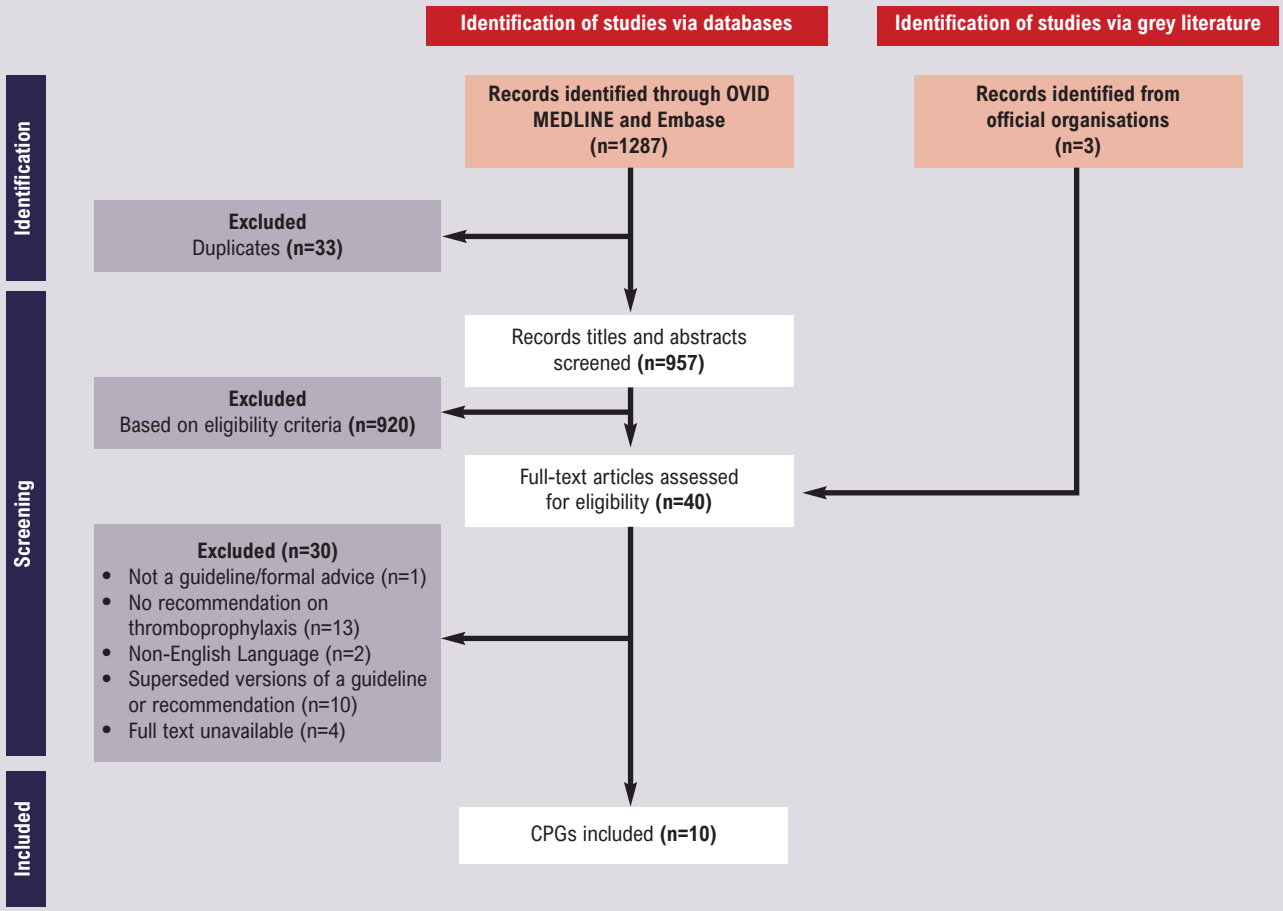
Eligible CPGs

The systematic search performed on Ovid Medline and Embase identified 1287 articles, of which 330 were duplicates. An additional three articles were identified through the grey literature search. A total of 957 titles and abstracts were screened, of which 920 were excluded based on the general eligibility criteria. Forty articles underwent full-text review, of which 30 were excluded for the following reasons: not being a guideline or formal advice (n=1), lacking recommendations on pharmacological thromboprophylaxis (n=13), not available in the English language (n=2), having been superseded (n=10) or full-text being unavailable (n=4). This resulted in 10 CPGs being included in the final appraisal (Figure 1). Of these, nine met the AGREE II definition of a CPG.[1,7] The RSM guideline,[37] while not strictly a formal guideline, was included due to its widespread use in UK clinical practice and relevance to the study objective. For the purpose of this manuscript, it will be referred to as a CPG.

The 10 CPGs included were published between 2014 and 2024 and originated from regions including North America, Europe, the UK, Scotland, France and international organisations (Table 5). The CPGs represented a diverse range of institutions including government bodies (eg, NICE and SIGN),[14,15] local and international scientific organisations (eg, ESVS and SVS) and medical societies (eg, RSM).[16,37,38] Notably, only one guideline focused exclusively on venous thromboembolism (VTE) prophylaxis in varicose vein procedures,[37] while others covered a broader scope. This included two guidelines on VTE prophylaxis,[14,15] one on the management of varicose veins,[39] one on the classification and treatment of endothermal heat-induced thrombosis,[40] three on thermal ablation,[41–43] one on sclerotherapy and one on the management of chronic venous disease of the lower limbs.[16,44]

Among the 10 CPGs, five recommended pharmacological thromboprophylaxis specifically for patients at high risk of

Figure 1 PRIMSA flow diagram of the conducted systematic search. Template available from[32].



VTE,[15,39,41,42,44] three recommended an individualised approach,[16,37,40] one recommended against routine administration of pharmacological thromboprophylaxis and one advised considering it only if anaesthesia time exceeded 90 minutes and the VTE risk outweighed the bleeding risk.[14,43]

Inter-reviewer reliability

The overall inter-reviewer reliability, measured by the ICC, was 0.81 (95% CI 0.534 to 0.944), indicating good agreement among the four assessors. ICC values for each domain across all guidelines are presented in Table 6. All domains had ICC values >0.5, suggesting good reliability. Domains 2 (Stakeholder Involvement) and 3 (Rigour of Development) exhibited the highest levels of agreement, with ICCs of 0.941 and 0.943, respectively, indicating excellent reliability. Domains 5 (Applicability) and 6 (Editorial Independence) showed good reliability with ICCs of 0.825 and 0.824, respectively. Domains 1 (Scope and Purpose) and 4 (Clarity of Presentation) demonstrated moderate agreement, with ICCs of 0.664 and 0.552, respectively.

Table 6 Individual domain intraclass correlation (ICC) of reviewer ratings across all guidelines.

Domain	ICC	95% CI - Lower	95% CI - Upper
2	0.941*	0.826	0.984
3	0.943*	0.848	0.984
5	0.825*	0.553	0.951
6	0.824*	0.532	0.951
1	0.664*	0.113	0.907
4	0.552*	-0.022	0.863

Colour codes: = excellent ; = good ; = moderate ; inter-reviewer reliability.

*p<0.05 denotes statistically significant ICC values.

CPG methodological quality appraisal

The individual reviewer scores and scaled domain scores for each CPG are presented in Table 7. Since the 'overall assessment' score is a separate summary score reflecting the assessors' overall

Table 5 Eligible clinical practice guidelines.

Country of origin	Organisation/society	Title of guideline	Title of publication	Summary of thromboprophylaxis recommendation
North America	AVF, AVLS, SVS[39]	Management of varicose veins of the lower extremities	2024	*"For high-risk patients undergoing endovenous ablation we suggest pharmacological thromboprophylaxis"*
North America	AVF, SVS[40]	Classification and treatment of endothermal heat-induced thrombosis	2021	*"The use of chemical prophylaxis for prevention of EHIT should be tailored to the patient after an assessment of the risks, benefits, and alternatives"*
Europe	ECoP[41]	European College of Phlebology guideline for truncal ablation	2019	*"Thromboprophylaxis should be considered for high risk patients"*
UK	NICE[14]	Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism [NG89]	2018	*"Consider pharmacological VTE prophylaxis with LMWH, starting 6 to 12 hours after surgery and continuing for 7 days for people undergoing varicose vein surgery if:* *- Total anaesthesia time >90 minutes* **or** *- The person's risk of VTE outweighs their risk of bleeding"*
UK	RSM[37]	Advice on VTE prophylaxis for varicose vein procedures	Not provided	*Low risk: no anticoagulation, single dose anticoagulation, 3 doses anticoagulation or 3 days of anticoagulation.* *Additional risk: Extended prophylaxis for 7–14 days.* *High risk: Extended prophylaxis for 4–6 weeks.*
Scotland	SIGN[15]	Prevention and management of venous thromboembolism	2014	*"… who have no additional risk factors for VTE, postoperative AES are recommended"* *"In the presence of additional risk factors, the addition of UFH or LMWH is recommended"*
Europe (Austria, Bulgaria, Czech Republic, Denmark, France, Germany, Great Britain, Hungary, Italy, Latvia, Netherlands, Poland, Portugal, Romania, Russia, Serbia, Spain, Switzerland, Turkey)	On behalf of 23 European Phlebological Societies* [44]	European guidelines for sclerotherapy in chronic venous disorders	2014	*"In patients with a high risk of thromboembolism such as those with a history of spontaneous DVT or known severe thrombophilia, we recommend use of pharmacological thromboprophylaxis in line with current guidelines / recommendations"*
Europe	ESVS[16]	Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs	2022	*"For patients with superficial venous incompetence undergoing intervention, individualised thromboprophylaxis strategies should be considered"*
France	FSVM[42]	Update of the FSVM guidelines on the conditions and safety measures necessary for thermal ablation of the saphenous veins and proposals for unresolved issues	2020	*"We propose anticoagulant treatment at prophylactic dose in patients at high risk of thromboembolism, notably those with a personal history of venous thromboembolism or known major thrombophilia. If anticoagulation is prescribed, we propose, in the absence of published data, the use of a DOAC or LMWH or fondaparinux at prophylactic dose for 7 days"*
Global	UIP[43]	Guidelines of the First International Consensus Conference on Endovenous Thermal Ablation for Varicose Vein Disease—ETAV Consensus Meeting 2012	2014	*"We recommend against routine prescription of prophylactic anticoagulation"*

AES, anti-embolic stockings; AVF, American Venous Forum; AVLS, American Vein and Lymphatic Society; DOAC, direct oral anticoagulant; DVT, deep vein thrombosis; ECoP, European College of Phlebology; EHIT, endothermal heat-induced thrombosis; ESVS, European Society for Vascular Surgery; ETAV, endovenous thermal ablation for varicose vein disease; FSVM, French Society of Vascular Medicine; LMWH, low-molecular-weight heparin; NICE, National Institute for Health and Care Excellence; RSM, Royal Society of Medicine; SIGN, Scottish Intercollegiate Guidelines Network; SVS, Society for Vascular Surgery; UFH, unfractionated heparin; UIP, International Union of Phlebology; VTE, venous thromboembolism.

*Austrian Society of Phlebology and Dermatologic Angiology; Balkan Venous Forum; Baltic Society of Phlebology; Benelux Society of Phlebology; British Association of Sclerotherapists; Bulgarian Society of Phlebology; Czech Society of Phlebology; French Society of Phlebology; German Society of Phlebology; Hungarian Venous Forum; Italian College of Phlebology; Italian Phlebological Association; Italian Society of Angiology and Vascular Medicine; Polish Society of Phlebology; Portuguese Society of Angiology and Vascular Surgery; Romanian Society of Phlebology; Russian Phlebological Association; Scandinavian Venous Forum; Serbian Society of Phlebology; Swiss Society of Phlebology; Turkish Society of Phlebology; Venous Forum of the Royal Society of Medicine.

Table 7 Individual raw and scaled scores for each clinical practice guideline.

Guideline	Domain						Mean+SD of scaled scores by CPG (%)
	1 (min 3; max 21)	2 (min 3; max 21)	3 (min 8; max 56)	4 (min 3; max 21)	5 (min 4; max 28)	6 (min 2; max 14)	
NICE[14]							
Reviewer 1	21	20	51	19	23	11	**83.2±16.6**
Reviewer 2	21	21	36	21	22	2	
Reviewer 3	21	20	53	17	21	7	
Reviewer 4	21	20	48	20	25	14	
Raw total score	**84**	**81**	**188**	**77**	**91**	**34**	
Scaled score (%)	**100**	**96**	**81**	**90**	**78**	**54**	
ESVS[16]							
Reviewer 1	21	21	50	16	7	11	**85.2±17.9**
Reviewer 2	21	21	56	21	27	14	
Reviewer 3	21	20	53	13	6	11	
Reviewer 4	21	20	51	21	25	14	
Raw total score	**84**	**82**	**210**	**71**	**65**	**50**	
Scaled score (%)	**100**	**97**	**93**	**82**	**51**	**88**	
AVF, AVLS, SVS[39]							
Reviewer 1	19	10	38	17	19	10	**65.8±21.0**
Reviewer 2	21	13	39	19	6	8	
Reviewer 3	21	15	37	12	7	8	
Reviewer 4	21	18	49	21	19	8	
Raw total score	**82**	**56**	**163**	**69**	**51**	**34**	
Scaled score (%)	**97**	**61**	**68**	**79**	**36**	**54**	
AVF, SVS[40]							
Reviewer 1	21	14	22	11	9	13	**60.0±24.4**
Reviewer 2	16	7	42	15	4	14	
Reviewer 3	19	16	27	11	8	9	
Reviewer 4	20	14	43	20	14	11	
Raw total score	**76**	**51**	**134**	**57**	**35**	**47**	
Scaled score (%)	**89**	**54**	**53**	**63**	**20**	**81**	
ECoP[41]							
Reviewer 1	15	7	17	16	7	14	**45.2±30.2**
Reviewer 2	10	3	8	7	4	14	
Reviewer 3	20	11	24	9	4	7	
Reviewer 4	18	14	32	18	5	14	
Raw total score	**63**	**35**	**81**	**50**	**20**	**49**	
Scaled score (%)	**71**	**32**	**26**	**53**	**4**	**85**	
RSM[37]							
Reviewer 1	19	3	12	12	9	2	**28.0±29.4**
Reviewer 2	15	3	8	12	7	2	
Reviewer 3	15	3	9	14	4	8	
Reviewer 4	12	6	13	19	10	2	
Raw total score	**61**	**15**	**42**	**57**	**30**	**14**	
Scaled score (%)	**68**	**4**	**5**	**63**	**15**	**13**	
23 European Phlebological Societies[44]							
Reviewer 1	14	11	14	14	8	3	**43.0±28.6**
Reviewer 2	21	8	22	19	17	2	
Reviewer 3	16	10	15	14	4	8	
Reviewer 4	21	14	29	17	6	2	
Raw total score	**72**	**43**	**80**	**64**	**35**	**15**	
Scaled score (%)	**83**	**43**	**25**	**72**	**20**	**15**	
FSVM[42]							
Reviewer 1	16	5	14	14	8	8	**45.5±27.6**
Reviewer 2	21	9	11	15	18	8	
Reviewer 3	16	9	20	15	4	6	
Reviewer 4	20	12	20	21	10	5	
Raw total score	**73**	**35**	**65**	**65**	**40**	**27**	
Scaled score (%)	**85**	**32**	**17**	**74**	**25**	**40**	

Colour codes: = high-quality ; = low-quality

Continued...

Table 7 Individual raw and scaled scores for each clinical practice guideline.

Guideline	Domain						Mean+SD of scaled scores by CPG (%)
	1 (min 3; max 21)	2 (min 3; max 21)	3 (min 8; max 56)	4 (min 3; max 21)	5 (min 4; max 28)	6 (min 2; max 14)	
SIGN[15]							
Reviewer 1		21	51	19	21	6	**80.3±25.2**
Reviewer 2	21	21	51	19	21	6	
Reviewer 3	21	21	42	20	21	7	
Reviewer 4	21	20	50	20	24	5	
Raw total score	**84**	**83**	**194**	**78**	**87**	**24**	
Scaled score (%)	**100**	**99**	**84**	**92**	**74**	**33**	
UIP[43]							
Reviewer 1	12	8	14	13	6	8	**46.5±22.7**
Reviewer 2	19	6	37	11	6	9	
Reviewer 3	16	9	25	13	6	5	
Reviewer 4	20	15	34	20	9	11	
Raw total score	**67**	**38**	**110**	**57**	**27**	**33**	
Scaled score (%)	**76**	**36**	**41**	**63**	**11**	**52**	
Mean±SD of scaled scores by domain (%)	**86.9±12.3**	**55.4±32.6**	**49.3±31.1**	**73.1±12.8**	**33.4±26.0**	**51.5±27.1**	

Colour codes: = high-quality ; = low-quality

AVF, American Venous Forum; AVLS, American Vein and Lymphatic Society; ECoP, European College of Phlebology; ESVS, European Society for Vascular Surgery; FSVM, French Society of Vascular Medicine; NICE, National Institute for Health and Care Excellence; RSM, Royal Society of Medicine; SIGN, Scottish Intercollegiate Guidelines Network; SVS, Society for Vascular Surgery; UIP, International Union of Phlebology.

judgment of the CPG rather than being a formal domain, it was excluded from the analysis and the scores are instead presented in Appendix 1 (see www.jvsgbi.com).

The mean scaled scores for each CPG were used to determine their methodological quality. Based on the quality cut-offs presented in Table 4, four guidelines (40%) – including those from NICE,[14] ESVS,[16] SIGN and the joint AVF/AVLS/SVS – were classified as high quality.[15,38] The ESVS guideline achieved the highest mean scaled score (85.2±17.9%) and scored above 50% in all six domains.[16] NICE was the second-highest scoring guideline[14] with a mean scaled score of 83.2±16.6%, also scoring above 50% in all six domains. Notably, NICE and ESVS were the only CPGs to score >50% in all six domains.[14,16] SIGN was the third highest ranking CPG[15] with a mean scaled score of 80.3±25.2%, scoring above 60% in domains 1–5. The fourth highest scoring CPG was the joint AVF/AVLS/SVS guideline,[38] which had a mean scaled score of 65.8±21.0%, scoring above 60% in domain 3 as well as domains 1, 2 and 4.

In contrast, six CPGs (60%) were classified as low quality, with the RSM guideline scoring the lowest (28.0±29.4%).[37] The second lowest scoring CPG was the joint phlebological society guideline,[44] which scored 43.0±28.6%. The remaining low-quality CPGs – including those from ECoP,[41] FSVM,[42] UIP and the joint AVF/SVS guidelines –had mean scores ranging from 45.2±30.2% to 60.0±24.4%.[40,43]

CPG performance in individual domains

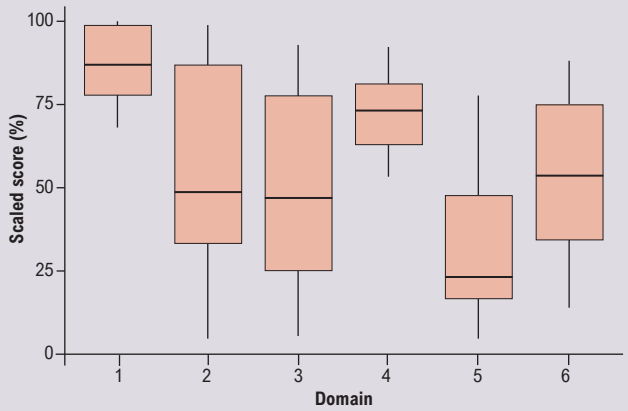
Considerable heterogeneity was observed across assessor scores of CPGs in Domains 2, 3, 5 and 6, reflected in the large interquartile ranges (IQRs) seen in the boxplot presented in Figure 2. Notably, Domain 3 (Rigour of Development) had the widest IQR, indicating the highest variability in assessor scores in this domain. Domains 1 (Scope and Purpose) and 4 (Clarity of Presentation) had the narrowest IQRs (21.5 and 18.25, respectively), suggesting the highest level of agreement and lowest heterogeneity across assessor scores in these domains.

Domain 1 (Scope and Purpose) achieved the highest mean scaled score (86.9±12.3%), with all CPGs scoring highly (from 68% to 100%). Notably, NICE,[14] ESVS and SIGN each achieved a perfect score of 100%.[15,16] Even the lowest scoring guideline (RSM)[37] still demonstrated high quality with a score of 68%. The ICC for Domain 1 was 0.664 (95% CI 0.113 to 0.907, $p<0.05$), indicating a moderate level of agreement between assessors, consistent with the narrow IQR of 21.5.

Domain 2 (Stakeholder Involvement) had a lower mean scaled score of 55.4±32.6%. This domain showed greater variability, with scaled domain scores ranging from 4% to 99%. The ICC for this domain was 0.941 (95% CI 0.826 to 0.984, $p<0.05$), indicating an excellent level of agreement among assessors. Notably, NICE,[14] ESVS and SIGN exceeded 90%,[15,16] while the RSM guideline scored the lowest at 4%.[37] This domain had the largest IQR of 54.25, reflecting significant heterogeneity in how assessors rated the stakeholder involvement in the CPGs.

Domain 3 (Rigour of Development) had a wide range of scores (from 5% to 93%) and a mean scaled score of 49.3±31.1%. High quality ratings were achieved by four (40%) CPGs (NICE,[14]

Figure 2 Boxplot displaying distribution of scaled scores in each domain.



Boxes represent interquartile ranges (IQRs) and the thick lines inside each box represent the median.

Domain 1: median 87.0 (IQR 21.50); Domain 2: median 48.5 (IQR 54.25); Domain 3: median 47.0 (IQR 52.50): Domain 4: median 73.0 (IQR 18.25); Domain 5: median 22.5 (IQR 31.00); Domain 6: median 53.0 (IQR 39.50).

Table 8 Pearson correlation coefficients.

Domain	1	2	3	4	5	6
1	1.00	0.92*	0.90*	0.88*	0.86*	0.24
2	0.92*	1.00	0.96*	0.83*	0.89*	0.34
3	0.90*	0.96*	1.00	0.74*	0.81*	0.44
4	0.88*	0.83*	0.74*	1.00	0.95*	-0.17
5	0.86*	0.89*	0.81*	0.95*	1.00	-0.01
6	0.24	0.34	0.44	-0.17	-0.01	1.00

*p<0.05 (statistically significant).

ESVS,[16] AVF/AVLS/SVS and SIGN).[15,38] The ESVS guideline performed the best in this domain,[16] with a mean scaled score of 93%, while four (40%) of the CPGs (ECoP,[41] RSM,[37] the joint European Phlebological Societies and the FSVM guideline) were classified as low quality.[42,44] This domain had a high ICC of 0.943 (95% CI 0.848 to 0.984, p<0.05), indicating excellent inter-reviewer agreement.

Domain 4 (Clarity of Presentation) had a mean scaled score of 73.1±12.8%, making it the second highest scoring domain. Scaled domain scores ranged from 53% to 92%, with nine CPGs (90%) receiving high scores. The ECoP guideline was the only CPG to score moderately,[41] with a scaled score of 53%. The ICC for this domain was 0.552 (95% CI –0.022 to 0.863, p<0.05), indicating moderate agreement between assessors, and the narrow IQR (18.25) indicates relatively consistent ratings across the assessors.

Domain 5 (Applicability) had the lowest mean scaled score (33.4±26.0%) and included the lowest individual score (4% by ECoP).[41] Scaled scores for this domain ranged from 4% to 78%. Only two CPGs (20%) – NICE and SIGN – scored highly,[14,15] while two others (20%) – ESVS and the joint AVF/AVLS/SVS guideline – were of moderate quality.[16,38] The remaining six guidelines (60%) were classified as low quality in this domain. The ICC for Domain 5 was 0.825 (95% CI 0.553 to 0.951, p<0.05), indicating good agreement between assessors.

In Domain 6 (Editorial Independence), the mean scaled score was 51.5±27.1%. Three guidelines (30%) – ESVS, the joint AVF/SVS and ECoP guidelines – were considered high quality in this domain,[16,40,41] while two guidelines – RSM and the joint phlebological societies guidelines – were rated as low quality.[37,44] The ICC for Domain 6 was 0.824 (95% CI 0.532 to 0.951, p<0.05), indicating a good level of agreement between assessors despite a broad score range (13–88%).

Correlation analysis

Pearson correlation coefficients between the scaled scores for each domain are presented in Table 8. Strong positive correlations were observed between Domain 1 and Domain 2 (r=0.92, p<0.05), Domain 1 and Domain 3 (r=0.90, p<0.05), Domain 2 and Domain 3 (r=0.96, p<0.05) and Domain 4 and Domain 5 (r=0.95, p<0.05). These findings suggest that high performance in one of these domains is associated with similarly high performance in the others. Conversely, Domain 6 showed weak or negative correlations with most other domains, with the exception of a non-significant positive correlation with Domain 3 (r=0.44) and a non-significant negative correlation with Domain 4 (r=–0.17).

Discussion

The CPGs developed by major organisations demonstrated higher quality compared with those from smaller or less specialised institutions. The Scope and Purpose domain achieved the highest score, reflecting a clear emphasis across all CPGs on establishing a clear foundation for recommendations. In contrast, the Applicability domain scored the lowest, highlighting a significant gap in providing practical guidance for implementing recommendations in clinical practice. The limited focus on applicability – such as considerations of facilitators, barriers and resource implications – may hinder the practical adoption of these guidelines, particularly in healthcare settings with varying resource availability and protocols.[45–47] It is important, however, to consider whether the performance of individual domains significantly impacts the overall usability of CPGs. While high scores in Scope and Purpose indicate well-defined guideline objectives, this does not necessarily translate to improved clinical implementation. Future research could explore whether high scoring domains correlate with guideline adherence in practice.

Our findings highlight substantial variability in the quality of CPGs. While some guidelines, particularly those from NICE, ESVS, AVF, AVLS, SVS and SIGN,[14–16,38] exhibit strong methodological rigour and consistency, they also acknowledge limitations due to reliance on low-quality evidence and a lack of randomised

controlled trial data. This raises the issue of whether guidelines based on poor evidence can still be clinically valuable. While these guidelines offer structured transparent decision-making frameworks, their recommendations may be largely opinion-based, reducing their clinical utility. In contrast, poorly developed guidelines based on the same weak evidence are less valuable, lacking rigorous evidence synthesis. Both types face similar challenges in supporting clinical decisions due to the absence of robust evidence. In such cases, guidelines may need to refrain from making recommendations when the evidence is insufficient to support a clear clinical direction. Relying on expert opinion or low-level evidence, though often necessary, risks blurring the line between evidence-based guidance and clinical advice. Therefore, clearly distinguishing between evidence-supported recommendations and those based on consensus is essential for ensuring transparency regarding their limitations.

Given these concerns, the AGREE II tool could be refined to assess whether the strength of evidence justifies a recommendation. While it is effective in evaluating guideline quality, it does not address the appropriateness of issuing recommendations based on weak or limited evidence. Incorporating criteria to evaluate whether evidence sufficiently supports a recommendation could improve the tool's utility in clinical guideline development. Ultimately, when recommendations rely primarily on expert opinion or best guesses, they function more as advisory statements than true evidence-based guidelines. This is particularly relevant for pharmacological thromboprophylaxis in superficial endovenous interventions, where most recommendations are weak, emphasising the need for high-quality research to inform future guidelines. This gap in evidence is one that the ongoing THRIVE (THRomboprophylaxis in Individuals undergoing superficial endoVEnous intervention) trial aims to address.[48,49]

The inconsistency in recommendations across guidelines further complicates clinical decision-making. While some CPGs recommend thromboprophylaxis only for high-risk patients,[15,39,41,42,44] others advocate for an individualised approach and some advise against routine use,[16,37,40,43] recommending it only when anaesthesia time exceeds 90 minutes and the VTE risk outweighs the bleeding risk.[14] Notably, the ESVS guidance on thrombosis does not provide specific recommendations on post-procedural thromboprophylaxis,[16] instead advocating for 'individualised thromboprophylaxis', highlighting the need for stronger evidence in this area. This variability in recommendations reflects weaknesses in guideline development and limits their applicability, making it difficult for clinicians to implement consistent evidence-based thromboprophylaxis strategies across diverse patient populations and healthcare settings. The resulting ambiguity fosters uncertainty, complicating clinical decision-making for patients undergoing superficial endovenous interventions.

The majority of guidelines advise offering pharmacological thromboprophylaxis to high-risk patients; however, the criteria for defining high risk in this patient cohort are unclear.[50] Guidelines recommending individualised approaches similarly lack specific scenarios for application, and while the ESVS and joint AVF/AVLS/SVS guidelines suggest routine risk stratification,[16,38] they do not specify tools or criteria for identifying 'high-risk' status. In practice, many clinicians use the Department of Health and Caprini risk assessment tools,[51,52] although no validated tool exists for this population. These inconsistencies reflect a lack of consensus, creating challenges for clinicians applying these guidelines in real-world settings.

Using the AGREE II instrument with four independent assessors strengthened the reliability of this evaluation. However, the relatively small number of included CPGs and the lack of guidelines specifically focused on superficial endovenous interventions may limit the generalisability of these findings. Although AGREE II is a valuable tool for assessing guideline quality, it lacks specific thresholds to distinguish high- from low-quality guidelines, leaving the overall assessment rating largely to the assessors' subjective judgement. Establishing clear thresholds within AGREE II to differentiate guideline quality could improve the consistency of assessments and provide assessors with clearer guidance in their evaluations.[25]

Consensus statements were excluded from this study as they are not official guidelines.[3] However, despite not meeting rigorous criteria for systematic guideline development, the RSM guideline was included given its widespread use and clinical relevance in the UK.[37] While lacking a strong methodological foundation, it was developed by a reputable medical society and offers practical recommendations aligned with the focus of this study. Its inclusion allows for a more comprehensive assessment of available guidance on pharmacological thromboprophylaxis for this patient cohort. Despite its practical utility, the RSM guideline had the lowest methodological quality score of all 10 CPGs, reflecting limited stakeholder involvement, weak development processes and a lack of transparency. This highlights both the existing gaps in high-quality guidance for pharmacological thromboprophylaxis in superficial endovenous procedures and the reliance on lower-quality sources in routine clinical decision-making.

Strong correlations among Scope and Purpose, Stakeholder Involvement and Rigour of Development domains suggest these aspects of quality are closely related. This could indicate that a well-defined scope and purpose promote rigorous development and comprehensive stakeholder involvement. Guidelines performing well in one domain tend to perform well in others, indicating that these elements may reinforce each other. Editorial Independence, however, showed weak or negative correlations with most domains, suggesting that it represents a distinct quality aspect not directly related to other domains. This may indicate inconsistent addressing of editorial independence across guidelines, irrespective of overall rigour or clarity. Previous research has highlighted that the Rigour of Development domain is a significant predictor of overall guideline quality,[53,54] and focusing on this domain could enhance CPG

KEY MESSAGES

- Existing guidelines for pharmacological thromboprophylaxis in superficial endovenous interventions are inconsistent, often ambiguous and largely based on low-quality evidence.
- High-quality research, including randomised clinical trials, is essential to build a stronger evidence base for more reliable and consistent guidelines.
- Enhancing the Rigour of Development and Applicability domains is crucial to improve the clarity, usability and practical impact of these guidelines across various clinical settings.

quality.[35,55] An extension of the AGREE II tool, specifically tailored to surgical guidelines, has been proposed to address limitations in surgical guideline development and provide a more suitable framework for high-quality guideline development.[56,57]

While clear reporting in CPGs is crucial for transparency,[35] strong reporting alone does not ensure robust methodological quality.[58] A guideline may be well reported but lack methodological rigour,[59] a distinction seen in systematic reviews where separate tools assess methodological quality and reporting transparency.[31,60,61] Applying a similar approach to CPGs would support guidelines that are both clearly reported and methodologically robust. Collaboration between AGREE II and GRADE (Grading of Recommendations, Assessment, Development and Evaluations) has been suggested to develop unified standards that would improve guideline development and appraisal.[62] Although both AGREE II and GRADE carry some subjectivity, GRADE provides a transparent framework for evaluating evidence certainty, requiring authors to justify their ratings, particularly in cases of downgrading.[49] AGREE II, in contrast, does not require assessors to document specific reasons for their domain or overall assessments.[25] Establishing predefined criteria for AGREE II item judgements may help raters reach consensus, especially when discrepancies arise.[35]

This review was limited to guidelines available in English. While this approach ensures consistency in evaluation and reduces potential translation biases, it excludes guidelines from non-English-speaking regions such as China, India and Japan, as well as those not available in English that were excluded during the full-text review.[63,64] Research on the impact of including non-English articles in analyses has yielded mixed results.[65–67] Consequently, our findings may have limited global applicability, particularly in regions with different healthcare systems and clinical practices. To address this limitation, future studies could incorporate translated versions of non-English guidelines or involve multilingual reviewers to broaden the scope and comprehensiveness of guideline appraisals.

Conclusions

Overall, the guidelines for pharmacological thromboprophylaxis in superficial endovenous interventions are often inconsistent, ambiguous and largely supported by low-quality evidence. Key domains, particularly Rigour of Development and Applicability, would benefit from targeted improvements to enhance the clarity and practical utility of these guidelines. High-quality clear guidance is essential to support effective clinical decision-making and ultimately improve patient outcomes. Future research may include evaluating how guideline quality affects patient outcomes or conducting qualitative studies with clinicians to further explore how inconsistencies in guidelines impact clinical decisions.

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ORIGINAL RESEARCH

A survey of contemporary acute lower limb ischaemia management

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Plain English Summary

Why we undertook the work: Acute limb ischemia (ALI) is a serious, potentially life- and limb-threatening condition that often results from a sudden blockage in a blood vessel. It requires urgent medical treatment. In recent years, new minimally invasive "keyhole" techniques have been developed, prompting discussion around the best way to treat ALI. This survey was carried out to understand how clinicians currently manage ALI and what treatment approaches they use in practice.

What we did: Between December 2022 and February 2023, clinicians from around the world who treat ALI were invited to complete an online survey. The survey was distributed via email and social media to gather insights into how they diagnose, treat, and manage follow-up care for ALI patients.

What we found: A total of 37 responses were received from vascular surgeons and interventional cardiologists based in Europe (UK, Italy, Greece), the USA, and New Zealand. Most of the respondents manage more than 30 ALI cases per year. The majority reported using CT scan to confirm the diagnosis and plan treatment.

In terms of treatment preferences:

- 51% preferred open surgery, citing confidence in outcomes and concerns over complications such as bleeding and distal embolisation from endovascular methods.
- 5% chose endovascular (keyhole) treatment first, while 40% used both approaches equally, depending on the case.
- 29% supported endovascular techniques as they are less invasive.
- 18% believed endovascular treatment leads to faster recovery.
- 42% reserved endovascular methods for patients with poorer health or limited surgical options.
- 10% made decisions case-by-case, considering factors like the cause of ALI, severity, and expected outcomes.
- For 5%, the availability of specialised facilities (e.g., hybrid operating theatres) and the lead clinician's preference influenced their choice of treatment.

What this means: There is significant variation in how doctors treat ALI, often based on their experience and available resources rather than strong clinical evidence. Although newer endovascular techniques are gaining interest, many clinicians still rely on traditional surgical approaches. There is strong support among clinicians for further research to determine which treatments work best for which patients.

Abstract

Background: Acute limb ischaemia (ALI) is a limb- and life-threatening condition requiring urgent management. Technological advances have led to the implementation of new endovascular devices into practice. This survey aimed to provide a better understanding of the contemporary management of ALI.

Methods: An international survey was conducted from December 2022 to February 2023 among clinicians who manage patients with ALI using an online survey tool through mailing lists and social media.

Results: 37 responses were received from vascular surgeons and interventional cardiologists from Europe (UK, Italy and Greece), USA and New Zealand. 65% of respondents manage >30 ALI cases annually. Computed tomography (CT) angiography was routinely used for diagnosis and intervention planning.

51% of respondents preferred open surgery for ALI management due to confidence in outcomes and concerns about distal embolisation and bleeding risks associated with

endovascular interventions, while 5% preferred endovascular first and 40% used both approaches equally. Approximately 14% of respondents reported lack of endovascular evidence and 5% reported lack of endovascular local expertise.

29% supported the endovascular approach as minimally invasive, while 18% believed it offers faster recovery. 42% reserved the endovascular approach for unfit patients and cases with poor outflow. 10% adopted a selective approach depending on aetiology, clinical severity and predicated endovascular outcome. An interventional radiology room or hybrid availability and leading clinician preference were the key deciding factors for 5% of respondents.

Conclusion: The survey results indicate variation in ALI management, steered by clinician expertise but lacking in level 1 evidence. The appetite for further study was high among respondents and could guide optimal ALI management.

Key words: acute limb ischemia; arterial thrombosis; endovascular percutaneous thrombectomy

Introduction

Acute limb ischaemia (ALI) occurs as a result of abrupt reduction in limb perfusion due to total or subtotal arterial occlusion by thomboembolism to the peripheral arteries within 14 days of the presentation. It is a vascular emergency with an incidence rate of 140 per million per annum and an average prevalence rate of 1–3%.[1,2] ALI severity ranges from a painful limb to complete loss of limb sensory and motor function. This severity range is most commonly classified by the Rutherford Classification.[3,4]

Although significant advances have been made in the management of ALI, studies to date report high amputation rates of 10–30% at 30 days and mortality rates of 15–20%, hence prompt recognition and emergency treatment is an absolute necessity.[5,6] The majority of patients with ALI are aged >75 years and are frail with multiple comorbidities including atrial fibrillation and heart failure, which can influence the management strategy.[7,8]

Surgical intervention includes urgent lower limb revascularisation procedures such as thrombo-embolectomy and occasionally bypass surgery. These have remained the standard treatments for ALI, but their invasive nature can lead to patient morbidity such as wound infection.[9] Patients in whom the limb is deemed unsalvageable as a result of severe ALI are offered a major amputation and/or palliation.[10,11]

Minimally invasive procedures include percutaneous catheter-directed thrombolysis, which have previously been studied, and modern endovascular thrombectomy techniques with a less definitive evidence base. Modern endovascular techniques aim to reduce the thrombotic burden by thrombus fragmentation, aspiration or rheolytic thrombectomy via a percutaneous approach.[12]

Historical data exist for catheter-directed thrombolysis, but reliance on this technique is still uncertain within contemporary practice for ALI.[13,14] Modern endovascular techniques are being increasingly adopted within the vascular armamentarium, with promising safety data.[15–20] However, these data are limited to registries, observational studies or small trials without comparison with surgery.

The suggested advantages of the modern percutaneous interventions are faster restoration of circulation, diagnostic imaging to guide onward management, reduced adverse events of thrombolytic medications (bleeding) and avoidance of risks of open surgical procedures and general anaesthesia.[12] These benefits, coupled with increasing availability, have potentially increased the treatment options for patients with ALI, especially in those with comorbidities or frailty that might prohibit gold standard open surgery.

This global survey seeks to explore the current practices in the management of ALI, focusing on the endovascular modern techniques as well as the rationale and follow-up protocol in this modern endovascular era.

Methods

Study design

An international survey was conducted from December 2022 to February 2023. Clinicians who manage patients with ALI were invited to complete an online survey through mailing lists and social media. This survey is reported with reference to the Checklist for Reporting of Survey Studies CROSS.[21]

Survey design

The survey was developed and reviewed by the lead authorship group. This was finalised and then peer-reviewed by the Vascular and Endovascular Research Network (VERN) before dissemination.

Survey respondents

The survey was aimed at clinicians managing ALI globally including vascular surgeons, interventional radiologists and cardiologists. Participating healthcare professionals were invited to share their contact details and institution for any future research.

Survey objective

The main objective of the survey was to determine how clinicians manage patients with ALI. This included the treatment preferences (such as open versus endovascular interventions) and the reasoning behind selecting one method over another. The

secondary outcomes were the type of imaging used before and after interventions, the follow-up (including surveillance) and anticoagulant/antithrombotic regimens. The survey also evaluated ALI research participation and equipoise.

Survey tool

Data were gathered using the JCIS online survey tool (Bristol, UK). The survey captured the respondent's healthcare setting and location. Respondents were asked to confirm that their response reflected the approach of the unit/centre/institution. The survey evaluated the treatment of ALI, postoperative protocols and their willingness to participate in future studies related to endovascular ALI intervention. The survey questions are shown in Appendix 1 online at www.jvsgbi.com.

Distribution

The survey was distributed through social media platforms and mailing lists via Twitter (X) and newsletters in conjunction with VERN, and responses were collected between 20 December 2022 and 20 February 2023. Only responses within this timeframe were considered in the data analysis.

Data analysis

Data submitted by duplicate responders from the same centre were checked for similarity before being included in the analysis and discrepancies were addressed by contacting the respondent directly. Responses were representative of the approach of a single centre/institution to ALI management. Descriptive statistics, including counts and frequencies, are reported where appropriate. Free-text responses of clinicians' opinions were collated and described.

Results

Respondent demographics and volume

A total of 37 responses were received from 30 vascular centres globally across Europe, USA and New Zealand. Nearly 95% of these institutions are publicly funded. Only one respondent was an interventional cardiologist (but still represented their unit level practice) while the remaining 36 were vascular surgeons.

Eight of the 37 respondents (21.6%) managed more than 50 cases annually, while 16 (43.2%) managed 30–50 cases and 12 (32.4%) estimated that they reviewed about 10–30 patients with ALI. Only one participant estimated that their unit managed less than 10 cases of ALI per year (Table 1). All the centres used CT angiography as their cross-sectional imaging of choice for assessing ALI.

Responses regarding the approach to management of ALI

Although a correlation between case volume and treatment modality preference was explored, no significant trend was observed due to the limited sample size. Regarding the intervention of choice, 19 of the 37 participants (51.4%) would adopt open surgery while 15 (40.5%) would approach using open or endovascular surgery equally. Only three participants (5.4%) would use the endovascular approach as first choice while one (2.7%) would manage medically with anticoagulants alone (Figure 1).

Table 1 Characteristics of survey respondents

Variable	n	&
Profession		
Vascular surgeon	36	97.3%
Interventional cardiologist	1	2.7%
Interventional radiologist	0	0%
Primary funding type		
Public	35	94.6%
Private	2	5.4%
Country of practice		
United Kingdom (UK total)	30	81.1%
England	23	62.2%
Wales	3	8.1%
Scotland	1	2.7%
Northern Ireland	2	5.4%
Republic of Ireland	3	8.1%
Italy	1	2.7%
Greece	2	5.4%
New Zealand	1	2.7%
USA	1	2.7%
Estimated ALI cases per year		
<10	1	2.7%
10–30	12	32.4%
30–50	16	43.2%
>50	8	21.6%
Preferred management approach		
Open surgery first	19	51.4%
Endovascular first	3	8.1%
Equal use of both	14	37.8%
Medical management only	1	2.7%

Figure 1 First line approach to ALI management.
Distribution of responses regarding the preferred first-line approach to managing acute limb ischemia (ALI). The majority (51%) favoured open surgery, followed by 41% opting for a combined open/endovascular approach. Endovascular intervention alone was preferred by 5%, while 3% supported a medical management strategy.

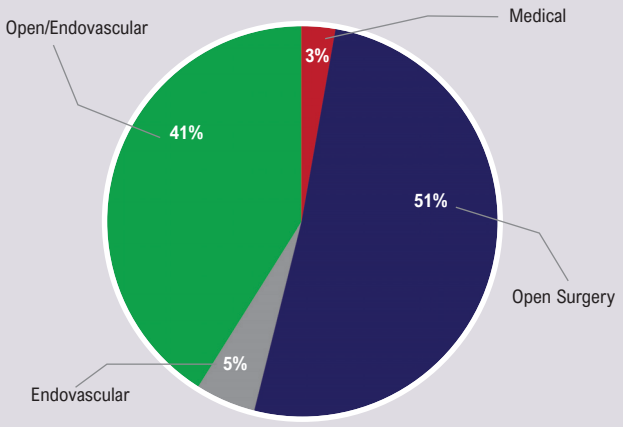
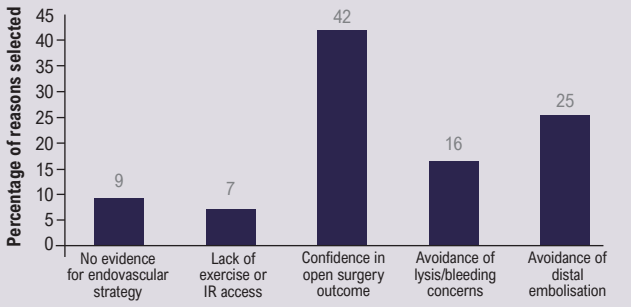


Figure 2 Reasons for selecting open surgery as the preferred intervention. The most cited reason was confidence in open surgery outcomes (42%), followed by the avoidance of distal embolisation (25%). Concerns about lysis/bleeding accounted for 16%, while lack of evidence for an endovascular strategy and lack of expertise or interventional radiology (IR) access were less common reasons, at 9% and 7% respectively.



Reasons for preferred intervention of choice

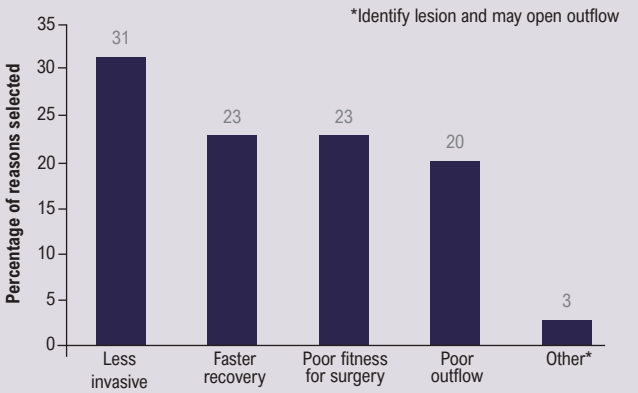
Open surgery

When we explored why respondents would consider an open strategy as the first choice of intervention, the majority (42%) cited 'confidence' in open surgery and in its outcome (Figure 2). Meanwhile, fear of distal embolisation (25%) and bleeding risks (16%) were the major concerns for adopting endovascular approach first.

Endovascular intervention

We also explored the reasons why the endovascular strategy is considered the first choice of management of ALI for some (Figure 3). Roughly one-third (31%) of the rationale was because it is less invasive and about one-quarter (23%) suggested that a relatively faster recovery was observed. Patients with poor fitness for open surgery (23%) and those with poor outflow (20%) were the other major reasons for employing endovascular intervention.

Figure 3 Reasons for choosing endovascular treatment as the first-line approach. The most common reason was that it is less invasive (31%), followed by considerations of faster recovery and poor fitness for surgery, both at 23%. Poor outflow was cited by 20% of respondents, while 3% selected "Other" reasons.



Use of on-table completion angiogram following open surgery

When respondents were asked if in their unit they would perform an on-table completion angiogram following an open surgery, five (14.7%) would always perform this but 17 (50%) would only do this when there is no clinical intraoperative improvement of the ischaemic limb or concerns about suboptimal revascularisation. The remaining 12 respondents (approximately 35%) would not perform on-table angiogram investigation, 10 (29.4%) due to logistic reasons and two (5.9%) do not think it is necessary.

Use of anticoagulants and antiplatelets post intervention

Open surgery

All participants would consider at least an anticoagulant or antiplatelet for post-surgical management of ALI. Twelve specialists (35.3%) would usually prescribe only anticoagulant medication, nine (26.5%) would routinely offer a combination of an antiplatelet and treatment dose anticoagulant medication while four (11.8%) would prescribe a combination of an antiplatelet and a prophylactic anticoagulant treatment. The regimen used by the remaining nine respondents (26.5%) would depend on the aetiology.

Endovascular intervention

Similarly, all participants would consider at least an anticoagulant/antiplatelet for post endovascular management of ALI. Seven respondents (41.2%) would routinely medically manage with only anticoagulants, three (18.8%) would routinely offer a combination of an antiplatelet and a treatment dose anticoagulant while two (12.5%) would offer a combination of an antiplatelet but with prophylactic anticoagulant treatment. However, four specialists would adapt their regimen depending on the case/aetiology.

Follow-up investigations and surveillance

Open surgery

Following open surgery for ALI, 14 respondents (41%) do not routinely offer follow-up investigations while eight (23.5%) would usually arrange for a one-off ultrasound arterial duplex. Four respondents (11.8%) would monitor their patient through an ultrasound arterial duplex surveillance programme and only one (2.9%) would perform cross-sectional imaging. The remaining seven respondents (18.9%) would offer follow-up imaging on a case-by-case basis depending on the type of revascularisation (stent/bypass), clinical status and ankle-brachial pressure index.

Endovascular intervention

We also asked all the 16 respondents in the endovascular group if they would offer follow-up imaging. Eight (47%) do not offer routine follow-up imaging and five (29%) would routinely perform a post-intervention ultrasound arterial duplex, of which three often perform this as a one-off investigation while two would place patients on the

Table 2 Availability of hybrid theatres

Location	Hospitals (n)	Hybrid theatre available, n (%)
UK	25	17 (68%)
England	16	12 (75%)
Wales	3	1 (33%)
Scotland	1	0 (0%)
Northern Ireland	2	2 (100%)
Republic of Ireland	3	2 (67%)
Italy	1	1 (100%)
Greece	2	2 (100%)
New Zealand	1	1 (100%)
USA	1	1 (100%)

surveillance programme. The remaining three respondents would approach this on a case basis depending on clinical outcome/patient-specific concerns.

Availability of hybrid theatres

Of the 30 hospitals represented in the survey, 22 (73%) had hybrid theatres. Table 2 further shows the availability of hybrid theatres based on the individual hospitals and regions represented in the survey. Only one hybrid theatre in Wales was not available during out of hours.

Further research and equipoise

We enquired about potential barriers in recruiting patients for future studies in each respective centre and three foresaw no major barriers. However, the lack of research time/staff/resources was the main barrier foreseen by 15 participants (40.5%) and lack of expertise for endo-interventions was a concern for 11 centres (29.7%). Nine (24.3%) expected that lack of equipoise would be an issue while the remaining two predicted a challenge of randomising these emergency cases during out of hours. The majority of participants (89%) were keen to partake in a randomised study of an endovascular versus open first strategy for revascularisation in patients with ALI.

Discussion

This survey shed some light on the contemporary management of ALI across a variety of countries. While severity stratification using the Rutherford Classification could have enhanced the analysis, this was not captured in the survey tool and remains an area for future research.

The breadth of the survey offered a panoramic view of international practice, but this may have limited the depth of data in specific domains such as antithrombotic strategy or follow-up imaging. Several imaging methods can determine occlusion sites in limb ischemia, such as ultrasound, CT angiography, digital subtraction angiography, conventional angiography and magnetic resonance angiography.[9] Notably, our survey found that CT angiography emerged as the preferred diagnostic imaging technique. This aligns with numerous studies demonstrating its high sensitivity and specificity for identifying arterial occlusions, providing precise anatomical site information, and its suitability for emergency settings due to its widespread availability in most centres.[22,23] This is also in line with the European Society for Vascular Surgery (ESVS) guideline for ALI, which recommends CT angiography as the first-line modality for anatomical imaging.[9]

Half of the specialists engaged in ALI treatment tend to favour open surgical revascularisation as a first choice owing to their established competency and concerns regarding complications of endovascular techniques, while others were willing to adapt new endovascular techniques equivalently or selectively. The current ESVS guideline recommends surgical thrombo-embolectomy as the standard treatment of ALI caused by embolic occlusions in an otherwise normal artery.[9] However, it appreciates that this cohort of patients is becoming increasingly rare as most surgical patients will also have concurrent vascular disease. Regarding evidence for modern endovascular procedures, there is lack of powered clinical trials demonstrating the efficacy and cost effectiveness compared with current surgical practice.[9] In addition, the available comparative randomised clinical trials were published in the 1990s, which does not reflect current practice.[13,24] Hence, the paucity of level 1 comparable evidence and current recommendations to consider either approach[9] could explain the clear division between the intervention techniques noted in the survey.

On-table completion angiography was not routinely performed by most surgeons following open surgical intervention except when there is a suspicion of inadequate or poor distal vascularity. This procedure is typically conducted to confirm full clearance of the arterial tree and distal patency, thus verifying the success of the performed procedure.[25] Research indicates that employing routine intraoperative completion angiograms, as opposed to selective use, has a positive impact on revascularisation outcomes, resulting in lower rates of re-occlusion.[26,27] In addition, the current ESVS guideline for ALI recommends a completion angiogram irrespective of the intervention method.[9] Also, following open surgery, about a third of surgeons do not offer a completion angiogram and nearly two-thirds of these surgeons do not have access to hybrid theatres. This is concerning as the availability of a hybrid theatre is essential for centres to be able to offer this emergency service, and our survey provides information to regulatory bodies to enhance patient care.[9,28]

Most of the respondents believed in prescribing antithrombotic agents as single or combined therapy. The VOYAGER PAD trial demonstrated that low-dose rivaroxaban with aspirin reduced the incidence of adverse major limb and cardiovascular events. Although bleeding risk was increased in patients with this regimen, this was without significant fatal bleeding.[29] A small group of patients with ALI in the COMPASS trial demonstrated similar benefit.[30] However, ALI was not the primary focus in these recent trials and there is a need for a focused randomised clinical trial on the management of ALI.[9] Our current practice has largely been derived from extrapolating findings from cardiology results and broad groups of patients with peripheral arterial disease.[9,31,32]

ESVS guidelines specifically recommend long-term anticoagulant cover following ALI revascularisation secondary to an embolus. On the other hand, ESVS recommended the use of either long-term antiplatelet or anticoagulation to reduce cardiovascular events following ALI revascularisation secondary to native artery thrombosis/popliteal aneurysm/failure of previous revascularisation.[9] These recommendations and lack of level 1 evidence for patients with ALI could explain the heterogeneity seen in current clinical practice.

CLARITY is an ongoing NIHR funded randomised controlled trial looking at the clinical efficiency and cost effectiveness of three different antithrombotic regimens following peripheral arterial endovascular revascularisation.[33] However, this is focused on patients with chronic limb threatening ischaemia (CLTI) which is a different subgroup of peripheral arterial disease with different aetiology, pathology and management principles. There is a need for a systematic review and potentially similar high-powered randomised clinical trials on clinical outcome of the new current endovascular management of ALI to guide current practice.

Post-intervention follow-up varied in our survey, with nearly half of the respondents not routinely offering follow-up investigations while nearly a quarter would perform this routinely. Only a few would initiate a surveillance programme after the intervention. It is not surprising that ultrasound arterial duplex seemed to be the investigation of choice as it is non-invasive and the recommended imaging modality of choice in our current clinical guideline.[9] However, the ESVS guideline appreciates that imaging is required if there are clinical concerns during follow-up, but recommends routine imaging follow-up only for patients treated for popliteal artery aneurysm.[9] A recent meta-analysis did not demonstrate any difference in clinical outcome when ultrasound arterial duplex was compared with clinical assessment following infrainguinal vein bypass.[34] The lack of a definitive protocol observed in the survey is a reflection of current evidence and clinical guideline suggestions.

Nearly three-quarters of respondents had access to hybrid theatres, indicating an increasing availability of a hybrid set-up with 24-hour access. However, in the UK, less than two-thirds of hospitals in the survey had access to a hybrid theatre despite being an established clinical standard for providing this emergency service,[28] but some centres that do not have a hybrid theatre may also have access to an interventional radiology suite. Also, the lack of interventional radiologists in our survey might have under-represented access to the interventional radiology suite. Patients need to have access to both open and endovascular interventions in a single procedure to have a potentially better clinical outcome.[9,26]

This survey has been insightful, but the relatively small number of centres without representation from interventional radiology does add caution to the overall generalisability of interpretation.

Study limitations

This study has a few limitations including the small number of heterogeneous respondents and vascular centres represented. Additionally, the relatively small sample size, lack of responses from interventional radiologists and the absence of Rutherford Classification data limit the granularity and generalisability of findings.

The online survey methodology carries a risk of sampling and response bias with limited accessibility to the questionnaire. There is always a risk of limiting the depth of responses and the ability to gather contextual details despite our best offer to mitigate this in survey questions.

KEY MESSAGES

- There is significant variation in the first-line management of acute limb ischaemia (ALI), with no clear consensus between open surgery and endovascular approaches.
- Clinicians favour open surgery due to confidence in outcomes, while endovascular methods are chosen for their minimally invasive nature and suitability for high-risk patients.
- The lack of robust, comparative evidence underscores the urgent need for high-quality trials to guide optimal ALI treatment strategies.

The future

Rather than providing greater clarity on current practices, this survey has perhaps raised more questions and highlighted diverse clinical practice and paucity of evidence to guide clinical practice. There have been numerous research studies on chronic limb-threatening ischaemia and peripheral arterial disease, but there is minimal research on the subgroup of ALI which has a different aetiology and pathology. The ESVS guideline on ALI recognises that the clinical efficiency of these modern endovascular techniques remains an unresolved issue, and there is a suggestion for patients receiving these modern interventions to be enrolled in clinical trials.[9]

Completion on-table angiography should be practised in all centres offering management of ALI, as supported by current evidence and ESVS guideline recommendations. There is a need for further studies to guide post-intervention anticoagulant regimens and vascular imaging.

Conclusion

This study sheds a contemporary light on the perspectives of the centres managing ALI. It highlights the growing acceptance of endovascular techniques for ALI treatment, either independently or in hybrid approaches, reflecting a desire for more facilities supporting these methods. ALI is well known to have a significant mortality risk and complications, hence future research comparing open and endovascular techniques in the treatment of ALI is vital.

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PROTOCOL

Effectiveness of antimicrobial dressings in surgical site infection prophylaxis in surgical wounds healing by secondary intentions (SWHSI): a systematic review protocol

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Plain English Summary

Why we are undertaking this work: Open surgical wounds are commonly left to heal from the bottom up but this usually takes a long time and they often get infected. Many different types of dressings are used to manage these wounds including dressings with antimicrobial properties which aim to reduce the risk of infection. Small studies have suggested these antimicrobial dressings may reduce infection but the data are not clear.

What we will do: To investigate the effect of antimicrobial dressings on infection rates in open surgical wounds, we are going to do a systematic review. A systematic review is a way of bringing together the results from existing studies to decide if an intervention is effective or not. This paper describes how we are going to bring all the existing studies on antimicrobial dressings and infection rates together to decide if they should be used in routine practice. We are going to search databases for published and unpublished studies that study the use of antimicrobial dressings to prevent infection in patients with open surgical wounds.

What this means: The results from the systematic review will tell us if antimicrobial dressings should be used in routine practice or if more research is needed. It will also allow other researchers to repeat the systematic review if they wish.

Abstract

Background: Surgical wounds healing by secondary intentions (SWHSI) refers to wounds left open after surgical procedures. SWHSI is challenging to manage and presents a significant burden to both individual and healthcare services. They require more nursing and healthcare support, such as continuous district nurse involvement, recurrent hospitalisations and surgical re-interventions. These wounds also negatively impact functional status, body image and psychological well-being. There are various treatment modalities offered for SWHSI ranging from negative wound pressure therapy to various dressings and implantable topical antibiotics. However, there is a lack of formalised guidance and decisions are highly variable by care provider. This study aims to systematically evaluate data on the effectiveness of antimicrobial dressings in preventing surgical site infections in SWHSI.

Methods: This is a protocol for the systematic review and meta-analysis of studies investigating the efficacy of antimicrobial dressings in preventing surgical site infections in SWHSI. It has been registered in PROSPERO with the registration number CRD42024608611. A comprehensive literature search will be conducted in EMBASE, MEDLINE, CINAHL and CENTRAL to identify relevant studies. Randomised controlled trials, cohort studies and cross-sectional studies will be reported. Data will be extracted, synthesised and a meta-analysis performed to determine the overall association of antimicrobial dressings with surgical site infections. Subgroup analysis will be conducted to elicit the influence of confounders on pooled data. If meta-analysis is unable to be carried out due to insufficient studies or high data heterogeneity, the results will be expressed narratively instead. A risk-of-bias tool appropriate for each study design will be used to ensure high quality studies are selected. The systematic review will be reported as per PRISMA guidelines.

Discussion: The findings from this systematic review will provide a comprehensive assessment of the available evidence. As there is a lack of high-quality clinical evidence exploring the benefits and drawbacks of this treatment, this review will be able to evaluate the quality of evidence and potentially produce a meta-analysis to further guide clinical decision-making.

Key words: antimicrobial dressings, surgical wounds healing by secondary intentions, surgical site infections

Prospero registration number: CRD42024608611

Introduction

Healing by primary intention occurs when the incision edges are approximated with physical means (sutures, staples, etc) after surgery. Surgical wounds healing by secondary intention (SWHSI) refers to surgical wounds left open after a surgical procedure. The general definition of SWHSI is a wound left open arising from any surgical specialty and occurring on any part of the body. This includes cases where wound closure was not planned (eg, due to infection, tissue loss or undue tension when wound edges are approximated),[1] initially closed wounds have dehiscence or experience a post-surgical breakdown and existing wounds that underwent debridement.[2] Secondary intention aims to heal by the formation of granulation tissue in the tissue defect.

The point prevalence of SWHSI has been found to be 4.1 per 1000 population.[3] Colorectal and vascular surgery are the most common surgical specialties with SWHSI, with SWHSI being most located in the abdomen and foot.[3] This is supported by Chetter *et al* who showed that the common operations leading to SWHSI are surgery for pilonidal sinuses, lower limb amputations and laparotomy with bowel resections.[4]

Postoperatively, open surgical wounds can require continuous intensive treatment. Acute wounds typically heal in a predictable fashion following the four defined stages of haemostasis, inflammation, proliferation and remodelling while chronic wounds do not progress through these phrases in the expected timeframe. While acute closed surgical wounds normally heal in 4 weeks, SWHSI take longer to heal with a median time to healing of 86 days.[3] In a study by Saramago *et al* of the cost-effectiveness of negative wound pressure therapy (NWPT), statistical modelling estimated that patients with SWHSI will take 181 days to heal compared with 42 days for patients without SWHSI when both were treated with NWPT.[5]

A burden of wounds study by Guest *et al* conducted in 2017/20186 showed that the annual prevalence of wounds increased by 71% between 2012/2013 and 2017/2018. SWHSI have explicit and implicit costs for individuals and healthcare services. Explicit costs include prolonged or recurrent hospitalisations with costs for laboratory investigations, radiological tests, treatment costs such as wound management therapies, antibiotic therapies, further surgical intervention and continuing community support requirement for district nursing. The annual cost of NHS wound management (closed and open wounds) was estimated at £8.3 billion, with 81% being incurred in community care.[5,6] The social and personal costs of living with a SWHSI can include unemployment and significant psychosocial impacts.

Current recommendations by the National Institute for Health and Care Excellence (NICE)[7] for infection prevention in SWHSI is to avoid Eusol, gauze, moist cotton gauze or mercuric antiseptic and to use an appropriate interactive dressing. This guideline lacks clarity on specific dressings and therapies to be used. Two therapies that are frequently implemented are wound dressings and NWPT. One of the fundamental tenets of wound healing involves establishing an optimal microenvironment. This is where advanced wound dressings are of critical importance as they have been proven to improve the microenvironment by facilitating cell migration and reducing the risk of infection from the bacterial microenvironment.[8]

A cross-sectional survey shows that most patients were receiving dressings in the community setting.[9] Given the lack of research in this area, decision-making regarding the choice of dressing is often made based on clinical or patient preference without a rigorous underpinning of evidence available to guide this choice. The lack of formalised guidance leads to a discrepancy in decision-making with potential implications for time to healing, wound infections and antimicrobial stewardship. The categories of dressings currently available as per the British National Formulary (BNF) are listed below:[10]

- Gauze
- Films
- Foams
- Hydrogels
- Hydrocolloids
- Alginate
- Antimicrobial

Antimicrobial dressings can be further divided into:[10]

- Silver
- Iodine
- Polyhexamethylene biguanide (PHMB)/polyhexanide
- Honey
- Chlorhexidine gauze
- Dialkylcarbamoyl chloride
- Alginate dressings with silver
- Octenidine dihydrochloride

There is a gap in evidence-based treatment for SWHSI. This is especially true for the selection of dressings, which are often the mainstay of SWHSI treatment.[9] Current guidelines do not precisely define dressing type, so the purpose of this systematic review is to help identify healthcare gaps and develop more comprehensive guidance for care providers in terms of dressing selection.

The aim of this study is to identify and establish the effectiveness of antimicrobial dressing usage in SWHSI in the context of surgical site infection. Currently, there is no formalised guidance on the benefits or disadvantages of antimicrobial dressings. A systematic review would help to consolidate our understanding and support decision-making to help fulfil current healthcare needs.

This systematic review also aims to assess variability in outcome reporting of surgical site infection if sufficient data could be collected.

Objectives

To investigate if antimicrobial dressings are effective in reducing surgical site infections in SWHSI.

Methods

Outcomes

The primary outcome measure will be the binary outcome of surgical site infection in SWHSI as defined by the individual studies. This could be diagnosed by any surgical site infection scoring system such as the ASEPSIS score, which is an acronym for Additional treatment, Serous discharge, Erythema, Purulent exudate, Separation of deep tissue, Isolation of bacteria and Stay as inpatient prolonged over 14 days. Alternatively, we also accept surgical site infection as diagnosed by predefined Centre of Disease Control (CDC) criteria and the Southampton score,[11] or by any other methods.

Secondary outcomes would be:

- Patient-reported quality of life measures
- Time to heal
- Mean length of hospital stays
- Reoperation within 30 days
- Amputation of affected body part
- Hospital re-admissions related to wound complications
- 30-day mortality

Eligibility criteria

Studies will be eligible for inclusion if they meet the following criteria:

- *Population*: Adult human patients with SWHSI (all surgery types will be included). This will include wounds where healing by secondary intention was planned, initial wounds closed with primary intentions that have dehiscence or experience a post-surgical breakdown. Wounds healing by primary closure or delayed primary closure and surgical procedures such as stomas, skin grafts and dental extractions will be excluded.
- *Intervention/comparator*: Studies with antimicrobial dressings as part of the intervention or standard treatment will be included. The comparator could be no treatment, systematic antibiotics, other dressings, adjuvant therapies (eg, NWPT, local application of antimicrobial implants, topical antibiotics or antimicrobial coated sutures). Antiseptic skin preparation used preoperatively will be excluded.
- *Outcomes*: Surgical site infections. Diagnosis could be made via any scoring system or method.
- *Study design*: Randomised controlled trials, cohort studies or cross-sectional studies.

Studies will be limited to those published in English from the year 1974. Studies with no full text but an abstract in English would be eligible for inclusion provided the primary outcome could be extracted.

Search strategy

In accordance with the recommendation from the Cochrane Handbook for Systematic Reviews of Interventions,[12] the following electronic databases will be searched: Medline, Embase, CINAHL and Cochrane Group. The following keywords would be used "anti- bacterial agents", "surgical site infection", "SSI", "open wound", "secondary intention" in combinations. An information search specialist was consulted for conducting the literature search (see Appendix 1 online at www.jvsgbi.com for a full search strategy). All published full-text articles will be included. For incomplete or restricted articles, the authors will be contacted to obtain the completed texts.

Data management

Selection process

All studies for potential inclusion will be imported into Covidence and de-duplicated prior to blind screening. Two reviewers (MCL/MS) will independently review and screen the remaining texts according to the inclusion/exclusion criteria. Where a full-text article is not available, we will attempt to contact the corresponding author for information. If this is unsuccessful, the studies will be excluded. Any difference in opinions between the two reviewers will be resolved with the input of a third reviewer (CA).

Data extraction

Data will be extracted from relevant studies into a pre-piloted Microsoft Excel spreadsheet. Data will be collected on:

- characteristics of each study (study design, sample size, publication year, funding source);
- demographic factors of participants (age, gender, ethnicity, comorbidities, smoking);
- wound-related information (number, duration, previous SWHSI, location, size, tissue involvement, originally intended secondary intention);
- surgery-related information (type, date, indication);
- associated treatment strategies (no treatment, systematic antibiotics, adjuvant therapies);

- primary outcome of surgical site infection and severity (including scoring system used to diagnose and stratify);
- secondary outcome measures.

Assessment of methodological quality

Different quality assessment tools will be used and tailored to the specific study design to enable rigorous appraisal of methodological quality. For randomised controlled trials, the Cochrane risk-of-bias tool (RoB 2)[13] will be used to systematically assess for risk of bias. For non-randomised studies, the Risk of Bias In Non-randomised Studies of Intervention (ROBINS-I)[13] will be used.

The Grading of Recommendations, Assessment, Development and Evaluations (GRADE) system will be used to assess the certainty of evidence for each outcome.

Data synthesis

Data extracted will be input into a standardised Excel table with any analysis being conducted with Stata. The primary outcome measure of surgical site infection will be expressed as odds ratios (ORs) with 95% confidence intervals (CIs) where clinical and methodological heterogeneity allows. This will quantify the strength of the association between the use of antimicrobial dressings and surgical site infections. A meta-analysis is planned to be conducted by using the inverse variance method. Studies reporting different effect measures will be converted to ORs to allow for consistency. This would be performed by either using raw data or the Generalised Linear Mixed Model.

Log-transformation of all ORs and standard errors will be calculated before proceeding with the meta-analysis. This will stabilise variance and allow additive calculations to be performed. A pooled OR will be calculated from transformed ORs and the results will be back-transformed and reported as OR and 95% CI for the likelihood of surgical site infection when antimicrobial dressings are used. The results of the pooled ORs and study weighting will be visualised with a forest plot. Sensitivity analysis will be conducted to assess the robustness of the results. If pooling is not feasible due to significant heterogeneity or lack of eligible studies, the results will be synthesised narratively.

Heterogeneity between studies will be assessed using Cochran's Q test and I^2 statistics. If substantial heterogeneity (I^2 >50%) as per Cochrane's Handbook for Systematic Review of Interventions[12,14] is found and sample size is adequate, potential sources of heterogeneity will be explored using subgroup analysis. The subgroups will include design (randomised controlled trials vs observational studies), type of SWHSI (planned vs unplanned), patient demographics (eg, age, sex, body mass index, presence of comorbidities), SWHSI location (abdomen vs limbs), therapies (dressings vs adjuvant therapies), surgery performed (elective vs emergency) and operation duration.

Publication bias will be assessed by construction of a funnel-plot of log-transformed ORs against standard error if at least 10 studies are included in the meta-analysis.

KEY MESSAGES

- Surgical wounds healing by secondary intentions (SWHSI) are surgical wounds that are left open after the procedure. These wounds are common in colorectal, plastic and vascular surgery.
- They require long healing times and more intensive care efforts, generating a significant economic and personal burden.
- There are various wound care options available, of which dressings are frequently used. Antimicrobial dressings are one such option.
- However, there is a lack of clear evidence-based guidelines regarding their effectiveness in reducing surgical site infections.
- This systematic review aims to assess the effectiveness of antimicrobial dressings in managing SWHSI and explores the variability in outcomes of surgical site infections reported in the current literature.
- The results of this study will help guide evidence-based decision-making and improve consistency in clinical practice and antimicrobial stewardship.

Meta-bias(es)

No meta-biases are expected to occur for this review.

Discussion

SWHSI is a significant clinical challenge with far-reaching impacts on both patients and healthcare services. This protocol is designed to systematically evaluate the current available medical literature on antimicrobial dressings. This planned review includes a comprehensive search strategy, independent dual assessor screening and data extraction in line with the Preferred Reporting items for Systematic Review and Meta- Analyses Protocols (PRISMA-P) guidelines and checklist. This ensures a maximal identification of relevant studies and reduction of selection and extraction biases. Validated methodological review tools will be implemented to enhance the internal and external validity of evidence.

Despite the planned methodological rigour, several challenges in interpreting the results of studies on SWHSI are anticipated. A key limitation is the presence of multiple confounders, including heterogeneity of the study population due to the variety of underlying comorbidities and clinical heterogeneity in wound aetiology. The lack of standardised surgical site infection diagnostic criteria is expected to lead to variability in outcome measures, complicating comparisons and data synthesis. Additionally, inconsistencies in treatment duration and wound healing outcome reporting (time to healing vs wound size reduction vs clinical judgement) might limit feasibility of a quantitative meta-analysis and may necessitate narrative synthesis.

While this review will address an important clinical question with a robust methodological framework, careful consideration of limitations is essential during the interpretation of the findings. These anticipated inconsistencies highlight the need for this review as well as the need for standardised trials in this field.

Conclusion

The findings of this systematic review will focus on the use of antimicrobial dressings and the effect on SWHSI, especially its efficacy in preventing surgical site infections. Based on the results of this systematic review, potential avenues for further research will be identified, including the potential need for extra research to address gaps in current evidence.

Conflict of Interest: None. We would like to declare that Professor Ian Chetter, who is a co-author of this protocol, also serves as Editor-in-Chief for *JVSGBI*.

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CASE REPORT

Traumatic superficial temporal artery pseudoaneurysm managed with ultrasound-guided compression

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Abstract

Superficial temporal artery aneurysms are rare, accounting for approximately 1% of all arterial aneurysms, with 95% of these being pseudoaneurysms. They are most commonly caused by trauma to the temporal region. Although ultrasound-guided compression has been described as a management technique, it has been believed to be ineffective. This report describes the case of an 81-year-old female on anticoagulation who presented with a pulsatile mass over her left temporal region 4 weeks after a fall. Arterial ultrasound confirmed the presence of a pseudoaneurysm of the frontal branch of the superficial temporal artery, which was successfully treated with ultrasound-guided compression. This case therefore highlights that ultrasound-guided compression can serve as an effective non-surgical treatment option for pseudoaneurysms of the superficial temporal artery.

Key words: superficial temporal artery; pseudoaneurysm; vascular trauma

Introduction

Superficial temporal artery aneurysms are a rare but potentially serious vascular injury that most commonly result from blunt trauma to the temporal region.[1,2] They account for approximately 1% of all arterial aneurysms, with around 95% classified as pseudoaneurysms.[3] Clinically, they present as a pulsatile subcutaneous mass over the temporal region and can lead to complications such as rupture, haematoma formation or compression of adjacent structures.[4] Diagnosis typically involves the imaging modalities ultrasound, computed tomography angiography (CTA) and magnetic resonance angiography (MRA). Given the potential for serious complications, urgent diagnosis and appropriate management are critical, with treatment options including surgical ligation, conservative approaches such as ultrasound-guided compression, and interventional radiology techniques such as coil embolisation and direct thrombin injection.[1,3]

Case report

An 81-year-old female with a history of atrial fibrillation managed with apixaban initially presented to the Emergency Department (ED) following a fall during which she sustained a head injury. A computed tomography (CT) scan revealed no intracranial pathology and she was subsequently discharged the same day.

Four weeks later she re-presented to the ED with a tender pulsatile mass over her left temporal region, corresponding to the site of her initial head injury. Clinical examination revealed a well-defined, circular, pulsatile swelling measuring approximately 2×2 cm, associated with surrounding erythema and an adjacent superficial healing laceration (Figure 1). Arterial ultrasound demonstrated a 1×0.8×0.5 cm pseudoaneurysm arising from the frontal branch of the left superficial temporal artery, with characteristic 'yin-yang' flow on colour doppler imaging (Figure 2).

Following consultation with the Interventional Radiology department, a decision was made to attempt non-surgical management using ultrasound-guided compression. The primary pseudoaneurysm was compressed under ultrasound guidance in two 30-minute sessions, resulting in cessation of blood flow within the pseudoaneurysm sac. During the procedure, a smaller secondary pseudoaneurysm was

Figure 1 Well-defined, circular, pulsatile, 2 x 2cm swelling overlying left temporal area, accompanied by surrounding erythema and an adjacent superficial healing laceration

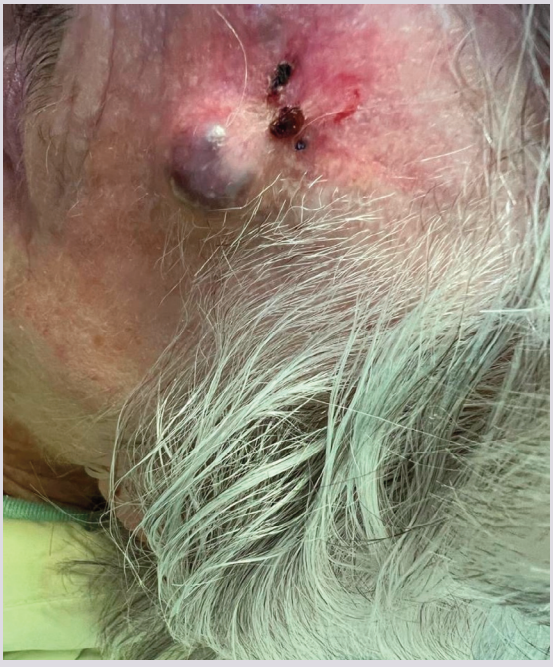
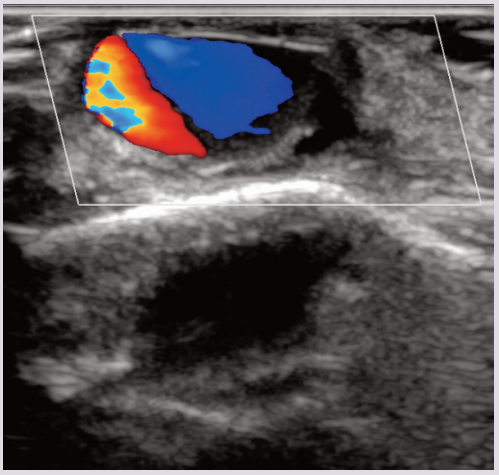


Figure 2 Ultrasound demonstrating 'yin-yang sign' indicating bidirectional flow within the pseudoaneurysm.



identified superior to the primary lesion. It was similarly treated with two 15-minute sessions of ultrasound-guided compression, with post-procedural imaging confirming the absence of blood flow within the sac.

Follow-up ultrasound performed the following day confirmed the resolution of both pseudoaneurysms and the patient was successfully discharged. Upon review in the outpatient department 4 weeks later, no residual or recurrent lesions were observed.

Discussion

Traumatic temporal artery aneurysms are rare yet potentially serious vascular injuries that can result from penetrating or blunt trauma to the superficial temporal artery or its branches. The superficial temporal artery branches from the external carotid artery at the base of the parotid gland. As it follows a tortuous course over the temporal bone, it is relatively unprotected and is therefore particularly susceptible to injury.[5,6] Pseudoaneurysms of the superficial temporal artery, as in our patient, have most commonly been reported due to blunt head trauma; however, cases secondary to penetrating trauma, injections and surgical interventions have also been described in the literature.[3]

Superficial temporal artery aneurysms occur as a result of traumatic disruption to the vessel wall. This is thought to occur due to one of two mechanisms: partial transection of the artery or severe contusion and subsequent necrosis of a section of the arterial wall. Subsequent haemorrhage is confined by the overlying skin, leading to the formation of a haematoma. Over time, this haematoma becomes organised and forms a fibrous pseudocapsule. Continuous lysis and resorption of the luminal thrombus may allow arterial recanalisation, permitting ongoing blood flow into the pseudoaneurysm sac, causing progressive dilation of the weak haematoma capsule.[3,6]

The diagnosis of superficial temporal artery aneurysms requires a multifaceted approach involving medical history, physical examination and imaging studies. Imaging modalities typically include ultrasound, CTA and MRA.[2]

Surgical management of superficial temporal artery aneurysms is frequently reported in the literature and typically involves ligation of the proximal and distal vessel segments with excision of the pseudoaneurysm.[5,6] More minimally invasive approaches include coil embolisation and image-guided thrombin injection.[1,3,5] Ultrasound-guided compression has been described in the literature as a management technique for these aneurysms, but it has often been considered ineffective.[3] However, our case demonstrates that ultrasound-guided compression can be a viable non-surgical treatment option in selected patients. Given the low recurrence rate reported in the literature, routine long-term follow-up is generally not required.[5]

Conclusion

Traumatic superficial temporal artery aneurysms are a rare but serious consequence of head trauma, with the potential to cause significant complications if not promptly managed. The risk of rupture and associated cerebral complications underscores the critical importance of early and accurate diagnosis. Advances in medical imaging and interventional techniques have significantly improved the ability to diagnose and manage these aneurysms, thereby reducing associated risks and enhancing patient outcomes. In this case, ultrasound-guided compression was an effective

KEY MESSAGES

- The majority of superficial temporal artery aneurysms are pseudoaneurysms
- They typically result from direct trauma to the temporal region
- Prompt diagnosis using ultrasound, CTA or MRA is essential to enable timely and effective management
- Ultrasound-guided compression may be an effective non-invasive treatment option in selected patients

minimally invasive treatment option and perhaps should be considered a first-line alternative to surgical intervention in selected patients.

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LETTERS TO THE EDITOR

The Journal of Vascular Societies Great Britain & Ireland welcome letters to the Editor. If a letter is relating to any articles published in the Journal, these letters should ideally be submitted within 2 months following publication of the article. Letters should be no more than 600 words with up to 5 references

Assessing for Depression in Patients Undergoing Major Lower Limb Amputations (MLLA)

Key words: major lower limb amputations (MLLA), depression, quality improvement

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Dear Sirs

The incidence of depression and/or anxiety following a major lower limb amputation (MLLA) ranges from 20% to 50%,[1] with factors such as physical health, emotional resilience, pre-existing illness and the indication/timing being risk factors. The rate of MLLA continues to rise, with 3,688 cases being recorded through the National Vascular Registry in 2024.[2] This is against a backdrop of limited resources here in the UK, with support services being stretched and services being cut.

All surgeons have received a rudimentary medical school level training in assessment of psychiatric conditions but will rarely be required to implement these skills. However, patients undergoing MLLA frequently have a protracted hospital stay after surgery due to a change in circumstances and therefore give the team an opportunity to assess the patients further and practise their skills. Work carried out from the SIMBA group (currently unpublished) suggests that only 26% of units have inpatient psychiatric services available to assess MLLA patients.

A 39-week audit at Russells Hall Hospital found that the patient's mood was never recorded on ward rounds. A re-audit, following presentation to the local vascular team, resulted in an improvement to 11.8%. The data were presented as a poster at the VSGBI ASM in November 2024.

As vascular surgery is an extremely demanding speciality, it is no surprise that our doctors may not have the time to discuss this topic in depth with their patients. It may well also reflect reticence to step out into an area of practice that is out of the surgical team's 'comfort zone'. Many units have Care of the Elderly support available which could facilitate learning and awareness.

The often protracted inpatient stay of patients following MLLA may provide an opportunity to address the wellbeing of our patients for the future, far beyond their stays in hospital. This may include formal mental health assessment with the use of questionnaires/surveys and interventions such as counselling, therapy or medication if required.

I hope that this letter encourages further discussion regarding this sensitive and important matter. The main aim is to increase awareness of these patients' mental health and the impact such a life-changing event can have for the rest of their lives.

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ROULEAUX CLUB ANNUAL ESSAY COMPETITION

Rouleaux Club Winning Essays 2024

The Rouleaux Club run an annual essay competition to help promote interest in vascular surgery. Entrants are asked to write 1,500 words on one of three topics selected by the RC Executive. The essays are marked by the committee and the prizes are awarded to the best essay at the annual Vascular Society meeting. There are two prize categories, one for medical students and another for junior doctors. We are delighted to publish the winning doctor essay.

DOCTOR CATEGORY

Will there ever be a place for robotic vascular surgery in the United Kingdom?

Alex Leslie Starkey, *North West (Lancashire)*

Introduction

Robotic surgery is now widespread among urological, general surgical and gynaecological centres, but remains poorly-established in UK vascular surgery.[1,2] Despite the recognized benefits of enhanced operative precision and growing evidence of favourable outcomes in robotic-assisted abdominal procedures, open or endovascular techniques remain the standard in the UK.[3,4] An increasingly old and comorbid UK population means that the need for precise, safe and uncomplicated vascular surgery has never been greater, with robotic surgery offering demonstrable promise in at least some of these domains.[5] However, technical limitations, National Health Service (NHS) sustainability targets, funding crises, and historically-high waiting lists for treatment all create potential barriers to the adoption of this still relatively novel technology among UK vascular centres. This review explores why robotic surgery is likely to continue struggling to gain a foothold in UK vascular care, despite potential benefits.

Minimally invasive techniques and vascular surgery

Compared with the PUMA machine, which performed the first robotic neurosurgical biopsies in 1985, modern-day surgical robots are incredibly sophisticated and versatile.[6,7] Between 2016 and 2019, 86.2% of radical prostatectomies were performed robotically, and integration of robotic surgical techniques has also continued to progress in other surgical disciplines.[2,8,9] The Royal College of Surgeons now publishes specific guidance on the adoption of robotic surgery, regarding the document as a 'pathway to the future'.[10] Despite this, competency in robotic surgery has yet to become a standardised part of surgical training, and opportunities are not equitable across different hospitals and deaneries.[11]

Robotics are not the only surgical innovation that vascular surgeons have been slow to adopt: the specialty continues to lag behind others in its use of laparoscopy, which is utilised for only a small proportion of cases in selected centres.[1] To this end, most evidence for laparoscopic efficacy in vascular surgery comes in the form of case series, and randomised-control trials are lacking.[12] Robotic-assisted vascular surgery unfortunately looks set to follow a similar pattern, with most published case series originating from a small number of vascular centres with a particular interest in robotics, most notably the department of Štádler *et al.* in Prague.[1,13–15]

The lack of significant progress in robotic vascular surgery in the UK may be surprising to some, given how quickly endovascular techniques were adopted as standard practice. In the year to date, 62% of UK abdominal aortic anneursym (AAA) repairs were performed endovascularly.[4] Why, then, has robotic vascular surgery failed to fully establish itself? The incorporation of endovascular technology into everyday practice disproves any notion that vascular surgeons are Luddites, and hence other factors must be at play.

Technical considerations

From a technical standpoint, the ability to sense pressure on delicate and easily-friable tissues is a key aspect of performing safe vascular procedures. While open and laparoscopic surgeries allow surgeons to sense tissue pressure directly or indirectly, this capability is not yet available in current robotic systems.[16] Tissue handling errors account for a large proportion of mistakes made by surgical trainees and can lead to significant tissue damage.[17,18] Fortunately, this important limitation may soon be overcome, with the upcoming Da Vinci 5 robot promising to deliver the first ever haptic feedback system in a surgical robot.[7]

Patient factors may also influence the suitability of robotics for performing vascular procedures. Robotic abdominal surgery requires the creation of pneumoperitoneum, which is potentially dangerous for the sizeable number of vascular patients suffering from obstructive lung disease.[19] For patients who have undergone multiple previous procedures, intraabdominal adhesions may also

lead to operative difficulties.[1] Endovascular or open surgery may therefore remain a more suitable choice for these patients, even if robotic technology continues to advance.

Conversely though, some patients potentially stand to gain significantly from robotic surgery. Younger patients keen to avoid a laparotomy scar - but also at risk from repeated irradiation during typical endovascular aneurysm repair (EVAR) follow-up scans - could benefit from similar outcomes to open surgery without the usual cosmetic implications.[1,16] Minimally invasive surgery also carries a lower risk of incisional hernia, may reduce the need for in-hospital analgesia, and often allows for earlier discharge.[20–22]

Surgeons themselves also have the opportunity to benefit from wider use of robotic systems. Reduced postural demand when operating from a robotic console could lower the risk of developing occupation-related musculoskeletal conditions, and the ability to perform surgery remotely could pave the way for more flexible working arrangements across multiple sites.[1,23] Tremor-reduction systems present in many modern surgical robots can lower the risk of handling errors, and novel blood vessel detection systems may help to prevent iatrogenic injury.[5] Additionally, while 3D laparoscopy cameras do exist, they are yet to fully replace their 2D counterparts – despite the European Association for Endoscopic Surgery recommending their use.[24] Modern surgical robots feature 3D viewing as standard.[1] Owing to these benefits, robotic vascular surgery may succeed in cases where endovascular procedures have repeatedly failed.[25]

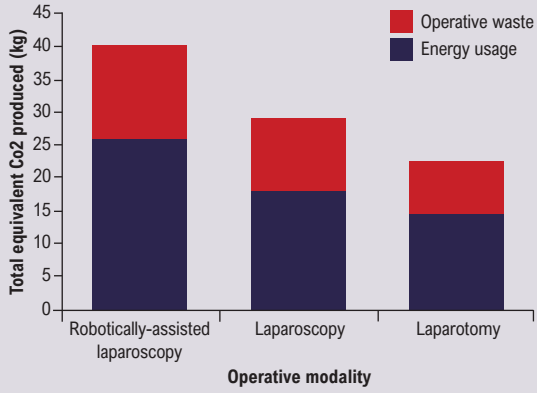
Specific vascular procedures may be more amenable to robotics than others, and to this end the adoption of robotic technology in the UK may also depend on the type of work undertaken by specific regional departments. Multiple studies have shown promise in treating median arcuate ligament syndrome (MALS) robotically, whereas robotic iliac aneurysm repairs – although demonstrably possible - have entailed significant operative and vessel-clamping times.[26–28] For smaller departments that see conditions like MALS less frequently, robotic technology may be of lesser benefit.

Political and environmental considerations

Whilst the UK NHS has a proud history of innovation, it and a large proportion of the population it serves remains in financial difficulty; which can make the acquisition and use of expensive new technologies politically contentious.[29] The ROLARR randomised control trial (RCT) found no significant benefits to robotic treatment of rectal cancer versus laparoscopic surgery, despite costing an average of £980 more per patient.[30] Moreover, this figure did not even include the costs of acquiring and maintaining the robots, which can be substantial.[1] The findings highlight the need for new good-quality research to assess the efficacy of robotic vascular surgery, before any action to promote it's wider use in the UK.

According to the most recent figures, only 31.6% of surgeries performed following AAA screening were completed within the UK government's target of 8 weeks, and waiting lists remain a significant problem for the NHS.[31] In addition to being generally more expensive, robotic surgeries tend to take longer than their open or laparoscopic alternatives.[1,30] In this political setting, proposing the use of a slower operative technique that could result in fewer per-day procedures would likely attract controversy.

Figure 1 Equivalent CO_2 production for different operative modalities in endometrial cancer staging. Data from Woods et al.



The NHS also has a clear vision regarding its environmental future, aiming to be 'carbon neutral' by 2040.[32] This presents a considerable problem for those advocating for the expansion of robotic surgery; which has been shown to generate significantly more carbon dioxide (CO_2) equivalent than both laparoscopy and laparotomy.[33–35] To align with long-term sustainability goals, robotic surgery would need to become significantly more efficient both in terms of operative waste and energy consumption. These key constituents of total CO_2 contributions are shown in Figure 1.

Conclusions

Despite the significant role that robotic surgery plays in other disciplines, there remains insufficient evidence to suggest that it will make an impactful contribution to the future of UK vascular surgery. The widespread adoption of EVAR shows that UK vascular surgeons are adaptive to change and welcoming of new technology if there is robust evidence for patient or system benefit, but this remains largely absent for robotic vascular surgery. Whilst it is conceivable that an improved evidence base could encourage UK vascular surgeons to utilise robotics to a greater degree, figuratively and literally buying-in to a costly, less-sustainable and resource-demanding technology would almost certainly not be without controversy. For certain niche procedures, robotic vascular surgery may be the treatment of choice in larger centres with existing access to surgical robots. On a broader scale, however, UK vascular surgery is unlikely to undergo any meaningful robotic revolution.

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NEWS

Updates from the Vascular Societies

JVSGBI is owned by the Vascular Society for Great Britain and Ireland (VSGBI), for all affiliated societies and the wider vascular community. Here's the latest society news.

British Society of Interventional Radiology (BSIR)

www.bsir.org
@BSIR_News

BSIR have been working on a new longer-term strategy, with input from Full Council, Committees and now membership. The Executive Officers are hosting a roadshow around regional IR meetings to engage the membership in the content and gather their feedback and ideas. The strategy can be found here https://www.bsir.org/society/our-strategy/.

The inaugural VITALS meeting (Vascular Innovation & Technology Advanced Learning Symposium) took place on 24-25th March at Sopwell House in St Albans. The programme chairs, Dr Raghu Lakshminarayan and Professor Mo Hamady, and the BSIR Vascular Special Interest Committee, welcomed over 140 delegates to the residential meeting for two full days of interactive discussions with expert panels. Feedback from delegates, faculty and industry has been overwhelmingly positive. BSIR are securing dates for 2026 and anticipate growth in the event next year.

The BSIR Nurses & Radiographers Special Interest Committee held a successful CPD meeting in March, in partnership with Terumo. This was shortly followed by the BSIR Basics Skills course in early April, which welcomed over 25 medical students and trainees to Leicester for hands-on learning. Late April held the annual BSIR Advanced Skills Course, which took place in Leeds, attended by 20 ST4-6 trainees for more in-depth lectures and hands-on workshops.

The BSIR Education & Training Committee have been collaborating with the Royal College of Surgeons Edinburgh on increasing IR involvement and exposure to their 'Non-technical Skills for Surgeons' (NOTSS) course, with the aim of increasing the number of IRs involved as faculty for this programme and encouraging IR trainees to attend.

Coming up in May is the Paeds IR UK meeting in Birmingham, followed by IOUK in London in June. **You can find out more about BSIR events and webinars here: https://www.bsir.org/events/.**

Save the date in your diaries for **BSIR 2025 in Liverpool on 11th-13th November.** An overview of the programme can be found at: www.bsirmeeting.org

Rouleaux Club

www.Rouleauxclub.com
@RouleauxClub

The Rouleaux Executive Committee have had a busy few months, as ever. Our ASiT representative attended their annual conference, this year in Belfast where the pre-conference course was attended by budding future vascular surgeons. Anurhadha also attended the (impromptu) meeting with head of COPSS (Andrew Garnham) and chair of JCST (Esther McLarty) and pan specialty representation. Here there was discussion regarding the new curriculum, better networking and dissipation of information through specialty reps. Rouleaux was also formally asked for our feedback on the latest version of the new curriculum, which we submitted to ISCP/JCST.

We've submitted our draft program for the RC session at VSASM; this year's theme will be along the line of "the lesser talked about training obstacles". Last year's winner of the Inaugural Averil Mansfield Prize Ms Mei Nortley will be speaking and we're delighted Professor Scarlett McNally Consultant Orthopaedic Surgeon has accepted our invitation to speak along with Miss Claire Dawkins, Consultant Vascular Surgeon in Newcastle.

Our joint Rouleaux/BSIRT session at BSET is taking shape too.

There have been concerns raised to ourselves about the lack of notice regarding invitation to interview for ST3s, potentially due to delays in releasing portfolio scores. In addition, there are applicants who applied for the section 2 exam May sitting, in good time, but weren't able to be accommodated. Both of these issues we will discuss in person at upcoming VS meetings and through the exam board and SAC.

Abstract submission to the VS MDT session is open and submissions are to be encouraged. Case submissions are invited from nurses, scientists and all grades of resident doctors involved in caring for Vascular patients including trainee members of the joint Vascular Societies' and must be submitted electronically via the submission portal using the link found below.

Winning entries will have the opportunity to work with a member of the Vascular Society / Rouleaux Club to ensure the learning points in the cases are maximised and to

make the presentations as interactive as possible.

The session is a relatively informal space designed to generate discussion and facilitate learning whilst offering a national presentation opportunity for the speaker.

This month we will be launching the second year of the "Averil Mansfield trainer of the year" prize again, please encourage submissions from your units.

Vascular Anaesthesia Society of Great Britain & Ireland (VASGBI)

www.vasgbi.com
@vasgbi

The purpose of the Vascular Anaesthesia Society of Great Britain and Ireland (VASGBI) is to promote excellence in the peri-operative and anaesthetic care of patients undergoing vascular surgery. The committee organise educational meetings, promote research in vascular anaesthesia, support development of guidelines, and represent our speciality within other national bodies. We have recently advertised 3 places available for election to serve on the VASGBI committee. If you know of any committed colleagues who may wish to take on this responsibility, please encourage them to get in touch via jane.heppenstall@vasgbi.com

In March 2025 we hosted the biennial residents' symposium. This virtual one-day meeting is designed primarily for anaesthetists in training and covers core FRCA topics in vascular anaesthesia, covering material essential for final exam preparation. It is also popular amongst anaesthetists who don't have a regular commitment to vascular anaesthesia, but who cover out of hours emergency vascular surgery. The meeting is recorded and content is available to view via the VASGBI website VASGBI Trainee Symposium 2025 - VASGBI . It may be of interest to vascular surgeons or other specialists who wish to gain a deeper insight into the thought processes of vascular anaesthetists.

Members of our committee are involved in various different ongoing projects. We currently have a survey open to investigate the use of tranexamic acid in vascular surgery. Reduction in blood and blood product transfusion is especially important considering ongoing national supply issues. If you are interested in participating in our survey, please click here Tranexamic Acid in Vascular Surgery. If you have a survey you would like to distribute to our members, please get in touch to discuss.

The NVR report 2024 summary for anaesthetists is available to read on our website, if you know anyone who may appreciate this condensed version relevant to anaesthesia, it can be found here: National Vascular Registry Report 2024: Summary for Anaesthetists - VASGBI. Members of our committee are involved in developing audit and quality improvement tools for the Royal College of Anaesthetists to facilitate local projects which aim to address some of the issues highlighted in the NVR reports.

We regularly update the clinical guidelines area of our website; this area is accessible to VASGBI members only, but if you are interested in any of our clinical guidelines please get in touch via our administrator Jane Heppenstall jane.heppenstall@vasgbi.com

Applications are open (but will close soon) for our trainee research development grants VASGBI Trainee Development Grant — National Institute of Academic Anaesthesia. Do encourage any trainees to consider applying.

The next VASGBI ASM will be held in London at the RSM on 15th and 16th September 2025 hosted by Dan Taylor and colleagues from GSTT. The programme is in the final draft stage and will soon be available on the VASGBI website - VASGBI Annual Scientific Meeting 2025