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The Vascular Society for Great Britain and Ireland

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The VSGBI is a charity organisation funded principally by Members who are vascular specialists in the UK and Ireland who treat non-cardiac vascular diseases. It has a professional structure including a permanent Secretariat, Executive Officers and Council elected by Members. The aim of the VSGBI is to have an interest in the provision of diagnosis and treatment of non-cardiac vascular diseases in the UK and Ireland.

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- The VSGBI **publishes virtual educational resources** which are available to members.
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- The VSGBI together with HQIP and the clinical effectiveness unit (CEU) at the RCS London **maintains the National Vascular Registry**, the principal outcomes database for vascular interventions in the UK and Ireland (and for the NHS AAA Screening Programme).
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Editor's foreword

Welcome to the fifth issue of the *Journal of Vascular Societies Great Britain and Ireland (JVSGBI)*. We are really delighted with the success of the journal, and this issue marks the first anniversary of the launch at the Vascular Societies GB&I Annual Scientific meeting last year. The increasing interest in the *JVSGBI* has been demonstrated by the growing number of submitted articles and the impressive website stats (over 3,000 views).

This issue includes three editorials. The first by Andrew Garnham (VSGBI President Elect) and Rachael Forsythe (Rouleaux President) provides a thoughtful reflection on the problem of bullying, undermining and harassment in (vascular) surgical training highlighted as a persistent problem by a Rouleaux Club paper in this edition. The second editorial from Dr Una Adderley, National Wound Care Strategy Programme (NWCSP) Director, outlines past achievements and future plans for the programme. Finally, Duygu Yenidogan-Schmidt, Chair of the Executive Committee of AAA UK, a newly formed patient representative group giving national representation to AAA patients and relatives, highlights the origins, purpose and aims of this group. I am sure these editorials will be of great interest to readers.

There are four original research articles, the first from the Rouleaux Club, the UK Vascular Surgery Trainees' Association, reports the findings from their recent bullying, undermining and harassment survey. The second from the Vascular and Endovascular Research Network (VERN) reports the findings from the Tier 3 COVID-19 Vascular Service (COVER) study. The final two original articles present the findings from the James Lind Alliance Priority Setting Partnership from the Vascular Services and Venous Conditions Groups. It is fantastic to see vascular trainees continuing to undertake meaningful and impactful research and choose the *JVSGBI* to disseminate their work.

This edition also contains a research protocol from Ravindhran *et al* for a systematic review which aims to study changes in functional health status following open abdominal aortic aneurysm repair. Finally, in this issue there is a short educational report entitled '*Intraoperative management of REBOA*' and a case report entitled '*Carotid web: an important cause of stroke in young people*'.

The National Wound Care Strategy Programme Guidelines for lower limb wounds are published as a supplement to this issue and can be located on the journal website.

This is our fifth issue, and we would like to take the opportunity to thank all the authors who have submitted articles during the last year, which is building on the success of the journal – your contribution has been really appreciated and I hope you are delighted with your publication. We would also like to thank all the reviewers for their timely and thorough contributions.

Finally, please do continue to share your work by submitting articles for publication.

Ian Chetter
Editor in Chief JVSGBI
VSGBI Research Committee Chair

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EDITORIAL

Bullying and harassment: a disease for eradication

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Some diseases are endemic and persistent. In this edition of the journal, the paper by vascular trainees Madurska *et al* points to bullying and harassment being such a disorder which is stubbornly resistant to intervention.[1] Previous surveys have highlighted this problem and, although reported here in vascular surgery, it pervades much of surgery.

Why is this so important? Dysfunctional teams and poor behavioural markers are associated with inferior patient outcomes, which can be improved with appropriate team training.[2,3] Well-established data around civility confirm that adverse behaviours affect not only those to whom they are directed but also witnesses.[4,5] Both victims and bystanders experience decreased productivity and reduced engagement in work. Indeed, a significant number leave work altogether. The current workforce crisis mandates that we can ill afford to disengage trainees and allied health professionals with an interest in our specialty.

Why is this so difficult to change? Situational learning models and theoretical frameworks describe "cycles of abuse" where poor behaviour becomes learnt and normalised.[6] Role modelling is important in many fields and, to an extent, we all model ourselves on those who teach us the craft of surgery. Previous trainee surveys highlighting similar issues resulted in responses from bodies such as the Vascular Society of Great Britain and Ireland (VSGBI), Specialty Advisory Committee (SAC) and the Royal Colleges and triggered letters to CEOs and MDs in all acute trusts. The VSGBI published an article in the *European Journal of Vascular and Endovascular Surgery*.[7] The Royal College of Surgeons of Edinburgh developed a training module addressing bullying and harassment which was recommended to all those consultants involved in vascular surgical training.

Given all that has been done, the results of this latest survey provoke predominantly feelings of failure, disappointment and dismay. Whilst we must accept that the response rate is low, it signals that issues are likely to persist. How can we explain the results of this latest work? It appears to confirm that the diagnosis endures and the disease is endemic as it affects units throughout the UK. It is positive that the issue is being examined in an open way and perhaps the apparent increased rates of reported poor behaviour may represent colleagues feeling able to speak up. Apathy may have contributed to the poor response rate. The COVID pandemic presented unprecedented working challenges often outside our control, usual activities and comfort zone, resulting in additional extraordinary stressors for both trainees and trainers. Having now entered a phase of so-called recovery and faced with the Herculean challenge of "clearing the backlog" in an NHS that is far from ready, tensions will inevitably escalate. Are these pressures reflected in the outcomes of the present survey?

So what about the pathophysiology? Data from the Royal College of Surgeons of Edinburgh website[8] confirm that the most commonly examined webpage is entitled "Am I a bully?" Self-reflection and personal inquisition may be necessary to become aware of distress provoking actions and behaviors. We must all place ourselves and our professional interactions under the microscope.

Further work is certainly required in order to more fully understand this disease. Its aetiology, environmental contributing and confounding factors, early indicators, prevention and management all merit further investigation. How can the problem be further dissected? Perhaps a range of real-life examples of these behaviours for

Key words: bulling, harassment, undermining, human factors, vascular surgery training, non-technical skills.

discussion and thematic analysis with trainees and consultants together would be valuable? It is hoped that discussion and exploration of situational feelings and emotions in a safe environment will guide management strategies. Perhaps compulsory targeted training in emotional intelligence and stress management will provide trainers with effective "medicine" for this disease. As with any disease without a thorough understanding of the aetiology and careful dissection of the pathophysiology, we will be scratching around in the dark for suitable effective treatments.

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EDITORIAL

National Wound Care Strategy Programme: past, present and future

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Introduction

Wound care consumes a considerable proportion of NHS resources, particularly for services that deliver healthcare outside hospitals.[1] It is estimated that around 50% of community nursing time is spent delivering wound care.[2] The burden is considerable for people living with wounds who too often cannot access the right care early enough in their wound care journey. As we move through the Covid pandemic towards recovery, the need to improve wound care is more pressing than ever.

Past

In 2018, the NHS England Nursing Directorate commissioned the National Wound Care Strategy Programme (NWCSP) to be delivered by the Academic Health Science Network (AHSN).[3] The aim of the NWCSP is to develop and implement a strategy for improving wound care with a particular focus on lower limb wounds (leg and foot ulcers), pressure ulcers and surgical wounds.

Early work identified that leg and foot ulcers account for the largest number of patients and the largest proportion of NHS spend. The NWCSP estimated in 2019 that there were 739,000 leg ulcers in England with an associated annual healthcare costs of £3.1 billion.[4] A large proportion of these ulcers are due to venous insufficiency for which there is a strong evidence base in favour of compression therapy and endovenous ablation for promoting healing and preventing recurrence.[5,6] The NWCSP also identified that there are at least as many people with foot ulcers but without diabetes as there are people with diabetic foot ulcers, and that more than half of all major lower limb amputations are in people who do not have diabetes.[7] The healthcare needs for both groups are very similar, but without diabetes it is difficult to access the necessary care early to reduce the risk of amputation and death. This, coupled with unwarranted variation in evidence-based care, made improving lower limb care a NWCSP priority.

In 2020 the NWCSP published its Recommendations for Lower Limb Care.[8] In 2021 this was followed by a business case for implementing the NWCSP Lower Limb Recommendations.[4] The business case detailed:

- Projected prevalence of chronic lower limb wounds and associated NHS costs.
- The degree to which care can be improved through service change along with the potential clinical and patient benefits.
- The potential economic and financial benefits from such improvement.
- Potential costs of implementation.
- Possible time scales to realise the stated benefits.

Due to the lack of robust data about foot ulceration, the business case was built on the evidence for venous and 'mixed venous/arterial leg ulcers', but makes a convincing case of benefit for all those with leg and foot ulcers and for the NHS as a healthcare provider. It predicts that improving wound care and thus improving healing, reducing recurrence and reducing amputation rates would lead to improved physical and psychological health for patients and incur less time and money spent attending clinical appointments.

For the NHS, improving lower limb wound care offers financial benefits equivalent to a net present value of £14.6bn and a benefit cost ratio of 9.8 over 30 years through a predicted 30% reduction in leg ulcer prevalence. The business case also predicts a reduction in the consumption of clinical time and equipment which, when the cost of implementation is included, will deliver an estimated £7.8bn of net cash releasing savings. This is equivalent to a 9% cash saving on the

Key words: leg ulcer, foot ulcer, quality improvement, vascular surgical procedures

NHS cost of leg and foot ulcer care in England. It also predicts £6.8bn of non-cash releasing savings (efficiencies) from an estimated 23% reduction in clinical time spent on lower limb ulcer care which will increase staff capacity. There is also expected to be an immediate in-year 11% reduction in the cost of dressings and wound care products.[9]

Figure 1 NWCSP framework for improving lower limb wound care

People
- Provide multi-level, multi-professional online free-to-access wound care education resources
- Outline multi-level multi-professional wound care capabilities to inform deployment of staff

Process
- Redesign the clinical pathway across primary care, community services and secondary care to incorporate:
- Dedicated chronic lower limb wound care services staffed by clinicians with appropriate time, knowledge and skills
- Pathways for referral to vascular, podiatry, dermatology and lymphoedema services

Technology
- Support clinical care and quality improvement through effective data capture and reporting
- Roll out of point of care NHS compliant mobile digital technology
- Establishment of information feedback systems to inform business and clinical needs.
- Implementation of data collection and reporting systems to inform a set of agreed national metrics to inform quality improvement.

Present

In 2021 the NWCSP began to recruit seven 'first tranche implementation sites' ('FImps') to implement the NWCSP Recommendations for Lower Limb Ulcers. The aim was to test the assumptions of the NWCSP business case and to develop 'blueprints' to guide wider adoption and spread. This FImp work continues but, in early 2022, the AHSN selected implementation of the NWCSP lower limb wound recommendations as one of its new national programmes.[9] The NWCSP is now working in partnership with the Academic Health Science Network (AHSN) Transforming Wound Care (TWC) programme to achieve wider implementation.[10]

For Phase 1, the AHSN TWC programme is working with six AHSNs (East Midlands, Eastern, Health Innovation network (South London), Kent, Surrey Sussex, Oxford and South West) to each recruit an initial Test and Evaluation Site (TES). Phase 2 is expected to start at the end of 2022 and will include the remaining AHSNs in England.

In April 2022 the NWCSP was invited to present its lower limb wound work to the NHS England National Productivity Board. The NWCSP and AHSN TWC programme is now working with the NHS England Transformation Directorate to develop a strategy for accelerating implementation across England.

Working closely with the seven regional FImp sites and the AHSN TWC programme, the NWCSP is developing a lower limb 'bundle' structured around people, process and technology (Figure 1). Together with the NHS England Transformation Directorate, different options for accelerated implementation are being considered, with the focus on implementation at regional/local level.

Future

Progress is encouraging and the FImps are already seeing dramatic improvements in healing rates which are reducing community workforce pressures. However, there is still some way to go before everyone with a lower limb wound gets the care they need sufficiently early in their wound care journey.

People

Improving the knowledge and skills of the workforce is a priority, so a multi-professional, multi-level capability framework for wound care has been developed to help organisations identify the capabilities required of their workforce.11 In terms of education, the universities already provide high quality Tier 3 postgraduate level wound care courses for those with responsibility for advanced wound care (such as tissue viability nurse specialists), but wound care is currently a low priority in most pre-registration clinical education programmes despite most registered clinicians regularly caring for people with wounds.

The NWCSP view is that it is inappropriate for the NHS to rely on education provided by wound product suppliers to fill this gap, so has developed a suite of online free-to-access educational resources.[12] The Tier 1 resources are for those who require a fundamental level of wound care (such as general practitioners and those working in community services and in acute care). The Tier 2 resources are for those requiring more advanced knowledge (such as those working in dedicated lower limb services). The resources are also highly suitable for use in pre-registration clinical programmes and the NWCSP is striving to raise awareness amongst providers of such programmes.

The NWCSP recognises that online education resources need to be complemented by experiential learning, so a lower limb wound 'curriculum' is also being developed to guide the development of local wound care education programmes. Some early adopters of the NWCSP recommendations for lower limb wounds are already using the NWCSP capability framework for wound care to identify the required wound care capabilities for their whole workforce, and have added the online learning resources to their mandated education requirements. The experience of the FImps has also revealed the need for protected clinical educator time to support improving wound care knowledge and skills across the workforce.

There is also an urgent need for high quality information resources for patients and carers. The NWCSP website signposts to trusted independent resources such as Legs Matter to help improve the public's knowledge and lower limb health,[13] but in

addition is working with the Patient Experience Network, patients and carers to co-create information resources for patients and carers. These will be published on the NWCSP website.[3]

Process

It has also become apparent that, even in organisations committed to improving lower limb care, there is considerable unwarranted variation in pathways of care. While some variation is to be expected, earlier identification of those in need of care, standardisation of the core elements of care and the development of closer links with relevant services are needed. Too many patients with lower limb lymphoedema cannot access lymphoedema services and too many non-diabetic patients with foot ulceration cannot access podiatry or orthotics services or are referred too late to vascular services.

There appears to be a mixed pattern in relation to referrals for endovenous ablation for venous disease. In some areas patients are being refused referral while, in other areas, vascular surgical services are swamped by referrals, only a proportion of which are suitable for surgery. The situation is exacerbated by a shortage of vascular surgical staff. The NWCSP and the Vascular Services Quality Improvement Programme (VSQIP) have together developed draft referral templates for both venous and arterial disease, and these are now being trialled by the FImps in the hope that this will improve the situation and identify further necessary work.

Technology

Finally, the NWCSP is addressing the challenge of the lack of data about lower limb wounds. Many clinicians have attempted to improve lower limb care in their organisations only to see their new services disbanded when NHS cuts hit. Quality improvement initiatives require accurate and timely data and information, so the NWCSP is committed to supporting clinical care and quality improvement through effective data capture and reporting.

The NWCSP is recommending roll-out of point-of-care NHS compliant mobile digital technology that replaces paper clinical notes with electronic clinical record-keeping. Such systems also need to have information feedback systems to inform business and clinical needs and to eventually provide clinical decision support.

The data situation is further complicated by the current lack of agreed national metrics and the myriad of codes that are currently used in wound care. This means it is impossible to know the size of the lower limb wound patient population or other information such as treatment, healing rates or rates of recurrence. Implementing robust data collection and reporting systems to inform a set of agreed national metrics is essential to inform quality improvement initiatives. Other digital initiatives encouraged by the NWCSP include the increased use of e-referrals, digital imaging to monitor wound healing and digitally supported self-care.

Conclusion

Looking ahead, although much has been achieved, there is still much to do. Moving into implementation is challenging, particularly in the current climate with so many demands on the NHS. However, improving lower limb wound care will not only help make the best possible use of NHS resources, but it will dramatically improve the quality of life for the many people who live with leg and foot ulcers.

KEY MESSAGES

- There are a large number of people with leg and foot ulcers and unwarranted variation in the standard of care.
- The National Wound Care Strategy Programme (NWCSP) is focused on improving the knowledge and skills of the workforce, care pathways, and data and information.
- Implementing the NWCSP recommendations is challenging but early results are very encouraging.

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EDITORIAL

Abdominal Aortic Aneurysm (AAA) UK

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Background

Abdominal Aortic Aneurysm (AAA) UK is a newly formed patient representative group giving national representation to AAA patients and their loved ones, providing a platform for national discussion on the impact of – and potential policy changes relating to – the condition.

For too long the patient voice has not been a focal point of conversations about the condition. AAA UK will amplify the voice of patients diagnosed with AAA and ensure that those directly affected by the condition are never overlooked in discussions about their care again.

Launched at the Houses of Parliament on 11th May 2022, AAA UK seeks to bring together people with lived experience, alongside renowned clinical experts, to represent those affected by AAA. We aim to address the imbalance of voice by promoting the views of patients and loved ones, providing a vehicle for patients to become more involved in policy and decision-making about AAA.

AAA UK serves a dual purpose: to provide a forum for support, information and advice for people affected by AAA, and to advocate for the interests of people living with AAA with stakeholders in Government, the NHS, and wider society. We aim to raise the profile of the condition among the general public and policymakers to drive policy change to benefit those affected by AAA, centring the patient voice at the heart of everything we do.

AAA UK believes patients should have access to the full range of treatment options recommended by clinicians. Patients should be consulted at each stage of the pathway, involving them in decision-making and empowering them to have an informed choice in treatment selection. Different treatment options will be appropriate for different patients in their particular situation and circumstance, and the decision of which treatment option is best suited to an individual patient should be left to the discretion and opinion of the medical practitioners responsible for an individual patient's treatment.

Although AAA UK seeks to gather contributions from clinical experts, all AAA patients should first consult their own medical practitioner for information and advice about their individual treatment and care. AAA UK seeks to educate patients and supporters on the different stages of an AAA diagnosis and the different treatments available; however, this should not be viewed as instructive of individual patient treatment. AAA UK hopes that the community and information provided by the group will help provide additional support to those with an AAA. However, this should always be viewed within the context of advice from a patient's own medical practitioner.

About the Group

Every year, 80,000 men are diagnosed with AAA in the UK, and it accounts for 2% of all deaths in men over 65.

Despite this prevalence, to date there has been no established patient advocacy group to support those affected by the condition. The establishment of AAA UK aims to address this by providing a national voice to those impacted by AAA, including advocating for policy changes to help improve the provision of relevant services within the field of AAA.

AAA UK exists to build a community of patients, clinicians, experts and policymakers, and aims to provide information, support and guidance to all AAA patients and their supporters, wherever they are on their patient journey. AAA UK hopes to build relationships between those who are at similar stages in their screening or treatment, and to connect patients and supporters with those who have gone through similar experiences of an AAA.

Since its launch, AAA UK has engaged with patients, researchers, leading clinicians and

Key words: Abdominal Aortic Aneurysm (AAA), screening, patient involvement

representative bodies, as well as national bodies such as NHS England, to build and develop its network of advocates and supporters, and plans for its work programme for the upcoming year. Clinicians, practitioners and researchers are vital to our work, informing and enriching our ability to make the case for AAA patients to policymakers and Parliamentarians. We are looking forward to engaging with many within the system – including the esteemed readership of the *Journal of Vascular Societies of Great Britain and Ireland (JVSGBI)* – over the coming weeks and months as we build our coalitions, develop our positions and deliver our policy recommendations.

Group constitution

This Group consists of an Executive Committee made up of people with first-hand experience of AAA. The Executive Committee will be supported by an expert Advisory Committee consisting of leading clinicians and experts in the field as well as selected patrons and parliamentary champions.

The group Executive Committee is made up of three Executive members including Chair, Duygu Yenidogan-Schmidt; Patient Affairs Officer, Les Ruffell; and Clinical Liaison Officer, Usman Jaffer, alongside a wider group of supporters and advisors.

Duygu, Chair AAA UK, is a passionate advocate for patient-centred care and became involved with AAA when her father went through emergency open surgery in the UK while he was visiting her in 2017. Duygu takes a leading role within AAA UK on promoting the interests of patients and carers, and is working to ensure that patients are given the voice in national discussions on their care and treatment.

Les, AAA UK's Patient Affairs Officer, was an AAA patient, having been diagnosed in 2014, and underwent open surgery in 2015. After his operation, Les was invited to join the Vascular Patients Interest Group in Leeds General Infirmary. This led to him becoming a Lay member on the NICE AAA Guideline Committee and patient representative on Leeds AAA Screening MDT. He has also sat as a patient representative on the NHS AAA Advisory and Research Committees and is a patient representative on research projects led by Leeds University and Leeds Hospital Trust, University of Leicester and Imperial College, London.

Usman Jaffer is a consultant vascular surgeon and senior lecturer at Imperial College NHS Trust. He has a passion for training as well as having published and led on numerous high impact papers. Usman is now supervising PhD and MD students through postgraduate degrees. As a day job he practices the full spectrum of vascular procedures at St Mary's Hospital and West Middlesex Hospitals. Usman holds a postgraduate certificate in medical education and is a full fellow of the Higher Education Academy. He has authored the 'Manual of Vascular Ultrasound' and developed a training simulator and assessment framework for vascular waveform assessment for frontline clinical staff.

The Secretariat for the Group is delivered by Healthcomms Consulting, who also run the Secretariat of the Vascular and Venous Disease All Party Parliamentary Group, providing expert public affairs, policy and engagement to the Executive Committee, as well as management of the day-to-day work of the Group.

The Group has been engaging with national, regional and local stakeholders and building collateral around AAA, screening and treatment for patients (including blogs and articles, video interviews with clinicians and patients, web and social media content), as well as planning for events and meetings for the upcoming year on issues such as AAA screening.

It has also engaged with and supported other organisations with their national engagement such as the Association of British HealthTech Industries (ABHI) Cardiovascular Group in their call to Government for a National Cardiovascular Strategy, which was signed alongside the President of the Vascular Society of Great Britain and Ireland; President of the British Society for Interventional Radiology; President of the British Society of Endovascular Surgery; and CEO of Heart Valve Voice.

Future work

Recent AAA screening data have highlighted the negative impact of COVID-19 and consistent regional disparities, with lower screening rates in areas of higher deprivation, leading to poorer outcomes for those demographics. Those most at risk of AAA are also most at risk of missing screening, and therefore suffering potentially deadly consequences. AAA UK will be working to bring together supporters and advocates, groups and coalitions, and patients to highlight these inequalities and promote policies to tackle them.

The Group will also look to promote best practice within current screening as it moves out of the challenges from the pandemic and as local screening teams begin to engage with the new Integrated Care System (ICS) structures.

Most of all, the Group will look to continue to develop its network of clinicians and patients. It will reach out to pre-existing networks within the clinical space to develop its range of supporters and advocates, and is open to engaging with everyone who has an interest in AAA. It aims to share knowledge and best practice, increase its footprint in the policy space, and develop its voice on a national parliamentary and policymaker stage. We are also keen to speak to readers of the *JVSGBI* to help in that regard, and would ask you to contact the Secretariat team on details provided below to learn more about how you can get involved.

Above all, AAA UK is a community to discuss AAA, give a collective voice to patients and experts to decision makers. Ultimately, AAA UK aims to improve outcomes for patients across the country so that we can level up screening, treatment and positive outcomes for patients whoever and wherever they are.

For more information, please contact Roger Greer, Secretariat of AAA UK, on roger@healthcommsconsulting.co.uk

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ORIGINAL RESEARCH

Bullying, undermining and harassment in vascular surgery training: a stubborn problem that damages the specialty

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Plain English Summary

Why we undertook the work: Bullying, undermining and harassment (BUH) behaviours are present amongst healthcare workers and have detrimental effects on the victim's well-being and may adversely affect patient outcomes. Although it is known that these problems are prevalent within surgery, there is little knowledge on the extent of the issue amongst UK vascular trainees specifically.

What we did: We carried out two surveys amongst vascular trainees in the UK to explore their experience with BUH at work.

What we found: We have shown that vascular trainees are continuing to experience BUH without evidence of improvement in the last few years.

What this means: BUH behaviours are ongoing problems faced by vascular trainees. Further research is required to more fully understand these issues and plan long-lasting interventions that will improve our workforce.

Abstract

Background: Bullying, undermining and harassment (BUH) behaviours are present amongst healthcare workers and have detrimental effects on the victim's well-being and adversely affect patient outcomes. Although it is known that these problems are prevalent within surgery, there are few data on the extent of the issue amongst UK vascular trainees specifically.

Methods: The Rouleaux Club (RC), representing UK vascular trainees, has conducted two surveys which were distributed amongst 137 members of the RC between May and July 2017 and 831 between March and April 2021. Data were collected on demographics and personal experiences of BUH behaviours as well as those witnessed by trainees. Comparisons were made between the responses of each survey.

Results: The 2017 survey yielded 71 responses and the 2021 survey resulted in 86 responses, with estimated response rates of 51.8% and 10.3%, respectively. In 2017, 33 (47.1%) respondents reported personally experiencing BUH compared with 57 (72.2%) in 2021 (p=0.002). In 2017, seven (20%) reported witnessing BUH compared with 45 (57.7%) four years later. The most frequent perpetrators were vascular consultants (31 (81.6%) in 2017 and 55 (96.5%) in 2021, p= 0.020). BUH behaviours related to gender or sexual orientation increased from affecting two respondents (5%) in 2017 to 18 respondents (28.1%) in 2021 (p=0.004).

Conclusions: BUH behaviours are an ongoing problem within UK vascular training. Despite recent attempts to tackle these issues, there is no evidence of improvement and a signal for possible worsening of the problem. There is a need for further research to understand this issue in more detail in order to plan long-lasting interventions that will minimise detriment to individual trainees, protect the reputation of the specialty and maintain the safety of patients and optimal delivery of care.

Key words: vascular training, bullying, undermining, harassment

Introduction

There has been growing recognition and concern related to workplace bullying, undermining and harassment (BUH) in the NHS. Although some overlap exists between BUH behaviours, they are well defined. Bullying is unwanted, offensive, intimidating, malicious or insulting behaviour related to an abuse or misuse of power towards a more vulnerable peer. Undermining is a behaviour that subverts, weakens or wears away confidence, and harassment is defined as unwanted conduct similar to bullying and undermining but related to a specific protected characteristic.[1–3]

BUH amongst healthcare workers can have a detrimental effect on the mental health of the victim, the training environment, as well as cause workforce attrition and result in lower standard of patient care.[4–7] A safe training environment is paramount in medical training,[8] yet a culture of bullying is reported to be a familiar setting to people working in the surgical field.[9]

Recent reports suggest that at least half of surgical trainees in the UK and abroad experience BUH.[10–13] Unpublished data from a 2017 survey conducted by the Rouleaux Club (RC) (the UK vascular trainees' association) demonstrated similar outcomes, prompting formal recognition of the issues by the Vascular Society of Great Britain and Ireland (VSGBI), General Medical Council (GMC) and the Joint Committee for Surgical Training (JCST).[14,15] The RC has since repeated the trainee survey in 2021 to assess any changes in BUH in the UK vascular training environment.

The aim of this paper is to present the results of the 2017 and 2021 surveys with a view to analysing reported BUH behaviours in the UK vascular training environment.

Methods

The study was designed and conducted by members of the RC executive committee without any input from other organisations or professional bodies. The RC is the official UK vascular trainees' association and aims to represent the views of trainees in vascular surgery in the UK and Ireland. It is free to join and has a current membership of about 1,000 participants including vascular trainees, non-NTN (National Training Number) registrar level doctors, core surgical trainees, foundation doctors as well as affiliate members including medical students interested in a career in vascular surgery, non-UK vascular trainees, vascular nurses and vascular scientists.

Multiple-choice and open-ended question surveys were designed and distributed to RC members in 2017 and 2021. The surveys were distributed electronically using SurveyMonkey® via a link sent in an email. The 2017 survey was sent out to 137 members with two email reminders between May and July 2017. The 2021 survey was sent to a total of 831 members with three email reminders following the initial email between March and April 2021. The 2021 survey was also distributed via social media (Twitter) with a link available to the public; the link was re-tweeted four times through March 2021. The survey responses were anonymised and voluntary. Completion of the survey was considered as implied consent for use of the data in the analysis. The 2017 survey was distributed to UK trainee doctors only while the 2021 survey was distributed amongst all members of the RC (including non-UK trainees).

Each survey provided definitions of BUH behaviours, confirmed respondent anonymity and highlighted the aims of the survey – to gain understanding of the experience or witnessing of BUH amongst trainees. Moreover, the 2021 survey highlighted the strategies put into place by the working group following the initial survey. The questionnaires differed slightly in their design. The surveys consisted of questions relating to demographics (age, gender, training level and grade) as well as BUH experience including personal experience and witnessing of BUH behaviours, types of behaviours, frequency, perpetrator role, level and specialty, experience and outcomes related to reporting of the negative behaviour. Additionally, data relating to perceptions of RC representation and support in case of BUH were also collected. The survey templates are shown in Tables 1 and 2. Data were stored using Microsoft Excel for Mac (Redmond, WA, USA). Statistical analysis was conducted using IBM SPSS Statistics version 27 (Chicago, IL, USA). Categorical data were presented as percentages. Comparisons were performed using the χ^2 test or Fisher's exact test if assumptions were not met. Graphical presentation of data was delivered using Prism 9 for macOS, version 9.3.1.

Results

Demographics

The survey conducted in 2017 had 71 respondents, and the survey in 2021 had 86 respondents, yielding a response rate of 51.8% and 10.3%, respectively. Demographic data are presented in Table 3. Due to the anonymous nature of the surveys, it was not possible to directly link responses from those who completed the surveys in both 2017 and 2021. In the 2017 survey, most (n=35; 49%) respondents were aged 30–34, while in the 2021 survey, most (n=37; 43%) were aged ≥35 years. In 2021, half (n=43) of the respondents were women compared to 24.6% (n=17) in 2017 (p=0.001). National training number (NTN) appointed vascular registrars formed 39 (55.7%) and 57 (67.1%) of the respondents for the 2017 and 2021 surveys, respectively (p=0.148), while only 4 (5.7%) and 11 (12.9%) non-NTN registrar level doctors (p=0.130) completed the surveys. General surgical trainees formed 20% (n=14) of the respondents in 2017 compared with only 2.4% (n=2) in 2021 (p<0.001).

BUH experience

In 2017, 33 (47.1%) respondents personally experienced BUH behaviours compared with 57 (72.2%) in 2021 (p=0.002). In addition, seven (20%) reported witnessing someone else experiencing BUH behaviours in 2017 compared with 45 (57.7%) four years later (p<0.001; Figure 1). Of all the respondents, seven (9.9%) and three (3.5%) expressed that they did not want to say if they have experienced BUH in 2017 and 2021, respectively

Table 1 2017 Survey template.

Question	Answer
How old are you?	<25 25–29 30–34 >34
What grade are you?	Vascular Registrar NTN General surgical registrar Staff Grade Senior House Officer House Office Academic/Researcher
What is your sex?	Male Female Prefer not to say
Have you ever experienced bullying, harassment or undermining during your career as a vascular trainee?	Yes No
Do you feel bullied, harassed, or undermined in your current placement?	Yes No Prefer not to say
Have you witnessed another vascular trainee being bullied, harassed, or undermined?	Yes No
If experienced or witnessed bullying, undermining or harassment, how regularly do/did you experience or observe these behaviours?	Daily Weekly Monthly Other
Who perpetrated the bullying? (May select more than one)	Doctor Member of nursing staff Allied health professional Manager Patient/family or member of the public
If the perpetrator was a doctor, what was their grade? (May select more than one)	Consultant Registrar Staff grade Senior house officer House officer Other
What specialty/profession and grade was the lead bully?	Open ended question
Which do you feel best describes the incident?	Bullying Harassment Undermining
Please describe the incident	Open ended question
Was there repeated pattern of this behaviour?	Yes No
Was the incident a verbal threat/attack/harassment?	Yes No
Was the incident a physical threat/attack/harassment?	Yes No
Was the incident related to race or religion?	Yes No
Was the incident related to gender or sexual orientation?	Yes No
Was the incident related to a physical characteristic (including pregnancy) or a disability?	Yes No
Was the incident related to age?	Yes No
Was the incident reported to the responsible educational supervisor?	Yes No Unknown
If reported, Did the trainee feel:	The complaint was taken seriously Their welfare was appropriately addressed The perpetrator was treated appropriately
If not reported, what was the reason?	Open ended question
If you were to experience bullying in the future, who would you inform?	Open ended question
If the behaviour did not improve, or it was affecting your training, would you feel confident that the Rouleaux Club would help to	Yes No
Are you aware that the Rouleaux Club represents all trainees at the Vascular Society, SAC, and ASiT meetings where representatives	Yes No

ASiT, Association of Surgeons in Training; SAC, Specialty Advisory Committee.

Table 2 2021 Survey template.

Question	Answer
How old are you?	<25 25–29 30–34 >34
What grade are you?	Vascular Registrar NTN General Surgery Registrar Trust Grade Registrar/Clinical Fellow Core Trainee Foundation Doctor Other
What is your sex?	Male Female Prefer not to say
Did you complete the Rouleaux Club 2017 BUH Survey?	Yes No
Since the last survey in 2017, have you personally experienced bullying, undermining or harassment behaviours?	Yes No Prefer not to say
In the last 12 months, have you personally experienced bullying, harassment, or undermining behaviours?	Yes No Prefer not to say
Since the last survey in 2017, have you witnessed another vascular trainee being bullied, undermined, or harassed?	Yes No Prefer not to say
In the last 12 months, have you witnessed another vascular trainee being bullied, undermined, or harassed?	Yes No Prefer not to say
If experienced or witnessed BUH, how regularly do/did you experience or observe these behaviours?	Daily Weekly Monthly Other
Who perpetrated the bullying?	Doctor Member of nursing staff Allied health professional Manager Patient/family or another member of the public
If a medical colleague was the perpetrator, what was their grade? (May select multiple)	Consultant Registrar Trust Grade/Clinical fellow Core trainee Other
If a medical colleague was the perpetrator, what was their specialty? (May select multiple)	Vascular surgeon General surgeon Interventional radiologist Anaesthetist Other
Which do you feel best describes the incident? (May select multiple)	Bullying Harassment Undermining
Was the incident related to any of the following? (May select multiple)	Race Religion Gender Sexual orientation Physical characteristic Disability Pregnancy LTFT Academic Training Other
If reported, did the trainee feel: (select multiple)	The complaint was taken seriously The welfare of the victim was appropriately addressed The perpetrator was treated appropriately The BUH behavior stopped Other
If you were to experience bullying in the future, would you feel able to speak to...? (Select multiple)	AES TPD Not confident to speak to anyone Other
Are you aware of the Rouleaux/VSGBI/SAC Working Group Report on BUH behaviours?	Yes No
Are you aware of the RCSEd online module on BUH?	Yes No
Have you undertaken the RCSEd online module on BUH?	Yes No
Do you feel that the reporting of bullying, undermining and harassment has changed since 2017?	Yes No Unknown
If reported, did the trainee feel:	Improved Unchanged Worsened
Do you feel that the reporting of bullying, undermining and harassment has improved amongst trainees since 2017?	Yes No Other
Do you feel that the reporting of bullying, undermining and harassment has improved amongst consultants since 2017?	Yes No Don't know Other

BUH, bullying, undermining and harassment; RCSEd, Royal College of Surgeons of Edinburgh

Table 3 Demographic characteristics of the study groups.

Variable	2017 (n= 71)	2021 (n= 86)	P value
Age, n (%)			0.014
<25	0	1	
25–29	9 (13%)	24 (28%)	
30–34	35 (49%)	24 (28%)	
≥35	27 (38%)	37 (43%)	
Gender (female), n (%)	17 (24.6%)	43 (50.6%)	0.001
Training grade, n (%)			
Vascular Registrar NTN	39 (55.7%)	57 (67.1%)	0.148
General Surgery Registrar NTN	14 (20%)	2 (2.4%)	<0.001
Non-NTN Registrar	4 (5.7%)	11 (12.9%)	0.130
Senior House Officer	7 (10%)	13 (15.3%)	0.328
Foundation Doctor	1 (1.4%)	1 (1.2%)	0.701
Academic Trainee	5 (7.1%)	1 (1.2%)	0.066

NTN, National Training Number.

Figure 1 Bullying, undermining and harassment (BUH) survey reporting by vascular trainees between 2017 and 2021. Reported experienced and witnessed BUH behaviours in the past and over the most recent 12 months.

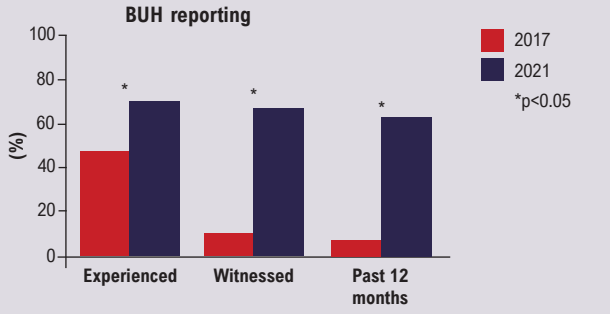
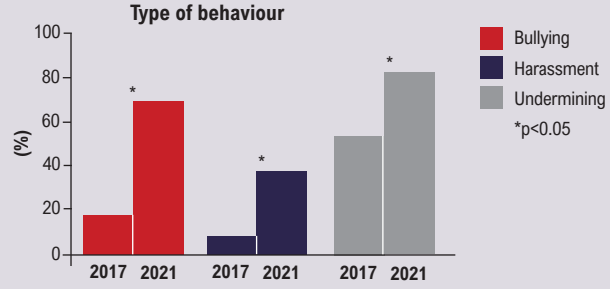


Figure 2 Prevalence of specific bullying, undermining and harassment (BUH) behaviours reported in 2017 and 2021 surveys.



(p=0.097). Reported witnessing and experience of BUH behaviours within the last 12 months had increased from six respondents (23.1%) to 49 respondents (62.8%) between 2017 and 2021 (p<0.001; Figure 1). When categorising the specific type of behaviour, bullying was reported by seven (17.5%) respondents in the first survey compared with 41 (68.3%) in the second survey (p<0001); harassment was reported by three respondents (7.5%) compared with 22 (36.7%) in the two surveys (p<0.001); and undermining was reported by 21 (52.5%) in 2017 and 49 (81.7%) in 2021 (p<0.001; Figure 2). Outcomes relating to experience of BUH behaviours are shown in Table 4.

With regard to specific characteristics related to harassment, there was an increase in BUH related to gender and/or sexual orientation, from two respondents (5%) in 2017 to 18 respondents (28.1%) in 2021 (p=0.004). There were no differences between 2017 and 2021 in the reporting of other characteristics relating to BUH. Interestingly, 19 and three of the respondents in 2021 reported BUH related to academic training and less than full time training respectively, although these characteristics were not included in the 2017 survey.

When comparing gender differences in an overall cohort of both surveys combined, 27 (48.2%) women and 23 (30.8%) men reported having experienced BUH in the most recent 12 months or during their current placement (p=0.034). With regard to specific characteristics related to the negative behaviour, 17 women (28.8%) reported experiencing or witnessing harassment related to gender or sexual orientation compared with four men (4.3%) (p<0.001).

Perpetrator characteristics

Most of the perpetrators were reported to be doctors (according to 38 responses: 95% in both 2017 and 2021), within a consultant role (31 (81.6%) in 2017 vs 55 (96.5%) in 2021, p=0.020) in vascular surgery (Figure 3). With regard to the specialty of the perpetrator, 21 (55.3%) respondents reported that the BUH was perpetrated by a vascular surgeon in 2017 compared with 52 (89.7%) in 2021 (p<0.001), while other specialty doctors were reported to be perpetrators by eight (21.1%) and 22 respondents (38%) in 2017 and 2021, respectively (p=0.018; Table 4).

Raising concerns

If a concern was raised regarding BUH, only three (7.5%) and 10 (23.3%) respondents who either experienced or witnessed the behaviour felt that their complaint was taken seriously in 2017 and 2021, respectively. Furthermore, four (10%) responders in 2017 and six (14%) in 2021 felt that the victims' welfare was appropriately addressed, and the perpetrator was appropriately treated. If experienced BUH in the future, only 39 (55%) of respondents in 2021 would be confident in reporting the incident to their educational supervisor, clinical supervisor, training programme director or other consultant colleagues within the team compared with 45 respondents (63.4%) in 2017 (p=0.018). Moreover, five (7%) respondents in 2017 and 26 (36.6%) respondents in 2021 expressed that they would not be confident reporting BUH to anyone.

Since the formation of the VSGBI BUH Working Group, 52 (73.2%) of the 2021 survey respondents were aware of the working group's report published in 2018.[15] Thirty (34.7%) respondents were aware of the BUH e-module offered by the Royal College of

Table 4 Study outcomes and compared responses between surveys in 2017 and 2021.

Variable	2017 (n=71)	2021 (n=86)	P value
Personally experienced BUH, n (%)	33 (47.1%)	57 (72.2%)	0.002
BUH in the past 1 year, n (%)	6 (23.1%)	49 (62.8%)	<0.001
Prefer not to say if experienced BUH in past year, n (%)	7 (9.9%)	3 (3.5%)	0.097
Witnessed someone else experience BUH, n (%)	7 (20%)	45 (57.7%)	<0.001
Type of incident experienced/witnessed*			
Bullying	7 (17.5%)	41 (68.3%)	<0.001
Harassment	3 (7.5%)	22 (36.7%)	<0.001
Undermining	21 (52.5%)	49 (81.7%)	<0.001
Characteristic that BUH was related to*			
Race/religion	4 (10%)	13 (20.3%)	0.166
Gender/sexual orientation	2 (5%)	18 (28.1%)	0.004
Physical characteristic/pregnancy/disability	2 (5%)	6 (9.4%)	0.341
Age****	1 (1.4%)	------	------
Less than full time training***	------	3 (3.5%)	------
Academic training***	------	19 (22.1%)	------
Other***	------	16 (18.6%)	------
Frequency of experienced/ witnessed BUH*			
Daily	2 (5%)	8 (13.3%)	0.090
Weekly	10 (25%)	21 (35%)	0.077
Monthly	13 (32.5%)	22 (36.7%)	0.175
BUH perpetrator*			
Doctor	38 (95%)	57 (95%)	0.104
Nurse	8 (20%)	16 (26.6%)	0.147
Allied Health Worker	2 (5%)	1 (1.6%)	0.428
Manager	2 (5%)	8 (13.3%)	0.090
Patient/public	3 (7.5%)	12 (20%)	0.055
Doctor perpetrator: grade**			
Consultant	31 (81.6%)	55 (96.5%)	0.020
Registrar (including non-NTN)	5 (13.2%)	11.1 (19.3%)	0.311
BUH perpetrator: specialty*			
Vascular surgery	21 (55.3%)	52 (89.7%)	<0.001
Other specialty	8 (21.1%)	22 (38%)	0.018
Incident reported (experienced or witnessed)*			
The complaint was taken seriously	3 (7.5%)	10 (23.3%)	0.082
The welfare of the victim was appropriately addressed	4 (10%)	6 (14%)	0.528
The perpetrator was treated appropriately	4 (10%)	6 (14%)	0.621
Future incidents			
Would be confident to report to AES/ CS/Consultant colleagues/TPD	45 (63.4%)	39 (55%)	0.018
Not confident to report to anyone	5 (7%)	26 (36.6%)	<0.001

*Responders who personally experienced OR witnessed. **Where the BUH perpetrator was a doctor. ***Only 2021 data available. ****Only 2017 data available. AES, Assigned Educational Supervisor; BUH, bullying, undermining and harassment; CS, Clinical Supervisor; NTN, National Training Number; TPD, Training Programme Director

Figure 3 Bullying, undermining and harassment (BUH) perpetrator specialty and grade.

Surgeons in Edinburgh (RCSEd) with only 10 (13.9%) reporting that they had undertaken it. With regard to perceived changes in BUH reporting, 20 of the 2021 survey respondents felt that there was overall improvement, with 24 (33.3%) expressing improvement for reporting amongst trainees and nine (12.5%) for consultants.

Discussion

This is the first study to report longitudinal data on BUH behaviours experienced by vascular trainees in the UK. Our data suggest that, since the first survey in 2017 and despite strategies to address BUH behaviours, this may be an ongoing problem for our trainees. This study also provides a signal that BUH behaviours may indeed have worsened in the last four years.

BUH behaviours are not new in medicine and are not exclusive to the UK or to vascular surgery training. Survey data from the *BMJ* found that some 84% of junior doctors (of 1,000 respondents from a wide range of specialities) had experienced bullying behaviour in the past, and 70% had witnessed others being bullied.[16] The GMC national training survey found that about one in 20 trainees reported bullying or undermining concerns. Whilst these data tell us that BUH behaviours affect trainees from all specialities, the problem has been highlighted repeatedly within surgical specialities and cannot be ignored. Our data compare with those reported by the Association of Surgeons in Training (ASiT) and the British Orthopaedic Trainees Association (BOTA), which included 1,412 surgical specialty trainees and found that 60% experienced or witnessed bullying or undermining, with 42% of these related to sexism. Similar to our findings, consultants were the most common perpetrators.[11] Another survey by the RCSEd found that 40% of 250 respondents had experienced bullying, with surgical trainees being three times more likely to be bullied than other healthcare professionals.[17] A recent study of US vascular trainees reported similar findings, with the most common perpetrator being a direct supervisor (48%).[13] BUH behaviours also affect non-trainees. The Royal College of Obstetricians and Gynaecologists found that 44% of consultants are persistently undermined or bullied,[18] whilst the Royal Australasian College of Surgeons found that almost half of its 3,516 members have experienced discrimination, bullying or sexual harassment, with consultants being the most frequent perpetrators.[12] In another study from Australia including general surgical trainees and consultants, 47% of respondents had experienced bullying and 68% had witnessed bullying within the last year.[19] A study from Greece found that about 50% of medical professionals have experienced abusive behaviour and a third of women surgeons experienced discrimination.[10]

BUH in healthcare harms not only the direct victim but ultimately affects patient care and can lead to poor outcomes.[7] The individual at the receiving end of a negative behaviour may experience anxiety and depression which can eventually lead to substance abuse, burnout and suicide ideation.[4,20,21] This in turn leads to absenteeism and long-term sickness, putting further pressure on an already strained service.[22] A culture of BUH affects teamwork, where not only the victim but also witnesses are reluctant to speak up even when patient care is compromised.[23] Furthermore, communication breakdown may take place leading to loss of situational awareness and loss of focus on the patient.[24] Doctors who are victims of BUH are more likely to make mistakes at work and less likely to report patient safety issues.[25]

In response to the unpublished 2017 RC survey data, the VSGBI, vSAC and RC acted immediately to create a BUH Working Group with the specific aim to tackle these behaviours in vascular training. It is important to note that, whilst our longitudinal data suggest that the problems persist, the Working Group report was only published in 2019, leaving little time between publication and the second RC survey in 2021. It is likely that the strategies adopted and approved by the Working Group (including open admittance of the problem, specific supervisor training, introduction of a formal pathway for reporting BUH[15]) would not have taken effect within this timeframe and may not therefore be reflected in the results. In addition, the RCSEd BUH e-learning module was launched in 2017 with 471 people completing the module in 2018; however, uptake has declined steadily and only 67 people completed the module in 2021. Re-launch of the module with a particular focus on vascular surgeons could be considered.

The survey results differed in terms the respondent demographics. The 2017 survey included 14 (20%) general surgery NTN registrars while the subsequent survey only had two (2.4%) such respondents. These trainees were likely a cohort who entered training before vascular surgery became a separate specialty in 2013. Only 17 (24.6%) of the initial survey responders identified as women compared with 43 (50.6%) 4 years later. This may be accounted for by an increase in women vascular trainees over the past few years, although formal data on trainee demographics are not available. The disparity could also be due to responder bias if women have experienced/witnessed more BUH behaviours. The 2021 survey response rate is an estimate and much lower than the 2017 survey. After the 2017 survey the RC gained a presence on social media, leading to more members but also the possibility to disseminate the survey to the public via social media. It is not possible to deduce how many of the responses (if any at all) resulted from social media posts. Many new members after 2017 could have been affiliates (including medical students or non-UK trainee doctors). While the 2017 survey was disseminated amongst members who were UK-based doctors, the 2021 survey was sent out to all the RC members including those who were affiliated. This could explain a 10% response rate in the 2021 survey, although it is not known if the 90% who did not complete the 2021 survey experienced or witnessed bullying in a UK vascular training setting. It should also be recognised that the 2017 and 2021 surveys varied slightly with regard to several questions which may have had an impact on the validity of the study. When asking about specific characteristics related to the incident in 2017 the race/religion, gender/sexual orientation and all physical characteristics were grouped together, not allowing specific characteristics to be discerned. In 2021 all specific characters were included into a multiple-choice question and were more quantifiable. The results of the report of an incident in the 2021 survey considered whether the BUH stopped, but this was not considered in the earlier survey. Lastly, when asking who the trainee would feel comfortable speaking to if experiencing BUH in the future, the 2017 survey was open-ended while the 2021 survey specifically asked about the role of TPD and AES, reflecting the currently recommended channels for raising concerns.

This study has some other important limitations. An accurate response rate for the surveys cannot be calculated, as they were disseminated via public social media platforms as well as RC membership mailing lists. This also means that they would be accessible by people who are not UK vascular trainees. In addition, accurate contemporary data on trainee numbers and demographics with which to compare are not available. As the surveys were anonymous and voluntary, it was not possible to link individual responses to determine the scale of the change between timepoints. It is possible that trainees who have been affected by BUH may have been more likely to complete the surveys, introducing bias. These surveys were conducted as part of the RC end-of-year activities and the questionnaires were not validated. Importantly, the second survey coincided with the COVID-19 pandemic, which has impacted the wellbeing of healthcare workers with reported increased anxiety, depression, stress and burnout.[26–28] The effect of the pandemic on the second survey results is unknown, but it is clear that trainees have been affected by significantly reduced training cases during the pandemic,[29] leading to concerns related to training progression. All of these may have had an influence on behaviours and perceptions reported in the 2021 survey and this is unaccounted for in our results.

Whilst our study suggests that BUH is a persistent problem in UK vascular training, further research is required to investigate the root causes of these issues more fully and objectively and to guide the next steps. Our non-validated survey data provide a signal, but we need robust and methodologically sound qualitative and quantitative research to clarify the scope of the problem. Thematic analysis of structured interviews may be one such approach, and the current close collaboration between trainee organisations and training bodies should certainly continue. The numerous resources already available should be highlighted again to the vascular community; an infographic guide for trainees experiencing BUH can be found in Appendices 1 and 2 online at www.jvsgbi.com.

KEY MESSAGES

- Bullying, undermining and harassment (BUH) remain problems within UK vascular training.
- There has been little improvement in the adverse behaviours towards trainees despite strategies put in place to address this in the last few years.
- There needs to be a review of the strategies implemented to alleviate BUH in vascular surgery.

Conclusion

BUH behaviours continue to be a problem within UK vascular training despite recent strategies to tackle these. Our data suggest a signal that things have not improved and are possibly worse. There is a need to revisit the approach to addressing BUH in vascular training and to continue close collaboration amongst professional bodies.

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ORIGINAL RESEARCH

The impact of the COronaVIrus Disease 2019 (COVID-19) pandemic on the clinical management of patients with vascular diseases: findings from Tier 3 of the COVID-19 Vascular sERvice (COVER) study

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Plain English Summary

Why we undertook the work: COVID-19 caused major disruption to the ability of hospitals to provide normal care for patients suffering from vascular conditions. The aim of this study was to evaluate how the pandemic affected the treatment delivered to patients with vascular conditions. It took place over a 4-week period during the first wave of the pandemic.

What we did: Vascular surgeons in 19 countries took part, collecting information from 1,801 patients. For every patient referred urgently to the emergency on-call vascular team during the period, the treatment provided was recorded and if/how that differed from the ideal treatment plan. Treatment differences were graded from 1 to 5 to illustrate how serious the changes were. Minor changes, such as a different imaging technique used, scored 1. Major life-changing differences, such as amputation where otherwise a patient would have been treated with an operation to save their limb, were scored as 5.

What we found: The study found that globally as many as one in five people received a different treatment compared with what they would have had prior to the pandemic. This included one in three people with abdominal aortic aneurysm, one in five people with carotid stenosis and one in 10 people with diabetic foot disease. One-third of changes to care were classed as major, the most common being non-surgical treatment or delayed surgery for a patient who would normally have received immediate or urgent surgery. Very rarely, clinical care was improved such as the increased access to urgent hot clinics, resulting in shorter waiting time and admission avoidance, for those with diabetic foot infections.

What this means: This study demonstrates that many patients did not receive ideal care for key vascular conditions during the first pandemic wave. We can see that the policy changes and updates to guidelines were rapidly implemented and that hospitals were responsive to these changes. Interestingly, as many as one in five of the changes from ideal care were related to patients' avoidance of hospitals for fear of catching coronavirus. If coronavirus-free surgical hubs are to be used going forward, patient perception of the safety of these centres will be key to their success.

Abstract

Background: During the first wave of coronavirus disease-19 (COVID-19), the pressure on healthcare led to significant restrictions and rationing of available services. Globally, vascular services were forced to change clinical management for a range of common, acute vascular presentations. The COVID-19 Vascular sERvice (COVER) Study Tier 3 aimed to understand the severity and impact of those changes on vascular patient referrals and acute presentations as a result of the pandemic in a global vascular cohort.

Methods: A 4-week multicentre multinational prospective observational study was launched in March 2020. Any hospital accepting urgent on-call vascular referrals during the pandemic was eligible to participate. Clinicians were asked to outline their actual management plan for each individual patient and to identify if the COVID-19 pandemic had changed their decision making. If so, clinicians then outlined their 'ideal' (pre-pandemic) management plan. All cases where management plans differed from that of the 'ideal' pre-pandemic management underwent further analysis to quantify the severity of the alteration on a scale of 1–5 (1: minor deviation in management, including imaging modality change, 5: palliation or amputation, where otherwise a patient would have been treated).

Results: A total of 1,801 patient episodes from 52 centres in 19 countries were included. The most commonly referred vascular conditions were chronic limb-threatening ischaemia (n=517, 28.7%), diabetic foot infections (n=237, 13.2%) and acute limb ischaemia (n=224, 12.4%). Only 2.3% of patients had a confirmed diagnosis of COVID-19. Deviations in management from pre-pandemic treatment occurred in 34.8% of those with unruptured ≥5.5 cm diameter abdominal aortic aneurysms, 27.0% of people with symptomatic carotid artery disease, 17% of people with acute or chronic limb-threatening ischaemia and 12.7% of people with diabetic foot conditions. Of these modifications, 40.7% were categorised as significant (grade 3a/3b) and 38.1% as major (grade 4), such as non-operative instead of operative management of carotid and lower limb disease. Life-changing/ending plans including major amputation or palliation, where pre-pandemic patients would have been offered limb or life salvage procedures, were made in 4.9% of cases (grade 5).

Lessons learnt: The results of this study suggest that the clinical disruption experienced by vascular surgery patients during the COVID-19 pandemic was largely due to redistribution of resources rather than individual patient infection. Guidelines for service modifications were adhered to, leading to significant changes in clinical management. One in five episodes of change in management were due to patient avoidance of clinical areas for fear of contracting coronavirus. If surgical hubs, with a low risk of COVID-19 infection, are to be utilised, then patient perception of the safety of these centres will be key to their success.

Conclusion: The COVER Study Tier 3 was able to show that close to one in five clinical vascular management plans were affected globally during the pandemic, with a small proportion leading to life-changing outcomes.

Key words: vascular surgery, cardiovascular, COVID-19, coronavirus

Introduction

The COronaVIrus 2019 (COVID-19) pandemic resulted in major changes in medical practice and clinical decision-making. Throughout the pandemic, the decision of whether, and how, to offer medical or surgical treatments was influenced by several factors such as COVID-19 positivity, patients' risk of contracting COVID-19 whilst receiving treatment, resource rationing, staff shortages and government guidelines.[1,2]

These considerations were pertinent for vascular patients as they typically have multiple comorbidities. Furthermore, vascular procedures are usually offered in tertiary centres, which were also hubs for managing COVID-19 patients, and suffered significant pressures on available resources.

To support vascular surgeons with decision making in resource-scarce settings, the international vascular community produced guidance for clinicians on how to manage patients during the height of the pandemic. One example was the Vascular Society of Great Britain and Ireland (VSGBI) COVID-19 guidance, produced in early 2020, recommending groups for delayed or conservative intervention during periods of greatest resource scarcity (presentations who would have received prompt and guideline-recommended surgery prior to the pandemic).[3]

The impact of COVID-19 across countries or regions differed greatly in terms of both the timing and the number of people affected. As a result, the scale of the changes to vascular patients' treatment and decision-making during the COVID-19 pandemic remains unknown. The COVID-19 Vascular sERvice (COVER) Study was a prospective multinational observational study evaluating the impact of COVID-19 on vascular patients using qualitative and quantitative methodology across 53 countries.[4] This report explores the findings from Tier 3 of the COVER Study. The aim was to examine decision-making for new referrals made to vascular units during the first wave of the pandemic and compare the care given with 'ideal' (or pre-pandemic) practice.

Methods

Study design

The COVER study was an international prospective cohort study (ISRCTN registration reference number: 80453162) designed and coordinated by the Vascular and Endovascular Research Network (VERN). The study protocol is available online and was published prior to commencing recruitment.[4] Tier 3 of the COVER study presented here evaluated the type of care provided to patients who presented with a vascular pathology during the first wave of the pandemic. All referrals made to the emergency on-call vascular service were eligible patient episodes, even if the referred condition was subsequently deemed non-urgent. Any surgeon providing direct vascular care in a hospital setting was eligible to participate. Invitations were sent via email and social media in March 2020 by the VERN group. A total of 52 centres across 19 countries took part in the study.

Approvals

Ethical approval for the COVER Study was provided by a UK National Health Service (NHS) Research Ethics Committee (REC) and the UK Health Research Authority (HRA) (reference:

20/NW/0196 Liverpool Central). All regulatory approvals were granted prior to commencing patient recruitment in late March 2020. Non-UK centres obtained institutional review board approval (locally or regionally) according to their individual policies and in compliance with the Declaration of Helsinki.

Participants

Any patient with an emergency or urgent presentation referred to the participating institutions' vascular services was eligible for inclusion, regardless of age or mode of referral. Participation in the study did not alter patient care in any way.

Data collection

Detailed records of how surgeons' practice deviated from pre-pandemic care were completed on a per-patient basis. Electronic remote data collection proformas were designed, tested and refined by the VERN COVER team in March 2020. Baseline data for each patient were captured prospectively upon patient referral or presentation. This included demographics, type of condition or nature of referral, co-existing health conditions, medications, American Society of Anesthesiologists (ASA) physical status classification, frailty, as well as details relating to the presenting vascular complaint.

Clinicians were asked to report their current plan using a multiple options list specifically designed for each of the vascular conditions. This included information on whether treatment occurred as an inpatient or outpatient, whether patients underwent non-invasive or invasive imaging, and the nature of any endovascular or operative intervention(s). Clinicians were then asked whether their plan for each patient had been modified or impacted upon due to constraints specifically related to the pandemic. If so, they were also asked to detail their 'ideal' management plan as it would have been pre-pandemic, using the same list of multiple-choice options.

A vascular change in practice specific score was developed by the study team to permit reporting of the severity of the change in practice (see Supplementary figures at www.jvsgbi.com) for all cases with a reported change of management plan.

The VERN COVER team (12 vascular specialists from centres, UK-based) reviewed all possible iterations of management changes for each clinical condition and scored each change using the following grading system:

1. Minor deviation in management – eg, imaging modality change (provided recognised form of imaging); changing which oral medication is prescribed; changing the intravenous medication prescribed.
2. Minor deviation in management, which can have a more significant impact – eg, changing of medication from intravenous to oral; change in outpatient movement/flow, including seen in a different clinic; not being discussed in MDT; not having assessment of fitness (pulmonary function testing); not referring to specialist when otherwise would have.
3. Deviation from practice – eg, being managed as an outpatient when would have normally been inpatient; increase in threshold of intervention (for abdominal aortic aneurysm (AAA) surgery).
    a. Less significant deviation in surgical/interventional practice or threshold – eg, ward-based amputation versus theatre-based amputation; slight technical difference in treatment (ie, different type of surgical bypass, different type of endovascular intervention).
    b. More significant deviation – eg, endovascular intervention rather than open surgery for treatment of AAA.
4. Major deviation from practice – eg, amputation versus revascularisation; no revascularisation versus revascularisation; major amputation versus minor amputation.
5. Palliation or major amputation, where otherwise a patient would have been treated.

If there were multiple changes to a patient's management pathway, they were allocated a score based on the single most significant and severe change.

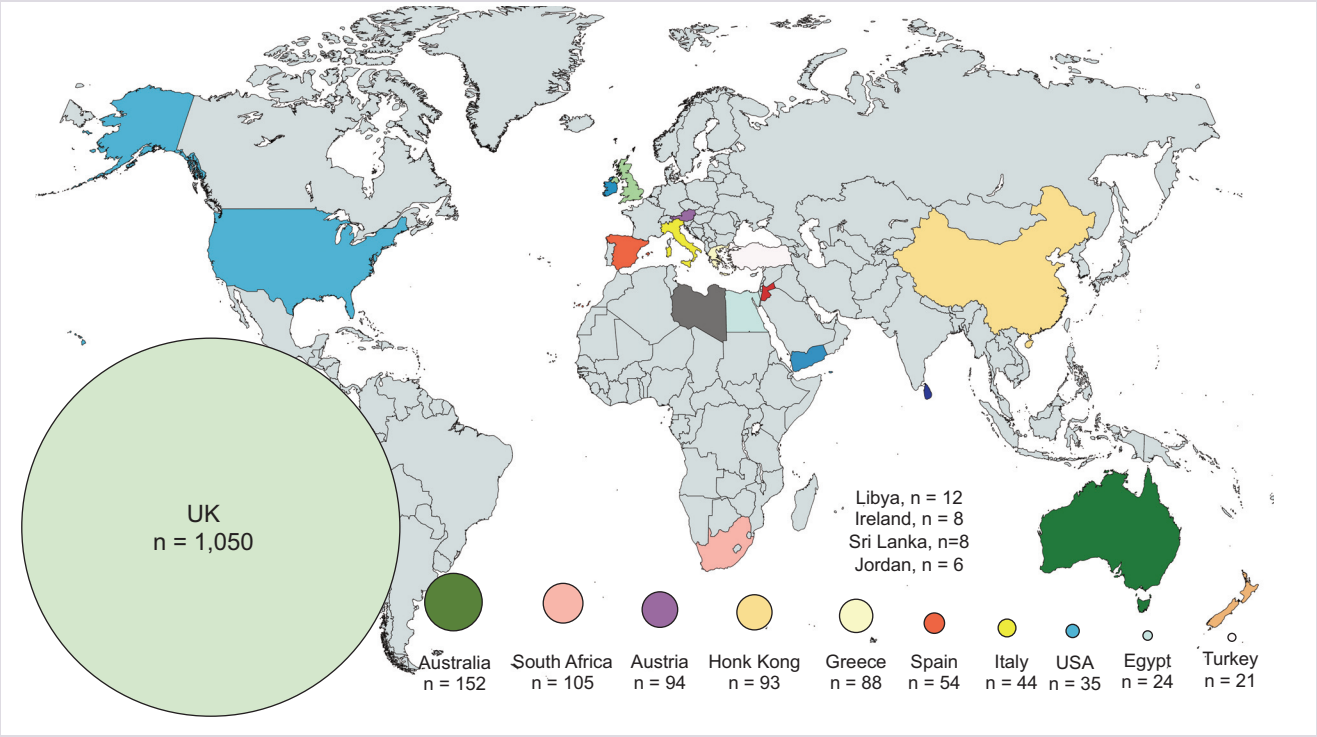
Data management

De-identified data were transferred to a secure UK NHS server based at the University of Birmingham. Data sharing agreements with each participating centre were in place to ensure data protection. Each centre was required to record local identifiers on a secure General Data Protection Regulation (GDPR)-compliant database to allow longitudinal data capture and linkage, overseen by the Research and Development Department of the University Hospitals of Coventry and Warwickshire, Coventry, UK, who also acted as study sponsor. No identifiable patient data were recorded or exchanged.

Data handling and analysis

Each participating centre identified and entered consecutive patient data over a single 4-week period; the start of the four-week time period was selected at the discretion of each centre after all necessary approvals were in place. A data lock was applied on 9th September 2020. Data are reported as raw frequencies and percentages. Normally distributed data have been presented as mean ± standard deviation (SD) and non-normally distributed data are presented as median (range) values. Statistical analysis was performed using SPSS version 26.0 (SPSS, IBM, Chicago, Illinois, USA) and the language and statistical computing software R (V6) utilising additional software libraries. Independent variables were treated as nominal factors. Numerical data were treated as continuous data to maintain power. Primary and secondary outcomes were treated as dichotomous variables. Completeness of data was interrogated with a threshold of 90% for participants and 70% for dependent variables. Logistic regression was undertaken for the primary outcome. Univariate analysis was performed on all independent variables as a prerequisite for inclusion in the multivariate analysis, with a set threshold of $p<0.1$.

Figure 1 Global representation.



Results

A total of 1,801 patient episodes were captured from 52 centres across 19 countries over a 4-week period (Figure 1). The largest proportions of referrals were made by speciality services such as secondary care physicians and podiatrists (Figure 2). Referrals from an emergency department constituted 26.6% of referrals.
The most common condition referred to vascular clinicians was chronic limb-threatening ischaemia (28.8%; Table 1).

A total of 41 patient episodes had a confirmed diagnosis of COVID-19 infection, 2.3% of the total 1801 episodes. Most patients were male (69%) and had diagnoses of hypertension and/or diabetes mellitus (Table 2). A pre-existing diagnosis of peripheral arterial disease was present in 31.5% of participants. Previous myocardial infarction was documented in 18.2% of patients, congestive cardiac failure in 7.8%, and/or angina in 5.5%.

Table 3 shows a summary of the changes in management for each of the presenting vascular conditions. We present the specific findings for 1334 patients presenting with the following condition areas: AAA, acute aortic syndromes, acute limb ischaemia, carotid artery disease, chronic limb-threatening ischaemia and diabetic foot infection or ulceration (see Appendix 1 at www.jvsgbi.com for details of presentations across conditions).

Deviation from 'ideal' management

A total of 290 patient episodes (16.1%) had a confirmed change from the 'ideal' management plan. The highest proportion of patient

Figure 2 Mode of referral to specialist vascular surgery services for the included participants.

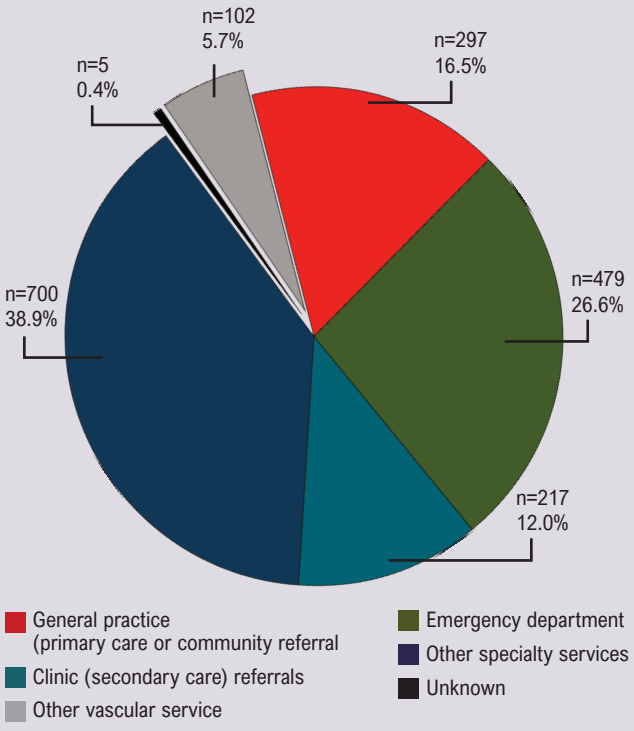


Table 1 The proportions of conditions referred to vascular specialists during the study ranking.

Condition referred	n (% of 1,801)
AAA <5.5 cm in maximal diameter, asymptomatic or non-urgent	31 (1.7%)
AAA ≥5.5 cm in maximal diameter, asymptomatic or non-urgent	66 (3.7%)
Aortic aneurysm urgent (eg, ruptured or patient presenting with pain)	50 (2.8%)
TBAD or thoracoabdominal aneurysm or acute aortic syndrome or traumatic aortic injury	47 (2.6%)
Severe claudication or CLTI	517 (28.7%)
Acute limb ischaemia	224 (12.4%)
Asymptomatic carotid artery disease (atherosclerotic)	33 (1.8%)
Symptomatic carotid artery disease (atherosclerotic)	129 (7.2%)
Diabetic foot infection or ulceration	237 (13.2%)
Iliofemoral deep vein thrombosis	37 (2.1%)
Venous leg ulceration	56 (3.1%)
Other	374 (20.8%)

AAA, abdominal aortic aneurysm; TBAD, type B aortic dissection; CLTI, chronic limb-threatening ischaemia.

Table 2 Baseline characteristics of the included participants.

Characteristic	n (% of 1,801)
Male gender	1,234 (68.5%)
Peripheral arterial disease	568 (31.5%)
Diabetes mellitus	753 (41.8%)
Hypertension	1,018 (56.5%)
Chronic obstructive pulmonary disease	283 (15.7%)
Lower respiratory tract infection, including suspected COVID-19 (but not laboratory confirmed)	22 (1.2%)
Confirmed COVID-19	41 (2.3%)
Myocardial infarction	327 (18.2%)
Angina	99 (5.5%)
Heart failure	141 (7.8%)
Atrial fibrillation or dysrhythmia	287 (15.9%)
Stroke or transient ischaemic attack	261 (14.5%)
End stage renal disease on dialysis	116 (6.4%)
Chronic kidney disease	252 (14.0%)
Actively smokes tobacco cigarettes	330 (18.3%)
Cancer	121 (6.7%)
Dementia	72 (4.0%)

COVID-19, COronaVIrus Disease 2019.

episodes in which a change in management occurred was for those with AAA >5.5 cm in size (34.8%).

Regarding the severity of change in management, the proportion of patient episodes graded as 1, 2, 3a, 3b, 4 and 5 were 4.9%, 10.3%, 23.8%, 17.5%, 38.6% and 4.9%, respectively.

Aortic referrals

Overall, 30 patient episodes out of a total of 196 (15.3%) for those with aortic pathologies underwent a change in management. There were no changes in the management of the 31 sub-treatment threshold (<5.5 cm) AAA referrals. Of the 66 patients with an AAA measuring >5.5 cm, 34.8% (n=23) had a significant deviation in management; 14 (21.2%) scored 3, including a change from open to endovascular AAA repair (EVAR) despite suboptimal anatomy or a lack of cardiopulmonary exercise testing and anaesthetic review prior to treatment. Nine patients (13.6%) had a major deviation in management (score 4) which was predominantly an increase in the threshold to offer surgical treatment or delay to repair indefinitely. There were 50 ruptured or symptomatic AAA referrals, of which four (8%) had a major deviation (score 4 or 5) to their care compared with standard pre-pandemic practice: three (6%) underwent emergency open repair where EVAR would have been preferred but suitable theatre space or availability was limited, and in one case (2%) there was an issue with the endograft supply chain.

Forty-seven cases of acute aortic syndrome were referred but only three patients (6.4%) experienced a change to their planned management in the form of postponement of thoracic EVAR.

Acute limb ischaemia

A change in management occurred in 17% of acute limb ischaemia referrals (38 of 224 patients). Five patients (2.2%) with unsalvageable limbs received no intervention where, ideally, they would have undergone a major lower limb amputation (score 4). Six patients (2.7%) had a 'major' (score 4) change to their management which no longer involved an operative or interventional procedure (where 'ideally' indicated). The remaining changes were in the most part an alternative intervention or imaging modality, or a delay to intervention (score 2 and 3a).

Carotid artery disease

Overall, 40 patient episodes out of a total of 162 (24.7%) for those with carotid artery pathologies underwent a change in management. Major (level 4) changes to management were documented in 15.2% of patients, who were not offered a carotid endarterectomy (CEA) when they would have been pre-pandemic. There were 129 symptomatic carotid disease referrals with 35 (27%) having a documented change in management. Nineteen (14.7%) had a major change (score 4) and were offered best medical therapy only rather than either CEA or carotid artery stenting. Significant modifications (scores 3a and 3b) included delays to intervention beyond the recommended 14 days.

Table 3 Alterations to management of the five key conditions (n=1,334).

Condition	Total n	Number of management plans changed	Severity of change to clinical management	
			Score/Class	N (%)
AAA <5.5 cm	31	0 (0%)	N/A	N/A
AAA >5.5 cm	66	23 (34.8%)	3b	14 (21.2%)
			4	9 (13.6%)
Ruptured/symptomatic AAA	50	4 (8.0%)	4	4 (8%)
Acute aortic syndrome	47	3 (6.4%)	3b	2 (4.2%)
			4	1 (2.1%)
Acute limb ischaemia	224	38 (17.0%)	1	2 (0.9%)
			2	6 (2.7%)
			3a	13 (5.8%)
			3b	4 (1.8%)
			4	6 (2.7%)
			5	5 (2.2%)
			4 (positive)	2 (0.9%)
Asymptomatic carotid presentations	33	5 (15.2%)	4	5 (15.2%)
Symptomatic carotid presentations	129	35 (27.0%)	1	1 (0.8%)
			2	3 (2.3%)
			3a	9 (7.0%)
			3b	3 (2.3%)
			4	19 (14.7%)
CLTI	517	88 (17.0%)	1	8 (1.6%)
			2	11 (2.1%)
			3	9 (1.7%)
			3a	15 (2.9%)
			3b	14 (2.7%)
			4	30 (5.8%)
			5	1 (0.2%)
Diabetic foot infection	237	30 (12.7%)	2	3 (1.3%)
			3a	7 (3.0%)
			3b	2 (0.84%)
			4	12 (5.1%)
			5	5 (2.11%)
			3a (positive)	1 (0.4%)

AAA, abdominal aortic aneurysm; CLTI, chronic limb-threatening ischaemia.

1. Minor deviation in management – eg, imaging modality change (provided recognised form of imaging); changing which oral medication is prescribed; changing the intravenous medication prescribed.
2. Minor deviation in management, which can have a more significant impact – eg, changing of medication from intravenous to oral; change in outpatient movement/flow, including seen in a different clinic; not being discussed in MDT; not having assessment of fitness (pulmonary function testing); not referring to specialist when otherwise would have.
3. Deviation from practice – eg, being managed as an outpatient when would have normally been inpatient; increase in threshold of intervention (for abdominal aortic aneurysm (AAA) surgery).
   a. Less significant deviation in surgical/interventional practice or threshold – eg, ward-based amputation versus theatre-based amputation; slight technical difference in treatment (ie, different type of surgical bypass, different type of endovascular intervention).
   b. More significant deviation – eg, endovascular intervention rather than open surgery for treatment of AAA.
4. Major deviation from practice – eg, amputation versus revascularisation; no revascularisation versus revascularisation; major amputation versus minor amputation.
5. Palliation or major amputation, where otherwise a patient would have been treated.

Chronic limb-threatening ischaemia

Of the 517 presentations, 88 (17.0%) received an alternative management plan to documented pre-pandemic ideal care. Half of these (45 of 88) had a significant or major adjustment (score 3a, 3b or 4), with one being palliated rather than being offered intervention (score 5). These significant or major deviations included delays to treatment and changing the operative modality to endovascular rather than open due to unavailability of endovascular suites or vice versa due to a lack of theatre space.

Diabetic foot infection or ulceration

Of the 237 patients seen with a diabetic foot infection or ulceration, 30 (12.7%) had a change in management. This included rare positive changes to care, such as access to urgent clinic assessment facilitated by a reduction in elective or other work, described in a single unit (positive 3a). For the remaining cases, the changes were adverse. Five cases (2.1%) had a major lower limb amputation (score 5) due to delays in presentation and access to services, which may have been avoidable if treated earlier. Twelve patients (5.1%) had wound and foot care only when 'ideally' revascularisation would have been indicated, constituting a 'major' modification (score 4). Ten patients underwent a 'significant' alteration (score 3a or 3b) to their plan with only ward-based foot care, toe amputation or sepsis drainage instead of operating theatre-based care under general or regional anaesthesia.

Drivers of change to management

The clinicians' reasons for having to provide management different from their ideal care were varied. A total of 240 patient episodes were confirmed to have a change in management across the chronic limb-threatening ischaemia, acute limb ischaemia, diabetic foot infection, carotid artery disease, AAA and acute aortic syndromes.

The barriers and stimuli for changes in management for these (grouped) conditions are listed in Table 4. The most common was department policy change for specific conditions (55.4%). The second most common reason was selected as "Other", with 46.3% of patient episodes listing this. 18.8% of patient episodes with confirmed altered management listed "Patient declined due to risk of hospital-acquired COVID-19". Other factors included a lack of operating space, lack of anaesthetic availability and a lack of suitable high-level care postoperative beds. Confirmed COVID-19 infection as a reason to change management was rare but did influence management negatively where indicated.

Table 4 Barriers to ideal management encountered for all patient episodes in which there was a change in managerment.

Reasons listed as barrier to ideal management	n (% of 240)
Departmental policy	133 (55.4%
Lack of imaging capacity	24 (10.0%)
Patient declined due to risk of hospital-acquired COVID-19	45 (18.8%)
Patient is COVID-19 positive	18 (7.5%)
No vascular beds for patient to be admitted to	17 (7.1%)
No postoperative bed for patient to return to	11 (4.6%)
Insufficient staff (eg, illness, redeployment)	24 (10.0%)
No interventional radiology procedural capacity	22 (9.2%)
No anaesthetic pre-assessment availability/cardiopulmonary testing	12 (5.0%)
No level 2/3 hospital bed (admitting capacity)	19 (7.9%)
Other	111 (46.3%)

240 is the total number of patient episodes in which management was confirmed to have changed due to COVID-19 pandemic in the following conditions: AAA <5.5 cm, AAA >5.5 cm, ruptured AAA, acute aortic syndromes, acute limb ischaemia, chronic limb-threatening ischaemia, diabetic foot infection.

AAA, abdominal aortic aneurysm.

Discussion

Emerging single institution and surgeon surveys published during the first and subsequent waves of infection demonstrated significant variation in how vascular services managed the interruption to normal services, such as how surgery was rationed and the move from inpatient to outpatient management to reduce pressure on hospital beds.[5,6] The COVER Tier 3 study has described these changes in more detail, and across a variety of countries and vascular centres.

As expected, lower limb emergencies comprised the most commonly referred condition, making up over half of the cases in this study (chronic limb-threatening ischaemia, acute limb ischaemia and diabetic foot infection/ulceration). The low proportion of emergency aortic pathology may reflect the global downward trend in AAA presentations, but does not take into account patients who died before reaching hospital or those who died at home while isolating.[7] A change in referring practices from stroke teams in response to guidelines recommending medical management for all symptomatic carotids except for crescendo transient ischaemic attacks may have led to a lower proportion of those patients being picked up by this study.[3]

Uniquely, Tier 3 of the COVER study has attempted to quantify the effect of the COVID-19 pandemic on the management of individual vascular referrals. Data indicated that around one in three above threshold AAA and symptomatic carotid disease patients presenting during the pandemic were delayed. With AAA rupture rates increasing incrementally beyond 5.5 cm, and between one in six to one in 13 strokes thought to be prevented by carotid intervention for high-grade symptomatic stenosis, the potential loss of quality-adjusted life years could be high in the coming years.[8] One in 10 chronic limb-threatening ischaemia presentations suffered delays and changes to management, and diabetic foot patients also suffered from delays to revascularisation and debridement. Guidelines have shown that non-optimised care in

these groups leads to higher rates of major amputation and rising healthcare costs.[9] This will place an additional burden on healthcare services globally.

The most common reason identified for a change in management was departmental policy, followed by "Other". Pre-emptive action was taken in many countries to suspend elective activities and redeploy specialty surgical staff to intensive care and respiratory services prior to the peak incidence of COVID-19, reflecting the stimuli for change being departmental policy rather than individual patient-related or clinical factors. Selection of "Other" likely reflects the complex decision making, with multiple factors contributing to a change in management that cannot be put down as a restriction or lack of any given resource.

Patient perception of hospital-acquired COVID-19 was a barrier in as many as one in five patient episodes. If COVID-free surgical hubs are to be utilised effectively in the future, it will be important to address perception to ensure effective delivery of elective services.

As reflected in the prevalence of COVID-19 in this cohort, individual infection with COVID-19 was a barrier in as few as 7.5% of cases. This again reiterates that the vast majority of changes in management of vascular patients stemmed from a shift in service provision.

Limitations of the study

Whilst this study was designed with the intention of capturing all referrals to acute vascular services and to document the management plans accordingly, it is likely that there will have been a proportion of missed urgent cases, especially those in the community who never made it to the point of referral. The busy vascular take, coupled with workforce pressures and a shift to tele- or remote services,[1,10] may mean that referrals received electronically or those triaged directly to outpatient clinics might not have been documented. Urgent or emergency vascular conditions, in general, carry a high associated mortality, in particular ruptured AAA or complicated aortic dissection. It is therefore possible that some cases may have been missed due to a lack of referral resulting from delays in presenting to medical services due to isolation or fear of catching COVID-19 in hospital. The timing for the 4-week data capture window was pragmatic and left to the participating institution to decide the start date. Consequently, in some cases this may not have aligned with the 'true' peak of the COVID-19 pandemic and could lead to under-representation of the true impact of clinical management changes. Long-term data out to 1 year from presentation was insufficient to provide information on impact on longer-term outcomes.

Furthermore, the scoring system used to grade the severity of change has not been validated. It was developed by UK-based vascular specialists and therefore may be biased towards UK-based practice.

Lessons learnt

The results of this study suggest that the clinical disruption experienced by vascular surgery patients during the COVID-19 pandemic was largely due to redistribution of resources rather than individual patient infection. The guidelines for service modifications, which were rapidly produced and published by the Vascular Society of Great Britain and Ireland, appear to have been taken up and adhered to both within the UK and further afield, leading to very real changes in clinical management during the first pandemic wave. Refinement of these guidelines should be a priority going forward, so that plans for service modification in the event of a future pandemic are available to expedite their timely publication.

It was interesting to note that one in five episodes of change in management were due to patient avoidance of clinical areas for fear of contracting coronavirus. If surgical hubs, with a low risk of COVID-19 infection, are to be used, then patient perception of the safety of these centres will therefore be key to their success.

Unfortunately, the lack of outcome data means it is difficult to interpret the impact of these changes in practice, and this is a limitation of the study.

KEY MESSAGES

- During the COVID-19 pandemic, one in five vascular clinical management plans were affected globally.
- Only a small proportion of patients had an immediate life or limb changing outcome (major amputation or palliation).
- Many of these alterations in management involved deferrals of treatment and will influence waiting lists for the foreseeable future.

Conclusion

Tier 3 of the COVER Study is unique in its description of management changes and the granularity of those changes. We have shown that decisions made for nearly one in five patients presenting during the pandemic were affected by significant or life-changing/ending alteration(s). Clearly these changes across the breadth of vascular surgery will lead to a surge of patients whose management was temporised in the initial pandemic wave.

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ORIGINAL RESEARCH

Research priorities for venous conditions: results of the UK Vascular James Lind Alliance Priority Setting Process

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Plain English Summary

Why we undertook the work: More research is needed to help improve care for people with venous conditions, but funding is limited. We ran a Priority Setting Process (PSP) to identify the most important research priorities to improve patients' lives, and generated a 'top 10' list. This list will help focus research and funding on areas that matter most to patients, carers and healthcare teams.

What we did: Patients and healthcare professionals participated in rounds of survey and were asked to suggest priorities for vascular research. Responses were summarised and organised into nine overall vascular condition areas. Summary priorities were then sent out in a second survey for scoring according to order of importance. The lists of patient and professional priorities were then combined into a shared list for discussion at a final workshop meeting where a mix of patients and healthcare professionals agreed the 'top 10' research priorities for venous condition research in the UK.

What we found: Research priorities about vascular conditions were submitted by 481 healthcare professionals and 373 patients or carers. A final list of 14 priorities specifically about venous conditions were discussed at a final workshop involving patients, carers and clinicians, and put into a ranked 'top 10' list according to perceived and shared importance. Research priorities relate to: access to venous specialist services, prevention, wound healing, pain management, education and compliance.

What this means: Research priorities have been identified by patients and health professionals with lived experience of venous conditions. Researchers and funders are encouraged to focus on addressing these priorities and supporting studies in these areas.

Abstract

Introduction: Venous disease comprises a range of conditions of varying severity, which can result in pain and discomfort and a reduced quality of life. The annual costs for the treatment and management of venous disease in the UK is in the order of billions of pounds. It is vitally important to direct finite National Health Service (NHS) funding into areas that will maximise health outcomes and reduce the burden on the NHS. To address the issue of where best to target resources and research, the Vascular Society of Great Britain and Ireland (VSGBI) in association with the James Lind Alliance (JLA) undertook a national Priority Setting Process (PSP) for vascular conditions. This paper presents the results of this process, with a focus on the topic of 'venous conditions'.

Methods: A modified JLA Priority Setting Partnership was developed to gather clinician, patient and carer research priorities for vascular conditions. Consensus workshops were held to discuss clinician and patient priorities and agree a list of joint research priorities. Consensus was achieved using the nominal group technique and a ranked 'top 10' list of research priorities for venous conditions was established.

Results: In the first phase (clinician-led survey), 481 clinicians submitted 1,231 research questions related to vascular conditions in general. Of these, 130 venous-specific research priorities were reduced to 13 overarching summary priorities recirculated for interim scoring. In the second phase (patient and carer-led survey), 373 patients and carers submitted 582 research priorities. Of these, 101 venous-specific priorities were reduced to 22 overarching summary priorities and recirculated for interim scoring. In the third phase (consensus workshop), clinician and patient priorities were amalgamated into 14 priorities for discussion. The final 'top 10' list of venous condition research priorities relate to: access to specialist

venous services, prevention, wound healing, pain management, education and compliance.

Conclusions: The 'top 10' venous-related priorities demonstrate the research areas considered to be most important from the perspective of patients, carers and healthcare professionals. Researchers can now focus their efforts on developing research questions and studies to address these priorities and funders should increase their investment to support new studies in these areas of greatest importance.

Key words: vascular, venous, research, priorities

Background

Venous disease encompasses a range of conditions that vary in severity and, if left unmanaged, can lead to serious conditions such as leg ulcers. This presents a huge economic burden to the NHS, estimated to be between £1bn and £3bn per year for ulcers alone.[1–3] Venous disease can negatively impact on quality of life with issues such as pain, restricted mobility and reduced psychosocial functioning.[4–6]

Despite a wide range of treatment options and guidelines, questions still remain unanswered about the efficacy and cost effectiveness of different interventions, with uncertainty over a selection of treatments.[7–11] In a recent report published by the All-Party Parliamentary Group for Vascular and Venous Disease, the data show that more than half of clinical commissioning policies (64%) do not provide access to venous treatment in line with NICE guidance, and pathways for venous conditions do not exist in a significant number of NHS Trusts.[12–15]

In order to ensure optimal management of venous conditions, more research is needed; however, funding is limited and highly competitive. Funding bodies need to ensure their limited investment is directed to areas with the greatest potential for improving clinical services and health outcomes, whilst avoiding research waste.[16] Priority Setting Processes (PSPs) are an increasingly popular method to address this issue; they systematically identify and prioritise research gaps and are seen as an effective way of highlighting important topics for funding consideration.[17]

The Vascular Society of Great Britain and Ireland (VSGBI) initiated a national PSP for vascular conditions in association with the James Lind Alliance (JLA) who specialise in facilitating patient involvement in research.[18] Prior to this there was no agreement for research priorities within the vascular specialist community. The aim of the Vascular PSP was to survey vascular health professionals, patients and carers to identify and prioritise the most important research priorities. This paper presents an overview of the vascular condition PSP, focusing on the recommendations for venous-related priorities and implications for future research in this area.

Methods

A detailed description of the process has been provided previously.[19–25] A summary of the process is outlined below and presented in Figure 1.

Figure 1 Flowchart of the Vascular Priority Setting Process (PSP).

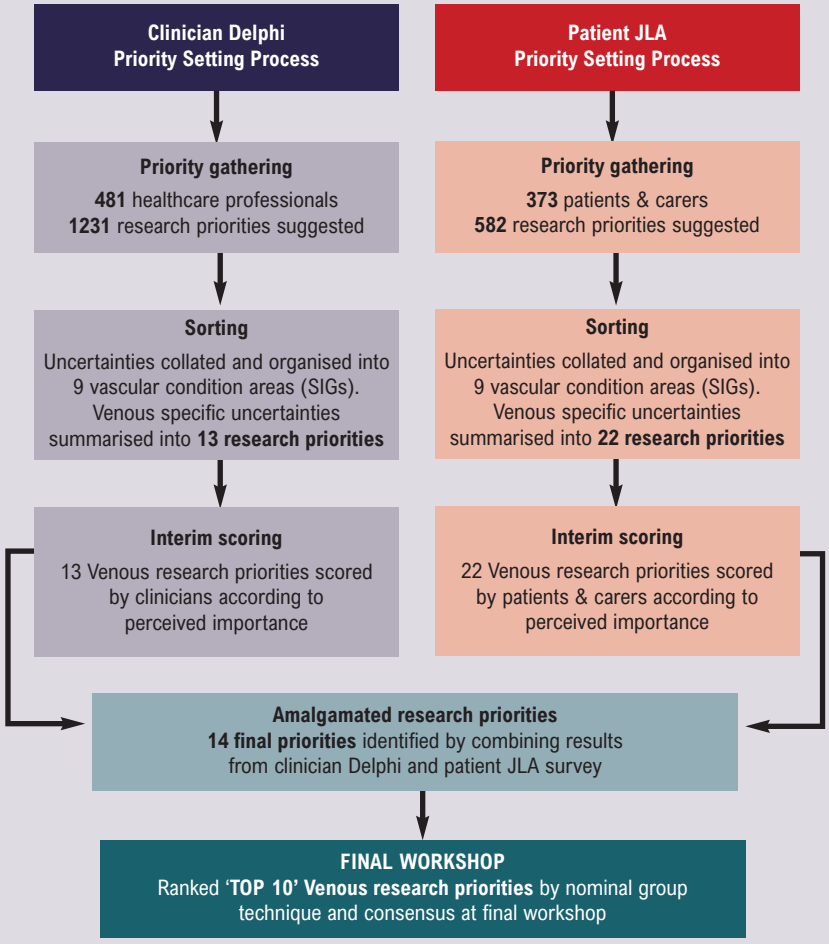

Table 1 List of nine Special Interest Groups (SIGs), categorised by overarching vascular condition.

Vascular PSP Special Interest Groups (SIGs)		
Access	Amputation	Aortic
Carotid	Diabetic foot	Peripheral arterial disease
Service organisation*	Venous	Wounds

*This category was established to support generic priorities that apply across all SIGs (e.g., questions about access, organisation and service delivery).

Table 2 Venous research priorities from the clinician survey and prioritisation process, with the mean ranking score.

Research priority	Mean Score
What is the optimal treatment strategy for proximal deep venous disease (thrombolysis, stenting, compression, surgery, anti-coagulation)?	7.75
Can we develop a leg ulcer care pathway to ensure optimal management?	7.48
Does early intervention in superficial venous incompetence prevent disease progression to ulceration?	7.40
What is the optimal compression strategy (bandages, stockings, boots) for patients with venous disease and how do we improve compliance?	6.77
What is the optimal VTE thromboprophylaxis strategy in varicose vein intervention?	6.76
What is the optimal commissioning policy for superficial venous incompetence?	6.68
What is the optimal strategy for the diagnosis and management of calf DVT?	6.62
How can we improve VTE prevention?	6.60
Are non-thermal as effective as thermal ablative techniques in the management of varicose veins?	6.52
How can the long-term outcomes be improved following treatment for varicose veins?	6.50
How prevalent is pelvic vein incompetence and is treatment effective?	6.31
What is the optimal compression regime following endovenous ablation?	6.24
What are the basic mechanisms underlying venous incompetence?	6.06

The VSGBI undertook a research PSP in association with the JLA to identify research priorities for vascular conditions. The work was overseen by a steering committee involving representation from all the leading UK Vascular Societies and patients. Nine overarching vascular condition Special Interest Groups (SIGs) were established to help support the process and ensure that each area retained their important research priorities (Table 1).

Initially, due to resource limitations, a clinician-led Delphi survey was conducted to produce a list of research priorities to reflect the opinions of vascular healthcare professionals. This was followed by a separate patient and carer focused JLA survey to identify important research priorities from the perspective of vascular patients and carers. The two processes were then brought together at final workshops held separately for each SIG, where patients, carers and clinicians worked together to agree a shared list of 'top 10' research priorities.

Scope of the Venous SIG

The remit of the Venous SIG is to support research into the care of patients with venous conditions. The Venous SIG aims to develop the list of top 10 priorities into funded venous research studies that address these important areas.

Clinician-led research Priority Setting Process

Healthcare professionals were surveyed using a modified Delphi approach that consisted of two rounds:

Survey Round One: In the first round, an open-ended survey invited participants to submit their priorities for vascular research. An electronic link to the survey was emailed via the following membership bodies: The Vascular Society of Great Britain, The Society of Vascular Nurses, and The Society of Vascular Technicians of Great Britain and Ireland and the Rouleaux Club. Letters including the survey link were sent to each vascular unit registered on the National Vascular Registry (NVR) and the survey was also promoted via twitter. Responses were collated and categorised into pathological topics and research themes by a core subgroup of the steering committee. Similar responses were amalgamated and summarised into an overarching priority. Responses considered out of scope (eg, too broad or logically unclear) were removed and remaining priorities checked for current evidence.

Survey Round Two: The refined list of priorities was redistributed in a second survey for scoring. Participants were asked to rate the importance of the summary priorities on scale of 1–10 (1 being the least important, 10 being the most important). This process was completed in 2018[21] and the results of clinicians' venous-related priorities are summarised in Table 2.

Patient/carer-led research Priority Setting Process

Vascular patients and carers were surveyed using a modified JLA approach, with guidance from a JLA advisor and used similar methodology as the clinician-led PSP.

Survey Round One: In the first round, a survey invited patients and carers to submit their own research priorities. The survey was provided in paper and electronic format and advertised to UK-based societies involved with care of vascular patients. Participant packs were sent out to vascular units and included paper surveys with freepost return address and promotional materials such as posters and postcards that could be left in waiting areas. The survey was also advertised via social media (twitter), websites and

newsletters. Responses were categorised and delegated to each SIG for further review. Similar responses were amalgamated and summarised into an overarching priority. Responses considered out of scope (eg, too broad or logically unclear) were removed and remaining responses checked for current evidence.

Survey Round Two: The refined list of priorities was redistributed in a second survey for scoring. Participants were invited to rate the importance of research priority using a 5-point Likert scale (scores ranging from 1 = "not at all important" to 5 = "extremely important"). This process was completed in 2020 and the results of patient and carer venous condition priorities are summarised in Table 3.

Special Interest Group Prioritisation Workshops

For each SIG, the results of the clinician and patient/carer-led interim prioritisation processes were combined. Similar or duplicated priorities were amalgamated and any technically worded language from the clinician priorities was revised with patient input. Care was taken to ensure that the original substance of the priority remained. This process generated a refined list of joint priorities for discussion at individual SIG workshops.

The final prioritisation workshop for venous conditions was conducted virtually using the Zoom platform to accommodate COVID-19 restrictions. All attendees (including healthcare professionals, patients and carers) were recruited via direct contact or were approached if they expressed an interest during the initial prioritisation process. Participants were sent details of the workshop, an agenda and a list of the research priorities to be discussed in advance. Prior to the workshop, participants were asked to consider the combined list of clinician and patient research priorities shown in Table 4, and to rank them in order of importance from 1 (most important) to 14 (least important).

The workshop was led by two experienced JLA advisers, a JLA coordinator and a technical lead who were skilled in the JLA PSP process and leading such workshops. Members of the venous SIG attended as observers and to provide support to attendees if required (they would join a separate breakout room). SIG members were not directly involved in the priority setting and had no influence over the final agreed list of priorities. Following welcome and introductions, participants were split into two breakout rooms which consisted of a mix of patients and healthcare professionals. Small group discussions were facilitated by an advisor and followed a nominal group technique to reach a consensus for an ordered list of 'top 10' priorities.

First round of discussion: Participants shared their top three and lowest three priorities with a brief explanation for why. This was followed by an open discussion about similarities and differences and any priorities that were not initially mentioned.

Second round of discussion: The JLA facilitator presented on screen a potential order of questions based on initial feedback and discussion. Participants had an opportunity to reconsider their initial placement of priorities whilst the facilitator moved priorities on screen to reflect an agreed order of priorities 1–14.

Third round of discussion: The ranked priorities of the two separate groups were combined by the lead facilitator using a geometric mean of the respective ranked positions. All participants came together as one group and the lead facilitator presented the combined results of the group rankings. Participants were then split

Table 3 Venous research priorities from the patient/carer survey and prioritisation process, with the mean ranking score.

Research priority	Mean Score
How can we improve awareness and education of venous disease for healthcare professionals?	4.22
How do we ensure that patients with venous disease receive the specialist assessment and treatment they need?	4.18
How can we make venous leg ulcers heal more quickly?	4.17
How do we improve the early detection of deep vein thrombosis?	4.14
Can we improve the treatment of patients who have had a deep vein thrombosis and go on to develop pain, swelling and skin damage?	4.14
How can we prevent patients developing pain, swelling and skin damage after a deep vein thrombosis?	4.10
How can we improve pain control in venous leg ulcers?	4.05
How do we prevent varicose veins from damaging the skin and from causing leg ulcers?	4.00
What is the most effective treatment for varicose veins?	3.96
Is there a long-term benefit to compression following varicose vein treatment?	3.95
What is the impact of compression treatment on inflammation?	3.90
Can we predict which patients with varicose veins or previous blood clots will develop skin damage?	3.87
Are varicose veins associated with an increased risk of other medical conditions such as stroke, heart disease, chronic fatigue, memory loss?	3.86
How effective is deep venous stenting in the prevention or treatment of pain, swelling or skin damage?	3.83
How can we improve pain in venous malformations where compression is not possible?	3.75
How can we prevent varicose veins from happening or them coming back after treatment?	3.74
How can we improve awareness and education for the general population and patients with venous disease?	3.73
Do hormone levels have an association with venous malformations?	3.53
What causes varicose veins?	3.52
Will a greater understanding of the micro-organisms living in venous leg ulcers result in less infection and/or greater wound healing?	3.50
Can compression be made more comfortable?	3.48
Does haemodialysis have an impact on venous disease?	3.29

Table 4 Collated research priorities that were circulated to all attendees prior to the final workshop. The priorities were listed randomly and assigned a letter rather than a number.

A	Will a greater understanding of the bacteria living in venous leg ulcers result in less infection and/or greater wound healing?
B	How can all patients be given the opportunity to access the specialist assessment and treatment they need?
C	How can the number of patients actually using compression treatment be improved?
D	How can the early detection of deep vein thrombosis be improved?
E	How can leg symptoms and tissue damage be prevented and treated in people with deep venous disease including deep vein thrombosis?
F	How can leg symptoms and tissue damage be prevented and treated in people with superficial venous disease?
G	How can venous leg ulcers be made to heal more quickly?
H	How common is pelvic vein incompetence and is treatment effective?
I	How can varicose veins be prevented from happening or coming back after treatment?
J	How can awareness and education of venous disease be improved?
K	What is the best type of compression for patients with venous disease?
L	How can pain be better controlled in venous leg ulcers?
M	What is the best way to prevent blood clots in the deep veins or lungs (deep vein thrombosis or pulmonary embolism) following treatment of varicose veins?
N	What is the most effective treatment for varicose veins?

into new groups and, again, participants had an opportunity to reconsider the order of priorities before reaching a final ranked 'top 10' list of venous research priorities. As before, the ranked priorities of the separate groups were combined to form a final shared ranking.

Results

Clinician research priority identification and prioritisation

A total of 481 clinicians submitted 1,231 research priorities relating to vascular surgery in general. Of these, 130 venous condition-related research priorities were submitted, 28 of which were excluded outright as they were too specific to single patient experience or there was no apparent priority (eg, nonsensical or broad statement). The remaining 102 priorities were combined and summarised into 13 clinician priorities for scoring, the results of which are shown in Table 2.

Patient/carer research priority identification and prioritisation

A total of 373 patients/carers suggested 582 research priorities related to vascular surgery in general, of which 102 responses were specific to venous conditions. After data cleaning (eg, removing nonsensical suggestions, separating out submissions with multiple suggestions and combining overlapping priorities), 22 research priorities were redistributed for scoring, the results of which are shown in Table 3.

Prior to the workshop, the SIG team pooled clinician and patient/carer research priorities and, after removing duplicate questions, 14 were taken forward for discussion at the final workshop (Table 4). In order to reduce risk of bias, these priorities were randomly ordered and each assigned a letter (rather than a number), before they were circulated to attendees in advance. Attendees reviewed and ranked the research questions in order of importance prior to the workshop.

Table 5 Final ranked 'top 10' list of venous condition research priorities.

Ranking	Question
1	How can all patients be given the opportunity to access the specialist assessment and treatment they need?
2	How can awareness and education of venous disease be improved?
3	How can leg symptoms and tissue damage be prevented and treated in people with deep venous disease including deep vein thrombosis?
4	How can varicose veins be prevented from happening or coming back after treatment?
5	How can the number of patients actually using compression treatment be improved?
6	How can leg symptoms and tissue damage be prevented and treated in people with superficial venous disease?
7	How can venous leg ulcers be made to heal more quickly?
8	What is the best type of compression for patients with venous disease and how do we improve compliance?
9	How can pain be better controlled in venous leg ulcers?
10	How common is pelvic vein incompetence and is treatment effective?

Final prioritisation workshop

The final prioritisation process was conducted via a virtual online meeting on 27 September 2021. It was attended by two patients and six healthcare professionals (specialist vascular nurses and vascular surgeons) with four observers. The final prioritisation resulted in a final 'top 10' research priority list (Table 5). The priorities are ordered according to importance as determined at the workshop. There was general consensus that the list correctly represented the discussions and viewpoints which occurred in the breakout groups. Results from the participant feedback indicated that 100% agreed or strongly agreed that the process for determining the top 10 priorities was robust and fair.

Discussion

The 'top 10' research priorities for UK venous conditions research have now been established. Using a modified JLA methodology, vascular healthcare professionals and patients with lived experience of venous conditions have jointly agreed the most important priorities for future research in this area. The four

priorities that did not make the ranked 'top 10' list are still considered important.

Overarching themes within the final 'top 10' list relate to access to services, prevention, wound healing, pain management, education and compliance.

Strengths and limitations

The Vascular PSP used well established methods throughout, with oversight from a multidisciplinary steering committee. The Delphi method, often used in PSPs, is regarded as a flexible research technique but one that tends to focus on the identification of expert opinion.[26] To mitigate this, the Vascular PSP sought the input of the JLA who provide a transparent and structured framework that emphasises patient participation in PSPs, with patients having an equal voice to clinicians and researchers in influencing the research agenda.[27,28] It is possible that the modified approach of having two separate processes before bringing the clinician and patient views together may have resulted in a different 'top 10'. However, during the amalgamation process there was already considerable of overlap with similar questions and the format of the final workshops did establish shared priorities.

Due to the nature of survey data collection, there is potential for responder bias,[29] and consideration was given to whether responses would be adequately reflective of the opinions of people with lived experience of venous conditions and those treating them. Under-representation is recognised as a limitation of many PSPs,[30,31] and therefore there may have been potentially relevant priorities not submitted and consequently not considered within the analysis. However, the value of PSPs is not in their universal coverage, but in eliciting some new insight and perspectives, especially from people with lived experience.

The Vascular PSP sought to minimise this risk in several ways. The survey was made available in electronic and hardcopy format (with freepost address), and it was promoted via the affiliated charity groups and organisations who regularly work with the population targeted for input. Furthermore, the introduction of SIGs meant that each vascular condition area had a dedicated review of responses by a group of interested professionals and patients that could highlight if there were any expected topic areas missing.

Most workshop participants found the use of a virtual platform acceptable, although it is recognised that potentially lack of access to IT may have limited participation and altered representation. On the other hand, the virtual platform meant patients did not have to travel, and this may have made the workshop more accessible for some patients. Positive comments collected from the feedback survey following the final workshop demonstrated that clinicians and patients found the process of discussing priorities in mixed groups a positive and worthwhile experience. It gave participants an opportunity to hear about the experiences of others and to reassess their initial judgements.[32] Although the mixed discussion groups were not strictly balanced in terms of patient attendance, this was carefully moderated through the skilled JLA facilitators who ensured that patient participants were regularly included and able to contribute their views. The final ranking was acknowledged as a compromise, but all participants had some of their high ranked priorities in the final 'top 10'. This is not uncommon for PSPs and is a known factor of a consensus approach.

KEY MESSAGES

- A total of 14 research priorities relating to venous conditions were considered by a group of patients, carers and healthcare professionals.
- Working with the James Lind Alliance, a final list of the 'top 10' most important venous research priorities have been established.
- Venous priorities broadly encompass research aimed at improving access to specialist venous services, prevention, wound healing, pain management, education and compliance

Implications for future research

The venous condition priorities now provide researchers with essential guidance on where best to focus their efforts in the immediate and long term. Studies and projects should now be developed to address these important priorities and we call on funders to recognise and support the delivery of this work.

Conclusion

The Vascular PSP has established a 'top 10' list of priorities for UK venous conditions research from the shared perspective of vascular patients, carers and health professionals. Researchers and funders can confidently invest resources into these areas of venous conditions research with reassurance that they are clinically relevant and of practical importance to patients.

Conflict of Interest: DC is on the Editorial Board of the *JVSGBI*. TG was the lead JLA advisor for the Vascular PSP and was paid to Chair the Steering Committee for the project. The other authors declare no conflicts of interest.

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ORIGINAL RESEARCH

Research priorities for vascular services: results of the UK Vascular James Lind Alliance Priority Setting Process

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Plain English Summary

Why we undertook the work: More research is needed to help improve treatment and delivery of care for people with vascular conditions, but funding is limited. The Vascular Society of Great Britain and Ireland (VSGBI) ran a Priority Setting Process (PSP) to find out the most important research priorities. This helps researchers to better focus their work and helps funders to direct their support to projects that aim to answer questions that are important to people with lived experience and vascular health professionals. This paper presents the results of this process, focusing on vascular service related research priorities.

What we did: We asked vascular patients and healthcare professionals in separate surveys to suggest their own priorities for vascular research. Responses were summarised and organised into nine overall vascular condition areas, including a general 'service' category that incorporated issues relating to the organisation and delivery of services or cross-cutting themes. A summary list of questions was sent out and participants were asked to score them according to their importance. The lists of patient and professional priorities were then combined into a shared list for discussion at a final workshop meeting where a mix of patients and healthcare professionals agreed the 'top 10' research priorities for vascular services research in the UK.

What we found: A total of 481 healthcare professionals and 373 patients or carers submitted research priorities about vascular conditions, which were consolidated into a final combined list of 18 general priorities about vascular services. At a final workshop involving patients, carers and clinicians, these priorities were put into a 'top 10' list ranked according to perceived importance. Research priorities relate to: providing an efficient and fair service for vascular patients, education and training of clinicians and patients, improving communication and the introduction of new and better vascular treatments.

What this means: Research priorities considered most important for people with lived experience and vascular health professionals for vascular services have been identified. Researchers and funders are encouraged to focus on addressing these priorities and supporting studies in these areas.

Abstract

Introduction: The configuration of vascular services is a challenging process where treatment options, access and delivery of services is variable. There is a significant financial burden to the NHS due to rising demand for vascular services; however, guidelines for treatment options and delivery are frequently based on low levels of clinical and cost effectiveness evidence. Therefore, further research is required but capacity is limited and funding is highly competitive. To address this issue, the Vascular Society of Great Britain and Ireland (VSGBI) in association with the James Lind Alliance (JLA) undertook a national Priority Setting Process (PSP) for vascular conditions. This paper presents the results of this process, with a focus on the topic of 'vascular services'.

Methods: A modified JLA Priority Setting Partnership was implemented in three overarching phases: (1) a clinician-led survey to gather clinician research priorities; (2) a patient and carer-led survey to gather patient and carer research priorities; (3) a consensus workshop to discuss clinician and patient priorities and agree a list of joint research priorities. Consensus was achieved using the nominal group technique and a ranked 'top 10' list of research priorities for vascular services was established.

Results: In the first phase (clinician-led survey), 481 clinicians submitted 1,231 research priorities related to vascular conditions in general. Of these, 338 service-related research priorities were reduced to 16 overarching summary priorities recirculated for interim scoring. In

the second phase (patient and carer-led survey), 373 patients and carers submitted 582 research priorities. Of these, 25 service-related priorities were developed and recirculated for interim scoring. In the third phase (consensus workshop), clinician and patient priorities were amalgamated into 18 priorities for discussion. The final 'top 10' list of vascular service research priorities relate to: service configuration (organisation, access and delivery), patient experience, education and training (staff and patients), lifestyle and prevention, audit and evaluation and outcomes, diagnostics screening and risk assessment and communication.

Conclusion: The 'top 10' vascular service-related priorities demonstrate the research areas considered to be most important from the perspective of patients, carers and healthcare professionals. Researchers can now focus their efforts on addressing these important questions and funders should increase their investment to support new research in these areas of greatest importance.

Key words: vascular, services, research, priorities

Background

Vascular disease covers a broad spectrum of conditions and treatments, with over 40,000 vascular surgical procedures performed in England each year.[1] It is one of the largest contributors to morbidity and mortality globally, accounting for 40% of deaths in the UK and estimated heath and care costs of £9 billion annually.[2]

Work conducted under the NHS Improvement programme Getting It Right First Time (GIRFT) and an NIHR Programme Grant for Applied Research (PGfAR) looking at configuration of vascular services both highlight considerable change in provision due to new treatment methods and increased specialisation.[3,4] This has led to inconsistencies and local variation in practice, demonstrating the need for reorganisation of services to help address the challenges of increasing demand and rising treatment costs.

Research is fundamental in addressing these healthcare challenges. It underpins evidence-based practice and helps to inform how treatments and services are delivered. However, funding is limited and highly competitive, in particular the vascular specialty receives relatively little research investment compared with other specialties.[5] Funding bodies need to ensure their limited investment is directed to areas with the greatest potential for improving clinical services and health outcomes whilst avoiding research waste.[6] Significant investment in vascular research is needed to improve treatment and care.

Priority Setting Processes (PSPs) are an increasingly popular methodology to address this issue; they systematically identify and prioritise research gaps and are seen as an effective way of highlighting important topics for funding consideration.[7] The Vascular Society of Great Britain and Ireland (VSGBI) initiated a national PSP for vascular conditions in association with the James Lind Alliance (JLA) who specialise in facilitating patient involvement in research.[8] Prior to this, there was no agreement for research priorities within the vascular specialist community.

The aim of the Vascular PSP was to survey vascular health professionals, patients and carers to identify and generate a ranked list of the most important research priorities. This paper presents an overview of the vascular condition PSP, focusing on the recommendations for service-related priorities and implications for future research in this area.

Methods

A detailed description of the process has been provided previously,[9–15] but is outlined again as a useful reference below and presented in Figure 1.

The VSGBI undertook a research PSP in association with the JLA to identify research priorities for vascular conditions. The work was overseen by a steering committee involving representation from all the leading UK Vascular Societies and patients. Nine overarching vascular condition Special Interest Groups (SIGs) were established to help support the process and ensure that each area retained their important research priorities (Table 1).

Initially, due to resource limitations, a clinician-led Delphi survey was conducted to produce a list of research priorities to reflect the opinions of vascular healthcare professionals. This was followed by a separate patient and carer focused JLA survey to identify important research priorities from the perspective of vascular patients and carers. The two processes were then brought together at final workshops held separately for each SIG, where patients, carers and clinicians worked together to agree a shared, ranked 'top 10' list of research priorities.

Scope of the Service SIG

Unlike the other vascular SIGs that are guided by a condition, the vascular service SIG was introduced to encompass the many submitted priorities that were considered general in scope and cross-cutting regardless of a particular vascular condition. The remit of the Service SIG is to support research into areas such as access, organisation and delivery of vascular services. The Service SIG aims to develop the list of top 10 priorities into funded research studies that address these important areas.

Figure 1 Flowchart of the Vascular Priority Setting Process (PSP).

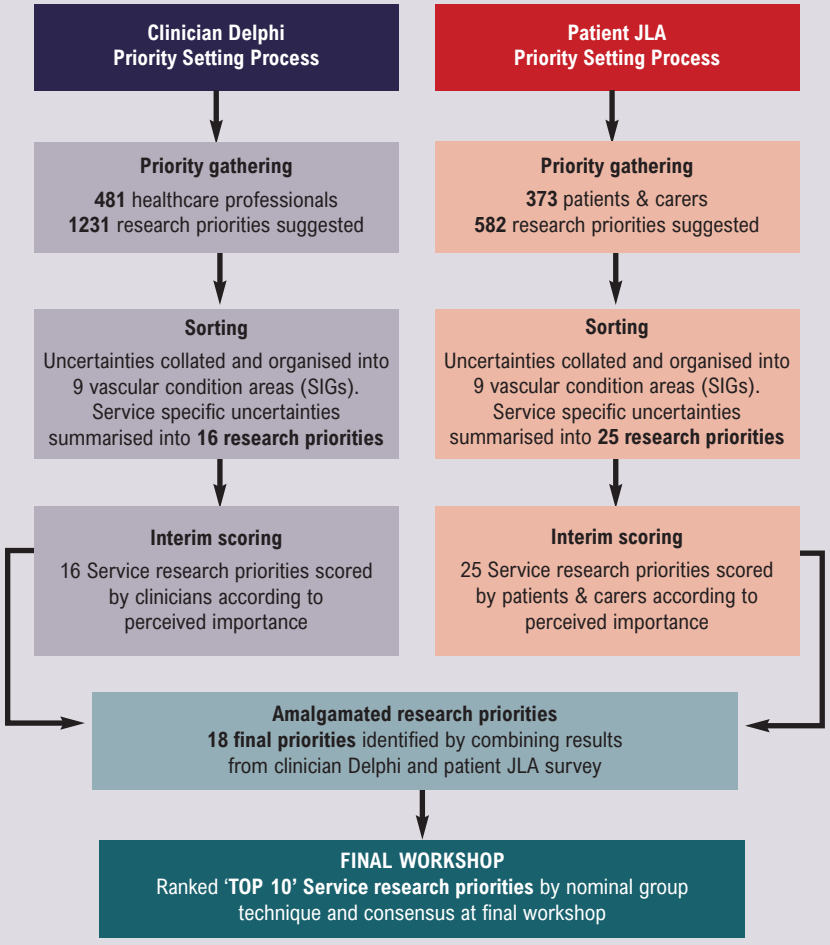

Table 1 List of nine Special Interest Groups (SIGs), categorised by overarching vascular condition.

Vascular PSP Special Interest Groups (SIGs)		
Access	Amputation	Aortic
Carotid	Diabetic foot	Peripheral arterial disease
Service organisation*	Venous	Wounds

*This category was established to support generic priorities that apply across all SIGs (e.g., questions about access, organisation and service delivery).

Clinician-led research Priority Setting Process

Healthcare professionals were surveyed using a modified Delphi approach that consisted of:

Survey Round One: In the first round, an open-ended survey invited participants to submit their priorities for vascular research. An electronic link to the survey was emailed via the following membership bodies: The Vascular Society of Great Britain, The Society of Vascular Nurses and The Society of Vascular Technicians of Great Britain and Ireland and the Rouleaux Club. Letters including the survey link were sent to each vascular unit registered on the National Vascular Registry (NVR) and the survey was also promoted via Twitter. Responses were collated and categorised into pathological topics and research themes by a core subgroup of the steering committee. Similar responses were amalgamated and summarised into an overarching priority. Responses considered out of scope (eg, too broad or logically unclear) were removed and remaining priorities checked for current evidence.

Survey Round Two: The refined list of priorities were redistributed in a second survey for scoring. Participants were asked to rate the importance of the summary priorities on a scale of 1–10 (1 being the least important, 10 being the most important). This process was completed in 2018[11] and the results of clinicians' service-related priorities are summarised in Table 2.

Patient/carer-led research Priority Setting Process

Vascular patients and carers were surveyed using a modified JLA approach with guidance from a JLA advisor and using similar methodology to the clinician-led PSP.

Survey Round One: In the first round, patients and carers were invited to take part in an open-ended survey which asked them to submit their own research priorities. The survey was provided in paper and electronic format and advertised to UK-based societies involved with care of vascular patients. Participant packs were sent out to vascular units and included paper surveys with a freepost return address and promotional materials such as posters and postcards that could be left in waiting areas. The survey was also advertised via social media (Twitter), websites and newsletters. Responses were categorised and delegated to each SIG for further review. Similar responses were amalgamated and summarised into an overarching priority. Responses considered out of scope (eg, too broad or logically unclear) were removed and remaining responses checked for current evidence.

Survey Round Two: The refined list of priorities was redistributed in a second survey for scoring. Participants were invited to rate the importance of research priority using a Likert scale ranging from 1 = 'not at all important' to 5 = 'extremely important'. This process

Table 2 Service-related research priorities from the clinician survey and prioritisation process, with the mean ranking score.

Research priority	Mean Score
How can we best organise regional vascular services to facilitate optimal management and outcomes for vascular patients?	7.84
How do we optimise delivery of vascular services to improve patient experience and outcomes?	7.78
How can we improve the vascular surgical curriculum to ensure high levels of competence in both open and endovascular surgery?	7.68
How can we effectively prevent/slow progression of arteriosclerosis?	7.54
How can we optimise preoperative risk assessment and improve fitness in vascular patients?	7.54
What can we do to promote research and improve recruitment to vascular clinical trials?	7.19
How do we improve access to vascular services?	7.15
New and emerging technologies: how are they introduced and evaluated?	7.10
Can we improve vascular surgical data collection, analysis, utilisation and reporting?	7.09
How do we develop/evaluate the role of the vascular nurse specialist/ practitioner?	7.06
How can we reduce length of stay for vascular patients?	7.06
How do we maximise patient participation in vascular service evaluation and research?	7.02
Can we develop a core outcome set for vascular procedures?	6.85
What is the role of 3D and contrast enhanced ultrasound in vascular imaging?	6.84
What is the role of hybrid procedures for intervention in vascular surgery?	6.80
How can we maximise awareness of cardiovascular disease and health to the wider healthcare teams and our patients?	6.73

was completed in 2020 and the results of patient and carer service-related priorities are summarised in Table 3.

Special Interest Group Prioritisation Workshops

For each SIG, the results of the clinician and patient/carer-led interim prioritisation processes were combined. Similar or duplicated priorities were amalgamated and any technically worded language from the clinician priorities was revised with patient input. Care was taken to ensure that the original substance of the priority remained. This process generated a refined list of joint priorities for discussion at individual SIG workshops.

The final prioritisation workshop for vascular services was conducted virtually on 9 July 2021 using the Zoom platform to accommodate COVID-19 restrictions. All attendees (including healthcare professionals, patients and carers) were recruited via direct contact or were approached if they expressed an interest during the initial prioritisation process. Participants were sent details of the workshop, an agenda and a list of the research priorities to be discussed in advance. Prior to the workshop, participants were

Table 3 Service-related research priorities from the patient/carer survey and prioritisation process, with the mean ranking score.

Research priority	Mean Score
How can we make sure that people with vascular problems get to see the most appropriate professionals as quickly as possible?	4.58
What can be done to reduce delays in treatment for vascular patients?	4.43
How can we develop better treatments for vascular conditions that do not require major operations?	4.35
What can be done to ensure that GPs and other healthcare staff have a better understanding of vascular disease?	4.34
What can be done to make sure that everyone gets fair and equal access to the best vascular treatment, regardless of individual characteristics?	4.32
What can be done to make sure that everyone involved in treating vascular patients communicates better with each other?	4.23
What can be done to improve communication between healthcare professionals and people with vascular disease?	4.21
What can be done to make sure that those who take part in research fully understand what is involved?	4.18
Which tests are most useful for the diagnosis of vascular disease and where should they be carried out?	4.18
What can be done to improve joined-up care for people with vascular conditions?	4.18
What can be done to make sure that the outcome measures used for vascular services address the things that matter most to people with vascular disease?	4.18
How can we improve the way that we inform people with vascular disease about the treatment options, so that they can take a greater part in shared decision-making?	4.16
What is the best way to help people with lifestyle changes such as diet, smoking cessation and exercise?	4.14
How can we make sure that people who need it get the best help with lifestyle changes?	4.12
How can we improve the awareness of vascular disease amongst people with vascular symptoms and the general public?	4.09
How can specialist vascular nurses improve the experience for people with vascular disease?	4.09
How can we provide better organisation and integration of vascular services between neighbouring hospitals?	4.07
Should current screening programmes look for other vascular conditions?	4.06
Why do the treatments that are used for vascular conditions vary so much between different hospitals?	4.04
How can we safely reduce the length of hospital stay for vascular patients?	3.94
How can we get greater involvement from patients and the public in research into vascular conditions?	3.91
What dietary advice should be given to people with vascular disease and is there any reason to alter this for specific conditions?	3.89
What can be done to increase patient choice in where they are treated, who treats them and the treatment they get?	3.85
What can be done to improve emotional and mental health support for people with vascular conditions?	3.82
How important are aspects such as the location of services, parking and public transport links to people needing to use vascular services?	3.77

Table 4 Collated vascular service research priorities that were circulated to all attendees prior to the final workshop. The priorities were listed randomly and assigned a letter rather than a number.

A	What can be done to make sure that people with vascular problems get to see the most appropriate professionals as quickly as possible?
B	What can be done to make sure that everyone gets fair and equal access to the best vascular treatment, regardless of individual characteristics?
C	What can be done to ensure that GPs and other healthcare staff have a better understanding of vascular disease?
D	How can better treatments be developed for vascular conditions that do not require major operations?
E	What can be done to make sure that everyone involved in treating vascular patients communicates better with each other?
F	What can be done to improve communication between healthcare professionals and people with vascular disease?
G	What is the best way to help people with lifestyle changes such as diet, smoking cessation and exercise?
H	Which tests are most useful for the diagnosis of vascular disease and where should they be carried out?
I	What can be done to make sure that the outcome measures used for vascular services address the things that matter most to people with vascular disease?
J	How can awareness of vascular disease be improved amongst people with vascular symptoms and the general public?
K	How can specialist vascular nurses improve the experience for people with vascular disease?
L	How can the way people with vascular disease be better informed about treatment options, so that they can take a greater part in shared decision-making?
M	Should current screening programmes look for other vascular conditions?
N	How can length of hospital stay for vascular patients be reduced safely?
O	What can be done to improve patient and public engagement and understanding of research?
P	How can regional vascular services best be organised and delivered to provide the best outcomes and experience for vascular patients?
Q	New and emerging technologies: how should they be introduced and evaluated?
R	How can preoperative risk assessment be optimised and fitness improved in vascular patients?

Table 5 Final ranked 'top 10' list of vascular service-related research priorities.

Ranking	Question
1	How can regional vascular services best be organised and delivered to provide the best outcomes and experience for vascular patients?
2	What can be done to ensure that GPs and other healthcare staff have a better understanding of vascular disease?
3	What can be done to make sure that people with vascular problems get to see the most appropriate professionals as quickly as possible?
4	What is the best way to help people with lifestyle changes such as diet, smoking cessation and exercise?
5	How can awareness of vascular disease be improved amongst people with vascular symptoms and the general public?
6	What can be done to improve communication between healthcare professionals and people with vascular disease?
7	What can be done to make sure that everyone involved in treating vascular patients communicates better with each other?
8	New and emerging technologies: how should they introduced and evaluated?
9	What can be done to make sure that everyone gets fair and equal access to the best vascular treatment, regardless of individual characteristics?
10	How can better treatments be developed for vascular conditions that do not require major operations?

asked to consider the combined list of clinician and patient research priorities shown in Table 4, and to rank them in order of importance from 1 (most important) to 18 (least important).

The workshop was led by two experienced JLA advisers, a JLA coordinator and a technical lead who were skilled in the JLA PSP process and leading such workshops. Members of the service SIG attended as observers and to provide emotional support to attendees if required (they would join a separate breakout room). SIG members were not directly involved in the priority setting and had no influence over the final agreed list of priorities. Following welcome and introductions, participants were split into three breakout rooms which consisted of a mix of patients, carers, clinicians and healthcare professionals. Small group discussions were facilitated by an advisor and followed a nominal group technique to reach a consensus for an ordered list of 'top 10' priorities.

First round of discussion: Participants shared their top three and lowest three priorities with a brief explanation for why. This was followed by an open discussion about similarities and differences and any priorities that were not initially mentioned.

Second round of discussion: The JLA facilitator presented on screen a potential order of questions based on initial feedback and discussion. Participants had an opportunity to reconsider their initial placement of priorities whilst the facilitator moved priorities on screen, to reflect an agreed order of priorities 1–18.

Third round of discussion: The ranked priorities of the separate groups were combined by the lead facilitator using a geometric mean of the respective ranked positions. All participants came together as one group and the lead facilitator presented the combined results of the group rankings. Participants were then split into new groups and, again, participants had an opportunity to reconsider the order of priorities before reaching a final ranked 'top 10' list of service research priorities. As before, the ranked

priorities of the separate groups were combined to form a final shared ranking.

Results

Clinician research priority identification and prioritisation

A total of 481 clinicians submitted 1,231 research priorities relating to vascular conditions in general. Over 250 general service-related research priorities were submitted, 80 of which were excluded outright as they were too specific to single patient experience or there was no apparent question (eg, nonsensical or broad statement). The remaining priorities were combined and summarised into 16 clinician priorities for scoring, the results of which are shown in Table 2.

Patient/carer research priority identification and prioritisation

A total of 373 patients/carers suggested 582 research priorities related to vascular conditions in general, of which 73 responses were directly assigned to the Service SIG, together with a further 96 cross-cutting responses shared from other SIG categories. After data cleaning (eg, removing nonsensical suggestions, separating out submissions with multiple suggestions and combining overlapping priorities), 18 summary research priorities were developed. An additional seven summary priorities were suggested based upon SIG review of published research and SIG members' knowledge of gaps in this area not addressed by submitted responses. A total of 25 summary priorities were redistributed for scoring and the results are shown in Table 3. Prior to the workshop, the SIG team pooled clinician and patient/carer research priorities, resulting in a list of 18 for discussion (Table 4). In order to reduce risk of bias, these priorities were randomly ordered and each assigned a letter (rather than a number).

Final prioritisation workshop

The final prioritisation process was conducted via a virtual online meeting on 9 July 2021. It was attended by nine patients and carers with experience of a range of vascular conditions and nine healthcare professionals representing vascular nurses, vascular surgeons, vascular scientists, podiatrists and public health representatives, plus five observers. The final prioritisation resulted in a final 'top 10' research priority list (Table 5). The priorities are ordered according to importance as determined at the workshop. There was general consensus that the list correctly represented the discussions and viewpoints which occurred in the breakout groups. Results from participant feedback indicated that over 80% agreed or strongly agreed that the process of determining the 'top 10' was robust and fair.

Discussion

The 'top 10' research priorities for UK vascular service research have now been established. Using a modified JLA methodology, vascular healthcare professionals and patients with lived experience of vascular conditions have jointly agreed the most important priorities for future research in this area.

Overarching themes within the final top 10 list relate to service configuration, patient experience, education and training, lifestyle and prevention, audit, evaluation and outcomes, diagnostics screening and risk assessment and communication. Priorities 1, 3 and 9 focus on access to services and optimising service delivery. Priorities 2, 4 and 5 relate to education and training of clinicians and patients to raise awareness of conditions and referral processes. Priorities 6 and 7 appear similar but there was an important distinction in improving communication between patients and clinicians but also improving communication between clinicians. Priority 8 addresses the introduction and evaluation of new treatments.

The priorities dovetail well with the recommendations from the aforementioned NIHR PGfAR.[4] The priorities not in the ranked 'top 10' list should still be considered important and merit further research.

Strengths and limitations

Strengths and limitations of the vascular PSP process have already been documented in previous publications of SIG results but are provided again here with additional reference to the Service SIG workshop feedback.

The Vascular PSP used well established methodologies throughout, with oversight from a multidisciplinary steering committee. The Delphi method, often used in priority setting processes, is regarded as a flexible research technique but one that tends to focus on the identification of expert opinion.[16] To mitigate this, the Vascular PSP sought the input of the JLA who provide a transparent and structured framework that emphasises patient participation in PSPs, with patients having an equal voice to clinicians and researchers in influencing the research agenda.[17,18] It is possible that the modified approach of having two separate processes before bringing the clinician and patient views together may have resulted in a different 'top 10'. However, during the amalgamation process there were significant similarities between clinician and patient priorities and the format of the final workshops established valid shared priorities.

The survey data collection process potentially predisposed to responder bias.[19] Consideration was given to whether responses would adequately reflect the opinions of people with lived experience of vascular conditions and those treating them. Under-representation is a well-documented limitation of many PSPs,[20,21] with the associated potential implication that other relevant priorities may not be submitted or considered. The Vascular PSP sought to minimise this risk in a number of ways. The survey was made available in electronic and hardcopy format (with freepost address), and it was promoted via a number of platforms with the help of affiliated charity groups and organisations who regularly work with the targeted population. Furthermore, the introduction of SIGs meant that each vascular condition area had a dedicated review of responses by a group of interested professionals and patients who

could highlight expected topic areas that were absent or under-represented.

Most workshop participants found the use of a virtual platform acceptable, but one participant from the Service SIG workshop suggested that it should have been held over a whole day to allow more time for discussion. Potentially, lack of access to IT may have limited participation and altered representation; however, the virtual platform meant patients did not have to travel, and this may have made the workshop more accessible for some patients.

Positive comments collected from the feedback survey following the final workshop demonstrated that clinicians and patients found the process of discussing priorities in mixed groups a positive and worthwhile experience. It gave participants an opportunity to consider other peoples' experiences and reassess their initial judgements.[22] One participant feedback commented, "It was very interesting debating with the medical professionals, whose original priorities were almost at the other end of the list to mine".

The mixed discussion groups were carefully moderated through the skilled JLA facilitators who ensured that patient participants were regularly included and asked for their views. Some participants expressed a preference for a different ranking order of the priorities, but this is not uncommon for PSPs and is a known factor of a consensus approach.

This particular SIG raised some specific issues in the priority setting exercise. Obtaining adequate patient/carer representation is an important part of the process, but the online questionnaire focused on diagnosis and treatment of specific conditions, and it is likely that individual patients/carers will have experience of vascular services that are limited to a particular condition and local service providers. Thus, questions that relate to the wider configuration of services and variation in practice may not be within the participants' experience. There were also a number of themes that were raised in relation to specific conditions and/or as general topics, particularly issues related to communication, referral processes and access to services.

Implications for future research

The Service SIG priorities now provide researchers with essential guidance on where best to focus their efforts in the immediate and long term. Due to the broad encompassing nature of the Service SIG, it will benefit from wider input from each of the SIGs to help develop projects to address these important priorities. We call on funders to recognise and support the delivery of this important work.

Conclusion

The Vascular PSP has established a 'top 10' list of priorities for UK vascular service research from the shared perspective of vascular patients, carers and health professionals. Researchers and funders can confidently invest resources into these areas of vascular service research with reassurance that they are clinically relevant and of utmost practical importance to patients.

KEY MESSAGES

- A total of 18 research priorities relating to vascular services were considered by a group of patients, carers and healthcare professionals.
- Working with the James Lind Alliance, a final list of the 'top 10' most important vascular service research priorities for patients and vascular health professionals has been established.
- Vascular service priorities broadly encompass research aimed at providing an efficient and equitable service for vascular patients

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PROTOCOL

Changes in functional health status following open abdominal aortic aneurysm repair and the role of exercise-based rehabilitation: protocol for a systematic review and meta-analysis

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Plain English Summary

Why we are undertaking this work: The abdominal aorta is a major blood vessel which carries blood to the organs in the abdomen and measures 1.4–3 cm. An abdominal aortic aneurysm (AAA) is a balloon-like swelling of the aorta, which has a significant chance of rupturing if it grows beyond 5.5 cm. Consideration of AAA repair within 8 weeks is therefore recommended for all patients with aneurysms greater than 5.5 cm. Delayed recovery and complications are frequent following AAA repair. Complications include temporary or long-term damage to the lungs, kidneys and/or bowel. Reduction in functional status, likely due to bed rest and the demands of surgery, is also common. Currently, we do not know the extent of the decrease in functional status following AAA repair. In addition, exercise-based therapy following AAA repair could improve functional status, but we do not know if there is enough evidence to support this suggestion. We aim to identify how much functional status is reduced following AAA repair and whether it can be improved with exercise therapy.

What we will do: We plan to systematically review the evidence to improve our understanding of the reduction in functional status following AAA repair (component 1) and whether exercise can improve functional status (component 2) following AAA repair. We intend to search databases to identify trials that have explored the changes in physical function and the effect of exercise following AAA surgery.

What this means: This information will help us to understand just how much functional status is affected by surgery and whether exercise after surgery is helpful to improve it. If there is not enough information to find this out, this will help us to plan new studies.

Key words: abdominal aortic aneurysm, exercise therapy, postoperative care, rehabilitation, function recovery

Abstract

Background and objectives: The aim of this systematic review is to explore the current evidence surrounding the changes in functional status following open or endovascular abdominal aortic aneurysm (AAA) repair and the role of postoperative exercise-based rehabilitation programmes.

Methods: The proposed study will incorporate two separate systematic reviews within it, one to assess changes in functional status (component 1) and another to consider the role of exercise-based rehabilitation for improving functional status (component 2), both following AAA repair. The Medline, EMBASE and Cochrane CENTRAL databases will be searched using two separate search strategies including the terms “aortic aneurysm”, “functional capacity”, “functional decline” and” exercise therapy”. We plan to include all prospective randomised and non-randomised trials that have considered the impact of AAA repair on functional status and/or the effect of exercise-based rehabilitation following AAA repair. For component 1, the primary outcome will be changes in objective measures of functional capacity or physical function following AAA repair and, for component 2, it will be changes in physical function or functional capacity following exercise-based rehabilitation after AAA repair. The extracted data will include study characteristics – ie, sample size, a description of the intervention and control conditions (where applicable), outcome measures, length of follow-up and main findings related to outcome measures. For both components a narrative synthesis will be produced, supported by a summary table. We intend to

conduct quantitative meta-analyses for both components. For each selected outcome we plan to evaluate the certainty of evidence based on the GRADE approach and risk of bias of included studies will be assessed using the Cochrane tool.

Conclusions: Based on a lack of current evidence, we present a protocol for a systematic review to investigate the functional changes associated with open and endovascular AAA repair and the potential value of postoperative exercise rehabilitation.

Introduction

Abdominal aortic aneurysm (AAA) repair may be associated with significant perioperative respiratory, cardiac, distal arterial or renal complications, which might necessitate a prolonged intensive care or hospital stay.[1–3] In addition, patients with AAA are frequently elderly with widespread atherosclerosis, cardiovascular risk factors and comorbidities.[4–8] This, in combination with the fact that AAA repair is associated with significant perioperative metabolic and cardiopulmonary challenges,[9,10] may mean that the required recovery, both in and out of hospital, has a significant and immediate impact on functional capacity, physical function and quality of life (QoL).

Indeed, systematic review evidence suggests that there are initial declines in both mental and physical domains of QoL following AAA repair, with the mental domains recovering to preoperative levels by 4–6 weeks, whilst the physical domains may take more than a year to recover.[11,12] There is, however, no systematic review evidence considering the quantitative changes in functional capacity and physical function following AAA repair that are reflected in these reductions in physical QoL domains

Moreover, the evidence for postoperative exercise-based rehabilitation following AAA repair has not been synthesised, despite its potential to ameliorate some of these reductions in physical function and QoL. This is despite evidence to suggest that preoperative exercise programmes improve postoperative functional capacity and outcomes,[13,14] and recommendations to enroll patients in exercise-based cardiovascular rehabilitation following major cardiac surgery.[15]

Therefore, the aims of this study are (1) to review the evidence considering quantitative changes in functional capacity and physical function following AAA repair; and (2) to review the evidence for postoperative exercise-based rehabilitation following AAA repair.

Methods

Protocol development

This protocol has been developed using the Cochrane Handbook for Systematic Reviews of Interventions[16] and is written in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol extension (PRISMA-P).[17] The PRISMA-P checklist is shown in Appendix 1 (online at www.jvsgbi.com). As we are encompassing two separate aims within this review, we plan to perform two separate systematic reviews which are outlined below.

Component 1: Considering quantitative changes in functional capacity and physical function following AAA repair

Search strategy and inclusion criteria

Searches will be performed using the MEDLINE, EMBASE and Cochrane CENTRAL databases with no date restrictions applied. In addition, trial registries such as clinicaltrials.gov and the Web of Science conference proceedings will be searched and authors of any identified ongoing studies or conference abstracts will be contacted to obtain study outcome reports where possible. Reference lists of any screened full texts or relevant systematic reviews will also be hand searched for other relevant papers. Only studies published in the English language will be included. Search terms will include “Aortic Aneurysm” [AND] “Functional Capacity” [OR] “Functional decline” [OR] “Functional capacity” [OR] “Aerobic endurance” [OR] “Functional Fitness”. A draft search is shown in Appendix 2 (online at www.jvsgbi.com).

We will include all prospective randomised and non-randomised trials that consider the impact of AAA surgery on quantitative measures of functional capacity and physical function. We plan to include participants aged 18 years and older, of either sex, who have undergone an elective open surgical repair or endovascular aneurysm repair, with results presented separately based on method of repair. We plan to include all types of AAA: infrarenal; juxtarenal; and suprarenal. To maximise available data, studies that include multiple surgical patient groups will be included if the data on the AAA subgroup can be obtained. Measures of physical function and functional capacity will include – but will not be limited to – cardiopulmonary exercise testing, the six-minute walk test, the short physical performance battery or its individual components and the timed up and go test.

Trial designs will include randomised controlled trials (RCTs) and observational cohort studies, but articles will only be included if measures are taken at baseline and following surgery to allow comparison. If studies include an intervention designed to reduce the impact of surgery on measures of physical function, these will only be included if data are available for a control group who did not receive an intervention.

Single-group, before-after studies will be included if the group did not receive an intervention designed to reduce the impact of AAA surgery on physical function. Studies that include other interventions, which are not likely to reduce the impact of AAA surgery on physical function, will be included.

Component 2: Considering the role of exercise-based rehabilitation following AAA repair

Search strategy and inclusion criteria

Searches will be performed using the same methods as those outlined above. However, search terms will include "Aortic Aneurysm" [AND] "Exercise therapy" [OR] "Physical Therapy" OR "rehabilitation". A draft search is shown in Appendix 3 (online at www.jvsgbi.com).

We plan to include all prospective RCTs and non-randomised trials that consider the effect of exercise-based rehabilitation following AAA repair. Again, we plan to include participants aged 18 years and older, of either sex, who have undergone an elective open surgical repair or endovascular aneurysm repair. To maximise available data, studies that include multiple surgical patient groups will be included if the data on the AAA subgroup can be obtained. Rehabilitation may include supervised or unsupervised programmes but will only be considered exercise-based if they include some form of structured exercise training with regard to frequency, intensity and/or duration during the postoperative period. We plan to consider all exercise-based interventions either delivered in isolation or as part of a more comprehensive multimodal rehabilitation programme.

Data management, selection and collection process

For both components, search results will be uploaded and deduplicated using the specialised online review tool Covidence.[18] Following this, titles and abstracts will be reviewed for eligibility by two independent reviewers (BR and RL). Full texts of these articles will be obtained and reviewed for inclusion. Any disagreement between reviewers will be resolved via discussion or by consensus with a third reviewer (SP). Information regarding search hits, number of duplicates removed, number of full texts reviewed, number of full texts excluded (with reasons) and number of studies included will be recorded for reporting in the PRISMA flow diagram. Where any full texts are not obtainable via conventional access methods, the authors will be approached to request the full article text.

Data extraction will then be performed by two independent reviewers using two separate bespoke designed spreadsheets, managed using a Microsoft Excel database (Microsoft, 2016, Redmond, WA, USA). The extracted data will include study characteristics including the sample size, a description of the intervention and control conditions (where applicable), outcome measures, length of follow-up and main findings related to outcome measures (a sample data extraction sheet is shown in Appendix 4, online at www.jvsgbi.com).

Outcome measures

For component 1, the primary outcome will be changes in objective measures of functional capacity and physical function following AAA repair. These measures will include – but will not be limited to – the ventilatory anaerobic threshold, peak oxygen consumption and ventilatory equivalents for carbon dioxide from cardiopulmonary exercise testing, the six-minute walk test, change in short physical performance battery scores and time taken for the timed up and go test. The changes in functional capacity and physical function at different time points following surgery will be collated and analysed as appropriate.

For component 2, the primary outcome will be changes in objective measures of functional capacity and physical function, including the measures outlined above, following exercise-based rehabilitation. For both components, secondary outcomes will include all-cause mortality, cardiovascular mortality, event-free survival, rate of rehospitalisation, changes in QoL and adverse events related to the intervention. We also plan to include measures of frailty such as the modified frailty index and components of comprehensive geriatric assessment such as nutritional status, cognition and falls risk, if available. However, all relevant secondary outcomes will be considered and reported including compliance with exercise interventions.

Risk of bias and rating the quality of evidence

For both components, the risk of bias for each of the included studies will be independently assessed by two review authors using the criteria outlined in the revised Cochrane tool (ROB 2.0)[19] (see Appendix 5, online at www.jvsgbi.com) or the ROBINS-I tool[20] for non-randomised studies (see Appendix 6, online at www.jvsgbi.com). The relevant information will be extracted as outlined in the guidelines and each study will be either classified as having a 'high risk', 'low risk' or 'some concerns' of bias. In the case of 'some concerns' of bias, study authors will be contacted for more information. We also plan to include the overall predicted direction of bias for each outcome as outlined in the guidelines.[16]

For each selected outcome we plan to evaluate the certainty of evidence based on the GRADE approach, which includes five main domains: study limitations, imprecision, indirectness, inconsistency and publication bias. These domains will be used to upgrade or downgrade evidence after initial assessment. Based on these, we plan to categorise the quality of evidence as high, moderate, low or very low.[21] We also plan to include a summary of the certainty of evidence and a quantitative synthesis of effects for each outcome.

Data analysis and synthesis

For component 1, the aim is to identify the impact of AAA repair on measures of functional capacity and physical function rather than to assess the impact of an intervention. Therefore, a narrative synthesis will be produced, outlining for each study the key characteristics and findings, supported by a summary of findings table.

For component 2, a similar narrative synthesis with a summary of findings table will be produced. In addition, if the included studies are sufficiently homogenous and include an intervention and control group, a meta-analysis will be carried out. This meta-analysis will

provide a pooled estimate of the effect of a postoperative rehabilitation programme on various outcomes of interest. A quantitative analysis will be generated using Review Manager (RevMan version 5.3),[22] which will allow for the creation of forest plots with an overall effect estimate and 95% confidence intervals. For this, we will use the reported post-intervention mean and standard deviation, unless only change scores are given. If the data reported are not suitable for entry into the meta-analyses, the authors will be contacted to obtain the required data.

The suitability of pooled analyses will be considered via interpretation of heterogeneity based on the I^2 statistic and p value for the χ^2 test. If significant heterogeneity is not present, data will be pooled using a fixed-effects model, with mean difference reported. If significant heterogeneity is present and the reason for it is not clear and explainable, then data will be pooled using a random-effects model, with standardised mean difference reported, which considers heterogeneity in the effect estimate. If the reason for significant heterogeneity is identifiable (ie, due to clear differences between interventions), data will not be pooled.

If meta-analyses are to be performed, sensitivity analyses will be carried out, removing trials of lower quality based on the risk of bias assessment and repeating the analyses. A minimal change in results would suggest that the analyses are robust.[23] In the case that studies report both post-intervention scores and change scores from baseline, a further sensitivity analysis will be performed by using change scores instead of post-intervention scores, as has been recommended.[24] If only post-intervention scores are reported in some studies, these will be used in conjunction with the change scores that are reported for the purpose of sensitivity analyses.

KEY MESSAGES

- This systematic review aims to explore the current evidence surrounding the changes in functional status following abdominal aortic aneurysm (AAA) repair and the role of exercise-based rehabilitation programmes.
- We plan to include all prospective randomised and non-randomised trials that have considered the impact of AAA repair on functional status (component 1) and/or the effect of exercise-based rehabilitation following AAA repair (component 2).
- For both components a narrative synthesis will be produced, supported by a summary of findings table. We intend to conduct quantitative meta-analyses for both components including a pre- and post-intervention meta-analysis, where possible. For each selected outcome we plan to evaluate the certainty of evidence based on the GRADE approach and risk of bias of included studies will be assessed using the Cochrane tool.

Discussion and conclusion

The possible complications and perioperative metabolic and cardiopulmonary challenges associated with AAA repair mean that the required recovery is likely to have a significant impact on physical function, functional capacity and QoL. Indeed, the former has been demonstrated in patients undergoing coronary artery bypass grafting,[25] but the evidence is yet to be evaluated in those undergoing AAA repair. QoL changes have been considered in those undergoing AAA repair, with significant reductions noted, which can take over a year to recover.[12] Exercise-based rehabilitation has the potential to ameliorate some of these reductions in physical function, functional capacity and QoL. In addition, the objective of any AAA treatment is to prolong patient survival and maintain a QoL comparable to that of the general population, which can arguably be assisted by postoperative rehabilitation. However, the evidence for such interventions following AAA repair has not been considered, despite evidence to suggest that preoperative exercise programmes are beneficial in this population and the recommendation that all patients undergo cardiovascular rehabilitation following major cardiac surgery. Even if adequate evidence is obtained in this review to support the efficacy of exercise-based rehabilitation, barriers to exercise rehabilitation such as lack of funding, patient motivation and paucity of specialised physical therapists providing standardised exercise programmes will be pertinent.[26,27] Given the limited evidence available, future research is urgently needed to explore ways to tackle these barriers in a patient cohort likely to achieve measurable benefit from exercise-based rehabilitation.

The anticipated limitation of this review is the possibility that there is little or limited evidence considering the areas of interest. Such a limitation has been identified in a recent review considering prehabilitation in a different vascular patient group.[28]

However, it is important to identify the current state of evidence on this topic to ensure that future research is accurately informed and appropriately designed to answer the intended question.

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SHORT REPORT

Intraoperative management of REBOA: experiences and lessons learned from the London Trauma Network – 10 points for consideration

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Plain English Summary

This paper describes the collected learning from a group of specialists about a technique to manage life threatening bleeding in patients with severe trauma. This technique involves inflating a balloon to temporarily limit blood flow through the major blood vessels. It highlights the risks associated with the procedure, and the importance of involving vascular specialists.

Key words: trauma, REBOA, haemorrhage, perioperative care

Abstract

Non-compressible torso haemorrhage resulting from vascular injury is the leading cause of death in trauma patients. Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) provides temporary haemorrhage control, permits transfer for definitive care and is becoming established in trauma systems throughout Europe. Drawing on experience of managing these critically injured patients, it is clear that involvement of vascular surgeons is highly important. Surgical management of vascular injury and of potential procedural risks and distal ischaemia associated with REBOA is essential for delivering time critical, safe care. We share 10 key points for intraoperative REBOA management for the vascular surgeon, wider surgical team and the endovascular resuscitation team to jointly consider.

Introduction

Trauma accounts for a significant proportion of annual worldwide mortality, with the World Health Organisation (WHO) estimating that 5 million people died following injury in the year 2000, accounting for 9% of total global annual mortality.[1] In the same year, 12% of the global burden of disease occurred following injury.[1] Traumatic vascular injuries are associated with high mortality, limb amputation rate and place high demand on healthcare resources.[2] Non-compressible torso haemorrhage resulting from vascular injury is the leading preventable cause of death in trauma patients. Rapid interventions are required to prevent the sequelae of uncontrolled haemorrhage, support coronary and cerebral perfusion and prevent death from exsanguination.[3] Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is a minimally invasive procedure which provides temporary haemorrhage control and physiological stabilisation. The importance of this endovascular technique is increasingly recognised within modern trauma resuscitation.[4] Its use has been extended into pre-hospital care,[5,6] with over 40 pre-hospital REBOA being performed since 2014, and has further progressed with the development of bespoke catheters and strategies.[7] In the UK, the in-hospital use of REBOA is currently the subject of a multicentre registry study which began in 2017. It is the first of its kind and aims to recruit 120 patients.[8]

Trauma teams are comprised of clinicians from different specialities with differing experiences and skill sets; however, it has been shown that, with specific training, REBOA can be safely performed regardless of base speciality.[9] It is recognised that REBOA comes with procedural risk related to vascular access trauma, thrombosis of lower limb run-off vessels and limb ischaemia, which is seen in 9% of patients,[10] and the complications of visceral ischaemia-reperfusion (which is demonstrated in animal models).[11–13] REBOA is a bridge to definitive haemorrhage control and patients who undergo REBOA require timely surgery to dissect, mobilise and control bleeding structures. For these reasons, the early involvement of vascular

surgeons in the care of trauma patients undergoing REBOA is appealing, both to manage potential complications of REBOA and for subsequent definitive haemorrhage control procedures.

Guidelines exist concerning safe REBOA practice.[14] A recent meeting of the London Trauma Network drew upon institutional lessons learned and shared experience in dealing with these rare cases of critically injured patients.[15] The importance of the involvement of vascular surgeons was highlighted specifically. We share 10 key points for intraoperative REBOA management that arose from discussions at this meeting for the vascular surgeon, wider surgical team and the endovascular resuscitation team to jointly consider.

Key points

1. ED to OR handover should happen in the operating theatre, with time of aortic occlusion emphatically underscored (especially if zone 1).
   Rationale: Patients with REBOA in place will require definitive surgical management to control haemorrhage. In order to minimise the time of aortic occlusion and distal ischaemia, the Trauma Team Leader and/or Prehospital Team Leader should ensure that the whole theatre team and surgeons receive an additional abbreviated handover in the operating theatre, emphasising the zone and elapsed time of aortic balloon occlusion (zone 1, supracoeliac aorta; zone 3, infrarenal aorta), so that the surgical team are clear on the remaining time to achieve haemorrhage control and balloon deflation.

2. One individual in the team should be given the task of tracking occlusion time (total or partial occlusion) and updating the surgeons at 5 minute intervals (for zone 1 inflation) and 10 minute intervals (for zone 3 inflation).
   Rationale: It is easy for the surgical team to become overly task focused and lose track of occlusion times, but updating and relay of information should guide ongoing surgical activity.

3. Two consultant surgeons should be in attendance if possible. One will be "looking in" (as primary operator, focused on delivery of surgery) and one will be "looking out" (as secondary operator, focused on assisting the surgery and updating/communicating with the other elements of the surgical-anaesthetic team).
   Rationale: These complex and critically unwell patients require senior procedural and decision making, working together to optimise human factors of the team. The primary surgeon should be given the space to focus on moment-to-moment technical delivery of dissection, definition of anatomy, vascular clamping, suture and/or tissue packing. The secondary surgeon is responsible for updating other elements of the team, co-ordinating concomitant activity and anticipating the mustering of other required elements (kit, personnel, etc).

4. A dedicated member of the team must control the sheath at all times when the balloon is in an inflated state to avoid displacement and loss of control. This can be a member of the ED or PH team if necessary (scrubbed into the field).
   Rationale: One dedicated person should be responsible for maintaining the safety of the catheter and sheath. The REBOA balloon may move as circulating volume is restored and vascular tone changes, with untoward displacement distally.

5. Gain expedited haemorrhage control as soon as possible.
   Rationale: For zone 1 inflation the balloon must be deflated as soon as possible (within 30 minutes and preferably sooner), and ideally within 60 minutes for zone 3 inflation, whether this represents deflation and normal distal perfusion or partial deflation with sub-occlusive aortic control (P-REBOA) where there is an intention to allow distal flow of a circumferential rim of blood between the inflated balloon and the inner aortic wall, analogous to partial aortic declamping. The minimum set of surgical manoeuvres required to get surgical haemostatic control is sufficient – ie, clamping a pedicle to a bleeding solid organ or proximal control of a bleeding vessel.

6. Deflate balloon with control.
   Rationale: It is important to graduate deflation to prevent sudden circulatory collapse and to allow the anaesthetic team to maintain circulatory competence via blood product administration and judicious use of intravenous calcium and other vasoactive agents. Incremental deflation should be performed (0.5 mL every 30 seconds) and it is vital to understand how much fluid is in the inflated balloon.

7. Be prepared to re-establish haemorrhage control once the balloon is deflated and distal perfusion is restored.
   Rationale: The initial surgical manoeuvers to gain haemorrhage control whilst the balloon is inflated (such as clamping of the splenic hilum) may not be sufficient once full perfusion is re-established. Proceed to perform haemorrhage control procedures on previously unrecognised areas of trauma and, if bleeding is not swiftly controllable, consider balloon re-inflation, warning the anaesthetic team.

8. Balloon catheter removal – leave the sheath in.
   Rationale: To reduce the burden of endovascular instrumentation (and reduce the likelihood of thrombotic complications), the deflated balloon and its catheter should be removed as soon as the surgeon is satisfied that definitive haemorrhage control has been obtained. The sheath can be left in a little longer as an access point for catheter re-introduction if there is doubt whilst the laparotomy or other surgical interventions (bowel resection, washout, debridement, etc) are completed.

9. Femoral vessel exposure and removal of the sheath under vision, with thrombectomy and potential fasciotomy.
   Rationale: Exposure of the femoral vessels allows for removal of the sheath under vision and embolectomy of inflow and outflow, with confirmation that there is no access vessel thrombus. Prolonged zone 3 inflation may lead to thrombosis of contralateral vessels and should be sought out via scrupulous assessment of the relevant limb. If in doubt, consider contralateral exposure and thrombectomy. Four-compartment calf fasciotomy is recommended for any limb where access vessel thrombosis has been observed.

10. Vigilance for rebleeding.
    Rationale: REBOA patients represent the most physiologically disturbed subset of Code Red (shocked, bleeding) patients. More bleeding may become apparent during rewarming/ resuscitation. Surgical vigilance for ongoing bleeding as manifested by ongoing physiological distress, transfusion requirement, or bloody discharge from drains and topical negative dressings will allow early re-intervention or transfer for other modalities of therapy such as embolisation. Accompanying the patient to ITU, in-person handover to the critical care team and confirmation of response to surgery and resuscitation is advisable.

Conclusion

The institutional learning of the London Major Trauma Network in managing patients with REBOA, represents perhaps the greatest UK experience in this area of trauma care. Reflecting on these experiences, it is clear that vascular surgeons have an important role to play in the care of these critically injured patients and it is crucial that this learning is shared.

Conflict of Interest: None.

Funding: None.

Reviewer acknowledgement: *JVSGBI* thanks the Editorial team for their contribution to the peer review of this work.

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www.jvsgbi.com

CASE REPORT

Carotid web: an important cause of stroke in young people

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Key words: carotid web, stroke, young

Case report

A 40-year-old female presented 3 hours and 15 minutes after acute onset speech disturbance, left-sided weakness, headache and neck discomfort. She was a smoker and had a history of fibromyalgia and anxiety disorder. Her regular medications included a selective serotonin reuptake inhibitor and propranolol. Physical examination showed mild dysphasia and dysarthria, left hemiparesis (face, arm and leg) and sensory deficit with tactile neglect (National Institutes of Health Stroke Scale score of 7).

Computed tomography (CT) of the brain and angiography (CTA) of the neck vessels confirmed an evolving right middle cerebral artery (MCA) territory infarct and acute occlusion of the right MCA (M2). Thrombolysis was deemed futile, and she was started on aspirin 300 mg.

Furthermore, the CTA showed a 'flap-like projection into the lumen of the right internal carotid artery (ICA)' suggestive of a carotid web (Figure 1, arrow).

No defect was seen on cross-sectional views. Subsequent magnetic resonance angiography revealed 'high signal at the posterior wall of the proximal right ICA'.

The patient was discharged on aspirin 75 mg. She made an excellent functional recovery and was re-imaged with CTA and duplex ultrasound at 4 months. CTA appearances of the ICA were unchanged. Duplex ultrasound showed no structural abnormality (Figure 2A) or significant flow disturbance (Figure 2B).

Peak systolic velocity within the ICA was 49 cm/s. Multidisciplinary team review recommended carotid endarterectomy because of a substantial

Figure 1 CT angiogram showing a carotid web in the right internal carotid artery (arrow).

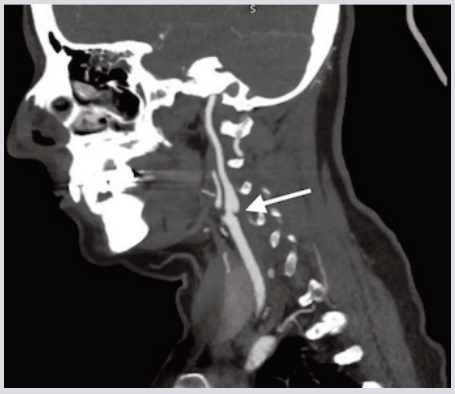
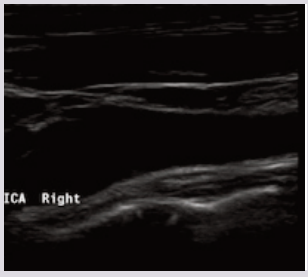


Figure 2 Duplex ultrasound showing (A) no structural abnormality or (B) significant flow disruption.

A



B

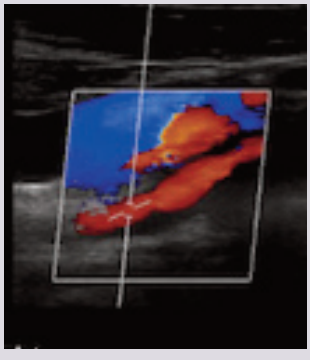
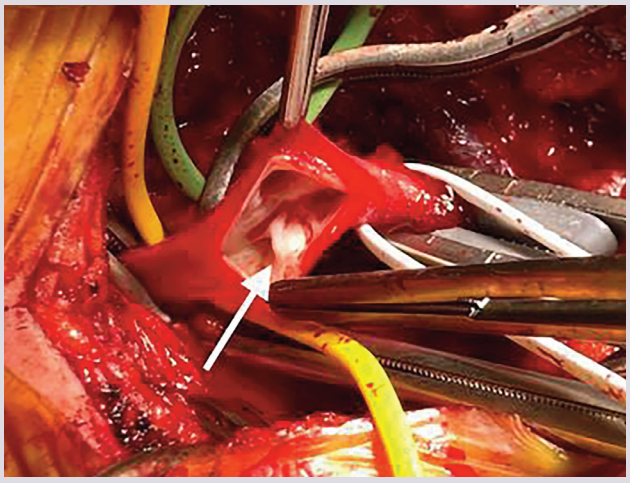


Figure 3 Intraoperative photograph of the right internal carotid artery demonstrating carotid web (arrow).



risk of recurrent stroke. The web was removed surgically (Figure 3, arrow) and the ICA closed with a patch.[1]

Discussion

Carotid web is an increasingly recognised cause of stroke in young patients.[2] It is a non-atherosclerotic fibromuscular dysplasia most commonly seen on the posterior wall of the origin of the ICA. It can be mistaken as carotid dissection and might not be apparent on some imaging modalities, particularly duplex ultrasound; CTA and digital subtraction angiography have good sensitivity.[3] It is associated with a high risk of recurrent thrombo-embolism despite optimal medical therapy, even if the degree of stenosis is <50%. Stroke recurrence is rare after surgery or carotid stenting.[4] A recent systematic review (37 articles, 158 patients) demonstrated the symptomatic carotid web population to have a high prevalence of women (68%) and African race (70%).[4] The severity of stenosis caused by the carotid web was <50% in 84% of cases. Recurrent stroke was seen in 25 of 45 patients (56%) managed with antiplatelets or anticoagulants at a median time of 12 months. In 70 patients who underwent carotid revascularisation (50% carotid endarterectomy, 50% carotid artery stenting), no procedural complications were reported and recurrent stroke is rare.

KEY MESSAGES

- Carotid web is an increasingly recognised cause of stroke in young patients.
- Carotid web may not be apparent on some imaging modalities; CTA has good sensitivity.
- Symptomatic carotid web is associated with high risk of recurrent thrombo-embolism.

Conflict of Interest: None.

Funding: None.

Authors' contributions: All authors were involved in drafting and reviewing the manuscript and contributed to the clinical management of the patient.

Ethics approval: Not required.

Reviewer acknowledgement: *JVSGBI* thanks the Editorial team for their contribution to the peer review of this work.

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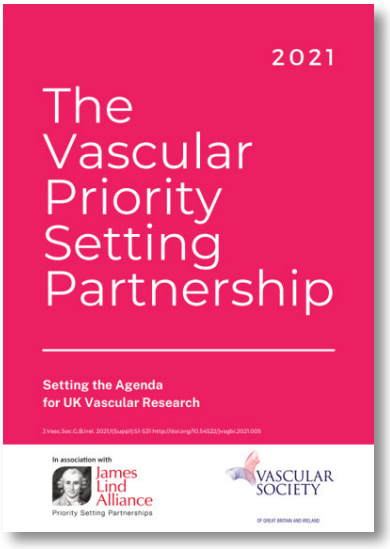
EVENT REPORT

Vascular Research Priorities to Evidence

The Vascular Research Priorities to Evidence Event took place on 13th September 2022 at the Royal College of Surgeons (RCS), England.

This meeting provided an opportunity to hear about what has been happening since the UK Vascular Priority Setting Project established a series of 'top 10' research priorities for vascular conditions. These important areas for research were identified jointly by patients, carers and vascular health professionals. As a reminder, the full report is available at www.jvsgbi.com[1]



Professor Ian Chetter, Chair of the Research Committee VSGBI and Chair of the event said, "It was fantastic to see so many colleagues from across all areas of the vascular profession, coming together to hear about this important work. It is vital that the vascular community makes full use of the vascular priorities and focuses research efforts in these areas that will have the most impact".

In the first session, attendees learnt about the nine vascular special interest groups (SIGs) that are helping to progress research in these priority areas and heard about plans for developing projects and funding applications. The second session provided examples of recently funded projects that are starting to address these priorities. During the final session, there were fantastic presentations from the NIHR Academy, NIHR Industry and the RCS who provided valuable insights about different opportunities available for support and collaboration.

Attendees were also given a preview of the UK Vascular Clinical Trials Network and project work that is being led by the Vascular Surgical Speciality Leads (and Associate SSLs). A new website: Vascular Research UK is currently in development and will act as a central point of information and collaboration for UK vascular research – watch this space.

Professor Chetter concluded, "I'd like to say a huge thank you to everyone for bringing their expertise and experience and engaging in constructive and open discussions throughout the day. We will continue work to raise the profile of the research priorities and look forward to sharing ongoing progress at future meetings".

The Vascular Research Priorities are freely available to be researched and anyone who is interested about the meeting, the Vascular Research Priorities or the SIGs can contact Judith.long3@nhs.net

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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 news from each society

British Association of Chartered Physiotherapists in limb Absence Rehabilitation. (BACPAR)

www.bacpar.org
@BACPAR_official

BACPAR is a Professional Network (PN) affiliated to the Chartered Society of Physiotherapy (CSP). Membership numbers continue to grow (301 at the time of writing). BACPAR supports and represents individuals working in acute and rehabilitation settings, NHS and private and some international members. BACPAR members benefit from the delivery of a focussed limb loss rehabilitation Journal twice a year; a member review of which was carried out in 2022 to identify areas that can be developed further.

In 2022 BACPAR participated in work to develop an Equality, Diversity and Belonging (EDB) reflective tool to be used by all CSP. PNs to start a conversation about EDB within their existing networks and this will be implemented in the Autumn Executive Committee meeting.

Regional CPD and peer support events are organised by regional representatives who have a place on the Executive committee to feed forward issues. BACPAR members also benefit from reduced registration fees for partners' conferences (VS and ISPO).

BACPAR's website continues to be updated to meet membership needs, it also holds resources for patients. There is an active closed membership Facebook group and Twitter page. Educational, post graduate and research bursaries are available to the membership. BACPAR members are active in research priority setting and delivery. Progress and outcomes are disseminated in the BACPAR journal, through the Amputee Rehabilitation Research Network and routinely feature in Conference programming. BACPAR's association with the Vascular Society is continuing to strengthen with representation on the journal Editorial Board, participation in Open Council meetings and partnership in the delivery of the Vascular Societies Annual Scientific Meeting (ASM).

BACPAR members continue to support humanitarian projects and have been involved in providing a webinar to support Ukrainian therapists working in the rehabilitation of amputees.

The BACPAR committee is supporting the update of clinical and education guidelines in lower and upper limb loss rehabilitation.

The 2022 AGM will be programmed within the ASM in November.

Louise Tisdale
BACPAR Chair
September 2022

The British Society of Endovascular Therapy (BSET)

www.bset.co.uk
@BSETnews

The British Society of Endovascular Therapy (BSET) was established to promote scientific research, education and training in endovascular treatment and procedures. Membership of BSET is free and open to all vascular and interventional radiology specialists with an endovascular interest.

The BSET Annual Meeting provides a major forum for the presentation of research into endovascular therapy, and attracts over 170 consultants, trainees and industry delegates. The meetings unique informal format encourages high level discussion and participation and an opportunity for networking between consultants and trainees.

The National Vascular Training Day is held prior to the Annual Meeting for vascular and interventional radiology trainees. The training day comprises case-based discussions led by senior endovascular specialists, as well as practical training led by industry.

BSET also runs a two-day Endovascular Training course for senior trainees and new consultants. This innovative two-day course provides extensive hands-on practical training in the principles and practicalities of endovascular management of vascular diseases. Attendees are mentored in small groups by world class trainers who are senior members of BSET.

BSET is committed to driving excellence in endovascular research and improving outcomes for patients by:

- Raising the profile and impact of endovascular vascular research
- Developing the research leaders of the future
- Increasing investment in research activities and programmes of study through sustainable research funding streams.

BSET offers Endovascular Fellowships for training and research, and provides travel grants, giving the opportunity for trainees to further their training and knowledge in endovascular procedures in dedicated training centres. These distinctive fellowships have led to many Fellows becoming prominent and successful endovascular specialists.

The 2023 BSET Annual Meeting will be held on Thursday 29th and Friday 30th June (National Vascular Training Day on

Wednesday 28th June). The 2023 Endovascular Training Course will be held on 23rd – 24th March.

British Society of Interventional Radiology (BSIR)

www.bsir.org
@BSIR_News

The British Society of Interventional radiology (BSIR) is a charitable foundation established to promote and develop the practice of Interventional Radiology. The strategic aims of BSIR are to promote safe and high-quality care for our patients by providing access to high quality information on Interventional Radiology procedures to patients and healthcare professionals, supporting audit and research in Interventional Radiology and assist education and training in Interventional Radiology.

In addition to serving the needs of practising UK Interventional Radiologists, BSIR works closely with the Royal College of Radiologists and other bodies, e.g. NICE to develop the strategic direction of Interventional Radiology. Day-to-day BSIR administration is provided by the Council Officers (President, Vice President, Secretary and Treasurer) with assistance of the administrators.

BSIR provides an annual fund of up to £50,000 as Interventional Radiology educational, research and audit bursaries. BSIR is committed to improving the quality and access to IR services through a structured Quality Improvement Initiative in conjunction with the Royal College of Radiologists and NHS England.

The BSIR Annual Scientific Meeting was held in Glasgow from 2nd to 4th November 2022 with more than 700 registered delegates, and included 7 overseas and many local faculty providing multiple workshops and plenary lectures. In addition, there are regular education meetings throughout the year including the Advanced Practice Course, Special Interest Group meetings in Interventional Oncology, Paediatric IR and Vascular Anomalies. There are also educational/networking events hosted by BSIRT (for trainees in IR) https://www.bsir.org/bsirt/, IR Juniors (for medical students and foundation doctors interested in IR) https://www.irjuniors.com, SIRNR (nurses and radiographers in IR) and SAR (anaesthetists in IR) https://www.sarweb.co.uk.

Rouleaux Club

www.Rouleauxclub.com
@RouleauxClub

It's been another busy year for the Rouleaux Club.

The biggest event for the association has undoubtedly been the Rouleaux Club's bullying, undermining and harassment (BUH) survey, which culminated with its recent publication within the JVSGBI. The survey aimed to reinvestigate BUH behaviours experienced by vascular trainees following the association's initial 2017 survey. Sadly, despite strategies implemented at the time, BUH behaviours are still an on-going problem for trainees, and indeed may have worsened since the initial survey. Based upon this work, the Rouleaux Club, Vascular Specialist Advisory Committee (SAC) and Vascular Society (VS) have committed to developing a strategic action plan to help address unprofessional behaviours and create a more positive work environment for trainees.

Whilst only time will tell if the situation improves, the Rouleaux Club is heartened by the positive responses so far and looks forward to working with both organisations to help stamp out these behaviours once and for all.

Moving forward, the association is keen to broaden its horizons. Whilst previously focussed on vascular surgeons in training, the Rouleaux Club now represents all post-graduate doctors and medical students who have an interest in vascular surgery. The success of the ASPIRE Junior webinar series, Rouleaux Club Essay Competition and Introduction to Vascular Surgery courses show there is a real interest in vascular surgery amongst medial students and junior doctors, something which the association is keen to grow further.

Andrew TO Nickinson
Rouleaux Club SAC Representative

Society of Vascular Nurses (SVN)

www.svn.org.uk
@vascularnurses

It is a year since I now took over as president of the SVN, which seemed at the time a momentous and daunting challenge but one that I am thoroughly enjoying. For those who are not aware of how our committee functions my presidency runs for a 2-year period and then I will remain on the committee for a further year as past president, in a supporting role for the incoming president who will be Jane Todhunter. Aims for this 2-year period include; the development of a new competency document and vascular nursing framework, and working with educational providers to improve access to vascular education for the vascular nurses of the future. The Provision of Vascular Nursing document encompasses the vascular nursing framework and is due to be launched at the Vascular Conference in Brighton, November 2022. We anticipate this will become a well referenced document across all vascular networks.

The committee publish a quarterly newsletter, Vascular Matters, sharing best practice, research and interesting case studies. It is also a forum for advertising courses and study days. We are always looking for content for future issues from members and colleagues.

As a Society we are able to offer bursaries to members of the society for individual development, improvement to services or attendance at conferences. We also have Emma's gift, which is a bursary aimed specifically at band 5 level nurses to help them attend the annual conference. This is in memory of Emma Bond a past president

who we sadly lost and it was her wish that we used her honorary membership to help fund this. Please see our website for details of both these opportunities at: www.svn.org.uk

The SVN also offer 2 secondment positions onto the committee for junior nurses wishing to further their networking and understanding of Vascular Surgery, this is an excellent opportunity for personal growth and development, the details can be found on the website. There is 1 vacancy on the SVN committee this year and we look forward to welcoming a new member in November.

We continue to value the support offered by the Vascular Society and are keen to continue the development of the joint Societies.

Gail Curran
SVN President
Vascular Specialist Nurse
Peterborough Hospital NWAFT

Society for Vascular Technology of Great Britain and Ireland (SVT)

www.svtgbi.org.uk
@svtgbi

The Society for Vascular Technology of Great Britain and Ireland was established in March of 1992 with aims to promote and advance education, training, and research in the field of vascular science for the benefit of the public.

At this time, duplex vascular imaging in its infancy had no professional training pathway to deliver a workforce or standardisation for imaging guidelines or reporting of disease.

The society set up three committees to tackle these issues: an education committee, a professional standards committee, and an executive committee, from these committees a national standardised professional training and accreditation scheme was developed.

The Accreditation certification (AVS) provides employers and patients with confidence in the standards an individual has reached to gain accreditation, and the standards for maintenance of accreditation through continued professional development that is monitored and approved by the Education Committee.

In April 2016 the SVT Research committee was set up to provide information and support to SVT members taking part in or setting up research projects. The research committee develops and facilitates research collaborations with external bodies (e.g., Vascular Society, Vascular and Endovascular Research Network etc on behalf of the SVT membership.

The SVT offers Research Grants of up to £4000 per project to both ordinary members and special interest groups. The Research/Innovation award is to enable Vascular Scientists to conduct small-scale studies such as pilot or feasibility studies, with the hope that larger grants will be applied for at a later date. There is a total of £10,000 available per year, with a maximum of £4,000 per award.

Our quarterly newsletter is an essential communication tool providing the membership with updates from committees, educational content, access to up-to-date information within the profession and CPD opportunities. This year we have launched a new virtual newsletter utilising mail chimp and have received good feedback on its refreshed look and easy to access content which is embedded within our website. The SVT website has also had updates to our Education and Research sections which has increased traffic to our website, increasing engagement with our membership and allowing for wider dissemination of information.

Due to the ongoing impact of COVID, our fundamental training days for trainee vascular scientists preparing for their AVS exams, moved to webinar format and saw a big uptake in attendance. Following this success, a follow-up revision day workshop was hosted virtually in April with white board facilities and break out rooms for tutor – student Q&A. We hope to keep this format going forward to facilitate wider participation in the UK and Ireland.

This year the SVT launched a new award initiative for Accredited Vascular Scientists looking to undertake equivalence to the AHCS STP qualification leading to registration with the HCPC. This award will continue to run in 2023 and the Education committee wish to offer additional educational grants to all members to improve access to training and development.

This year will be the 30th anniversary of the SVT, a huge achievement and one we have been celebrating with news articles and other activities throughout the year. We are planning a big celebration at this year's ASM 2022 and would like to congratulate the Circulation Foundation as it is also their 30th anniversary.

The achievements of the SVT this year as with all other years are down to the hard work of our committees, and in a time of unprecedented pressure within the NHS we are perpetually grateful to our exceptional volunteers for their time and efforts.

Ms Emma Waldegrave
President of the SVT GB&I

Vascular Anaesthesia Society of Great Britain & Ireland (VASGBI)

www.vasgbi.com
@vasgbi

The Vascular Anaesthesia Society of Great Britain & Ireland (VASGBI) promotes best practice in the perioperative care and anaesthetic management of vascular surgical patients.

VASGBI collaborates with The Vascular Society and continue to work with the National Vascular Registry (NVR) to amend the data fields to make them more suitable for vascular anaesthesia-related audit and research and to publish the annual NVR report for vascular anaesthetists. https://vasgbi.com/research-audit/nvr-summary-for-anaesthetists/

The Society supports research in vascular anaesthesia. A joint VASGBI/ACTACC Research Grant to the value of £70,000 was advertised in 2022. The VASGBI Trainee Research Development grants continue to be a great success and 11

grants have been awarded since 2016 to foster trainee research in vascular anaesthesia and perioperative care.

VASGBI also collaborates closely with the Royal College of Anaesthetists (RCoA) and are involved in the Centre for Perioperative Care (CPOC), the new Training Curriculum; Consultants CPD framework; the Quality Improvement booklet; NAP 7 and the National Institute for Academic Anaesthesia. Patients are at the centre of the existence of VASGBI and we have co-authored the patient information leaflet "Your Anaesthetic for Vascular Surgery" in conjunction with the RCoA.

https://rcoa.ac.uk/sites/default/files/documents/2022-06/14-VascularSurgery2020web.pdf

VASGBI's flagship Annual Scientific Meeting will be in Brighton on 11/12th September 2023. We are proud of the significant cross-specialty collaboration that is reflected in all recent and forthcoming conference programmes and joint sessions that include surgeons, interventional radiologists, cardiologists and allied health professionals.

The VASGBI website provides a wealth of information on everything related to vascular anaesthesia and the activities of the Society. There are up to date educational and training resources, guidelines, quality improvement projects and much more.

Dr Ronelle Mouton
VASGBI Chair

The Vascular and Endovascular Research Network (VERN)

www.vascular-research.net
@VascResearchNet

Executive Committee Update

*Authors: The Vascular and Endovascular Research Network Executive Committee**

The Vascular and Endovascular Research Network (VERN) has had a busy year. This year we have completed the COVER, PERCEIVE and DEFINITE projects. COVER (Covid Vascular service) involved 52 centres in 19 countries and reported the impact of COVID-19 on vascular services, outcomes and the management of vascular patients during the pandemic.[1-3] PERCEIVE compared clinicians to risk prediction tools performance at predicting outcomes following major lower limb amputation in over 500 patients in 41 centres.[4,5] DEFINITE outlined the contemporary surgical management of diabetic foot complications in over 700 patients.[6]

Ongoing projects include FrAiLTi, CAASP and VISTA. FrAiLTi, investigating the prevalence and short-term impact of frailty in chronic limb threatening ischaemia, is active in 7 centres. CAASP, a joint initiative with the IR trainee's collaborative, is investigating the diagnostic pathways in acute aortic syndrome, is underway in 17 centres.

In December 2021 VERN hosted Dragons' Den at the Annual Vascular Societies Meeting, supported by the Circulation Foundation. The winner, Katherine Hurndall, now leads the VISTA project, investigating the management and outcomes in vascular trauma. The project is currently active in 26 Major Trauma Centres in the UK. The Dragons will re-emerge again at this year's Annual Vascular Societies Meeting to judge a new batch of applicants.

At the beginning of the year Graeme Amber was inaugurated as the new VERN president. VERN has also welcomed the two newly appointed Associated Surgical Specialty Leads onto the committee, Nina Al-Saadi and Lauren Shelmerdine.

The VERN Executive Committee would like to thank all the collaborators who have made this amazing work possible, driving improvements in the care of people with vascular diseases. In the new year VERN looks forward to collaborating on a new series of projects and continuing to deliver high-quality vascular research.

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The Vascular Society for Great Britain and Ireland

www.vascularsociety.org.uk
@VSGBI

Vascular Society Update

This year has seen the Society's Council, under the Presidency of Jon Boyle, transition from a focus on the recovery of vascular services affected by Covid-19 to tackling two fundamental issues faced by UK and Irish vascular units. The first, are the workforce concerns highlighted by the Vascular Society Workforce Survey (2021) led by Denis Harkin. The second, is the report of unprofessional behaviour

persisting in the workplace from the Rouleaux Club members survey (2021). Work in these two areas has been the focus of the Workforce Committee chaired by Ciaran McDonnell. This committee is working with the Rouleaux Club, the Federation of Surgical Speciality Associations (FSSA) and the Royal College of Surgeons of England, to promote better understanding of the vascular Consultant workforce and achieve a culture change of 'zero tolerance' for unprofessional behaviour. This work is essential for the future of the vascular speciality and to ensure its multidisciplinary teams deliver safe, high quality, patient care.

Fantastic progress has been made with engaging our partner Societies through their full participation in the Annual Scientific Meeting (SVN, SVTGBI and BACPAR) and the Journal of the Joint Vascular Societies of Great Britain and Ireland (www.jvsgbi.com). The Council recognises that more needs to be done to make the Society accessible to all vascular specialists working in the UK and Ireland. The Council understands some of the changes needed, as these were highlighted in the Baroness Kennedy report for the Royal College of Surgeons of England. For example, we now have two SAS representatives on Council. Ibrahim Enemosah and Tatiana Martin are leading a drive to engage with SAS vascular doctors. However, only this week it was pointed out that whilst we have a SAS session at the ASM, we do not have a SAS registration category at the ASM for non-members. Rachel Bell will champion wider engagement will all vascular specialists working in the UK during her Presidency. The first step planned for this work is a survey to better understand what the Society is doing well, and where the Society needs to improve.

The Education Committee continue to support the delivery of the highly regarded ASPIRE and ASPIRE Digital Programmes. Patrick Couglin, who takes over as committee chair from Keith Jones at the close of this year's ASM, has plans to expand the scope of education work to overseas, SAS and consultant education as well as improving links to allied health care groups. Matt Bown will take over as Research Committee from Ian Chetter. The nine vascular specialist interest groups (SIGs) are now well established and Matt plans to use these to develop Research Fellowship posts, core outcome sets, and a national research network. A new website to support this work is under development by two fellows, Penny Bimpilli and Nina Al-Saadi. The Society is indebted to Keith and Ian for the development of the Society's Educational and Research activity under their tenure. Ian will continue in the role of Editor-in-Chief for the Journal of Vascular Societies of Great Britain and Ireland.

The Quality and Audit Committee, chaired by Arun Pherwani with Denis Harkin appointed has his successor from December 2023, has successfully reprocured National Vascular Registry (NVR) delivery for the next three years. The NVR will continue to be run by the Vascular Society and the Clinical Effectiveness Unit of the Royal College of Surgeons of England with input from allied vascular societies (BSIR, VASGBI, SVN and SVT).

The NVR team have been busy with analysing data for the NHS England CLTI CQUIN, analysing aortic medical device data, and reporting on the impact of Covid-19 on vascular services in the UK. Planned international collaborations, with VASCUNET and ICVR, have had to be deferred due to Covid-19. The work of the Committee and the NVR team has been superbly supported by our two PAD-QIF Fellows, Penny Birmpilli and Ellie Atkin.

The Professional Standards Committee has been restructured under Ian Loftus's leadership. Chris Imray appointed as chair from 2023-26. The reformed committee will have a stronger focus on supporting members than it has in the past. The Workforce Committee Chair, Vice President and Honorary Secretary will sit on the Committee to help embed these changes.

A wide-ranging Annual Scientific Meeting is planned for Brighton. The theme for the meeting is 'Improving outcomes' with the President's symposium encompassing CLTI, teamworking, the National Consultant Information Programme (NCIP), the National Wound Care Strategy Programme (NWCSP), acute aortic dissection management, and a report from the UK-COMPASS study. The Vice-Presidents symposium focuses on vascular networks with the title 'How big is too big?'. Oliver Lyons, Alison Halliday and Rob Hinchliffe will give their Huntarian lectures. Professor Beck will give the Kinmonth Lecture entitled 'Registry device capture is good for patients, clinicians and industry'. Professor Kevin Mani will give the Edinburgh Royal College of Surgeons lecture 'The risks and rewards of the centralization of aortic surgery'.

The Society's financial position remains strong despite turmoil in the financial markets. The treasurer, Paddy McCleery, is aware of the strain on members, and trainees', finances, and the need to be fiscally prudent when costing society events and membership. We were delighted to have launched a new paternal leave policy in May and will look to other ways to ensure that no one is excluded from Society membership on financial grounds.

Rachel Bell, with the support of Meryl Davis, have led on reinvigorating the Circulation Foundations fundraising activities. 'The Body Walk' is the most successful example of their work. Rachel and Meryl step down from this role after this year's ASM. Neeraj Bashin will take over as CF chair. In his year as shadow chair, Neeraj has demonstrated his wish to see a more financially independent CF that works with all the UK vascular societies and not just the Vascular Society. We know that Rachel and Meryl will continue to support the CF.

As Honorary Secretary I have led the tender process for a long-overdue update to the Society's website. This will include improvements to our membership database and the ability to better target news items. The Society aims to launch the new website by the 2023 ASM. I will also be giving members at the AGM a vote on opening the election of the Society President to all ordinary members.

Marcus Brooks
Honorary Secretary

Journal of
VASCULAR SOCIETIES
GREAT BRITAIN & IRELAND

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www.jvsgbi.com

ABSTRACTS

Top 4 Trainee Competition Abstracts from VASGBI ASM, Belfast

The Annual Scientific Meeting of the Vascular Anaesthesia Society, took place at the ICC in Belfast, on the 26th-27th September. Here are the top 4 trainee abstracts.

FIRST PRIZE

Emergency management of post-carotid endarterectomy neck haematoma: a teaching and simulation training package

R Little, E Spodniewska, G Hughes, M Safar, T Irving
Liverpool University Hospitals Foundation Trust (Royal Liverpool Hospital)

Background

Post-operative neck haematoma is a clinical emergency that can rapidly progress to airway obstruction and cardiorespiratory arrest if not recognised and managed in a timely manner. In response to a number of high profile cases, joint national guidelines have recently been produced by the Difficult Airway Society, the British Association of Endocrine and Thyroid Surgeons, and the British Association of Otorhinolaryngology, Head and Neck Surgery.[1] Although these focus primarily on the management of neck haematoma post-thyroid surgery; the principles can be applied to other forms of neck surgery, including patients who have undergone carotid endarterectomy.[1]

Aim/Method

Based on the recommendations set out in these guidelines, 'neck haematoma boxes' were introduced to our department to facilitate the rapid emergency decompression of a neck haematoma using the SCOOP (Skin exposure, Cut sutures, Open skin, Open Muscles, Pack wound) approach.[1] The contents were rationalised and standardised following discussion with our surgical colleagues to include laminated guidelines, scissors/scalpel, sterile gloves, and gauze.

Alongside the introduction of the boxes, a training package was created to develop the knowledge and skills of the non-surgical members of the perioperative team, with the aim of improving their competence and confidence in the early recognition and management of post-operative neck haematoma. This consisted of a short presentation, followed by familiarisation with the new boxes, and finally the opportunity to decompress a mannikin's 'neck haematoma' in a low-fidelity simulation. In the initial pilot phase, the training package was delivered to a range of members of the multidisciplinary perioperative team (n=65); including recovery nurses, operating department practitioners (ODPs), and anaesthetists. Pre- and post-knowledge questionnaires (with a maximum score of 23) and confidence surveys (with a ranking of 1-10) were performed to gain objective and subjective feedback respectively.

Results

The mean questionnaire score pre-training was 8.8 (SD 3.48) compared to a mean of 18.98 (SD 2.33) post-teaching (see Table 1). When comparing pre- versus post-training surveys, similar improvements were seen in candidates' confidence for the recognition (mean 5.88 vs 8.43), initial management (mean 4.52 vs 8.18), and performance of SCOOP decompression (mean 2.72 vs 7.95) of a post-operative neck haematoma. Analysis using paired t-test demonstrated statistically significant improvement in each of these score measures ($p<0.0001$).

Table 1 Comparison of mean scores pre- and post-training package.

	Pre-	Post-
Questionnaire (0-23)	8.8	18.98
Confidence: Recognition (0-10)	5.88	8.43
Confidence: Initial Management (0-10)	4.52	8.18
Confidence: SCOOP Decompression (0-10)	2.72	7.95

Conclusion

In conclusion, as a result of the introduction of this training package, our staff have both improved knowledge and confidence in the management of this life-threatening emergency.

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SECOND PRIZE

Hospital stress factors affects peri-operative care for non-elective lower limb revascularization

K Kohler, DJ Stubbs
University of Cambridge

Background

Patients requiring re-vascularisation for ischaemic lower limbs present a challenge to the peri-operative service as they require urgent intervention, often have complex medical needs and present outside of the elective pathways. The current capacity challenges in the NHS have resulted in a stressed peri-operative care system that faces significant challenges to provide efficient and expedient care. Hospital stress has been shown to result in worse patient outcomes.[1]

Post-operative care can be characterized by both the time to discharge and the complications a patient encounters. The severity of encountered complications can be summarized in a EPOMS score.[2]

Aims

The aim of this study was to investigate whether routinely collected hospital stress measures such as bed state and emergency department waiting times are related to a reduced level of care for these high acuity patients.

Methods

We used OPCS codes to select electronic health records from of patients who received non-elective lower limb revascularization at our tertiary care hospital between January 1st 2015 and August 1st 2021. We aggregated parameters such as basic demographics, length of stay, post-operative complication score and added routinely collected hospital stress parameters to build a model relating the outcomes of post-operative complications and length of stay to hospital stress.

Results

Our cohort contained 1072 unique patient encounters with sufficient data completeness in their electronic record. Within this patient cohort, the average length of stay was 6.25 days, 136 had an ICU stay and 29 patients died in hospital. The ASA distribution was: ASA 1 2%, ASA 2 24%, ASA 3 65% and ASA 4 7.2% and the median maximal EPOMS score was 2 (interquartile range 1- 3).

We built a cox-model for the length of stay analysis (censored for patients who died in hospital or were discharged back to their home hospital), which showed that when we considered patient factors alone – age, sex, ASA and complexity of the surgery we found the concordance to be only 0.5, but when we added in the hospital stress measures (hospital occupancy, ICU occupancy, number of theatre sessions cancelled, number of discharges, number of ED breaches and the hospital-wide acuity of inpatients represented by aggregate average NEWS2 score) we found the concordance improved to 0.6.

We also investigated whether we could model patients waiting time for their operation, in particular longer wait than the recommended 5 days, and found that the model again improved significantly with the inclusion of hospital stress measures compared to patient factors alone.

We then built a linear regression relating patient and hospital factors to post operative morbidity (EPOMS) and based solely on patient factors we had a $R^2 = 0.05$ and a p-value of 0.03. When adding daily averaged stress measures we improved the model performance to R^2 0.22 with a p-value<0.0001 and so found that including stress parameters we can explain 22% of the observed variation in post-operative morbidity.

Conclusions

Our study was able to quantify that patients admitted for lower limb revascularization had a longer length of stay if the hospital was more busy, which could potentially create further backlog and impact on the ability to perform elective surgery. Additionally, in a busy hospital patients waited longer for surgery and their post-op care needs were higher. While we did not yet investigate where the higher EPOMS score originated and which specific factors contributed most the results will warrant further investigation.

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Blood transfusion & lower limb amputations – A role for cell salvage

A Dodd, S Lillywhite, O Richards, G Ambler, E Cairns, K Zander
Southmead Hospital, North Bristol NHS Trust

Background

North Bristol Trust is the major arterial centre for Bristol and the surrounding regions and carries out 50-100 lower limb amputations per year. Local audit from 2019 identified a high requirement for allogeneic blood transfusions in this patient group (33% transfused; mean of 3.6 units per patient over days 0-7 post-operatively).

Aim

To reduce the requirement for allogeneic blood transfusion through the routine use of cell salvage and or tourniquet application during lower limb amputations.

Method

A process of continuous iterative quality improvement was employed. Baseline data was collected retrospectively on all lower limb amputations carried out in the Trust in 2020 and between January and April 2022. Electronic notes were examined to collect data on the type of amputation, indication for surgery, surgeon grade, cell salvage use (not used vs collection only vs processing and return) and tourniquet use. Haematology and transfusion records were interrogated to determine pre and postoperative

haemoglobin levels and the number of blood products transfused to each patient, days 0-7 post-operatively. Following analysis of this data, a multi-disciplinary education programme was initiated to embed the default use of cell salvage for lower limb amputations, with a focus on the use of swab wash. The education programme utilised posters, oral presentations to surgical and anaesthetic multi-disciplinary teams and regular email correspondence to all theatre staff. Practice was re-audited between May and August 2022.

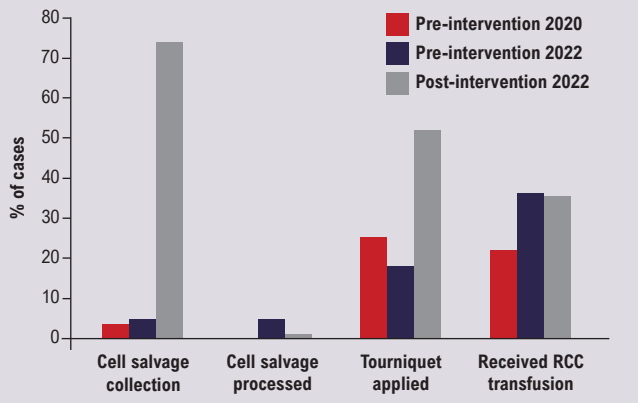
Results

Pre-operative mean haemoglobin levels were 114g/L (range 71-169g/L, 2020), 110g/L (range 79-137g/L, January-April 2022) and 114g/L (range 72-189g/L, May-August 2022). Post-operative mean haemoglobin levels were 95g/L (range 62-152g/L, 2020), 93g/L (74-112g/L, January-April 2022) and 96g/L (range 72-119g/L, May-August 2022).

Prior to the education programme, less than 5% of patients had cell salvage set up for collection and processing (collection only: 4% in 2020 and 4.5% in 2022; processing: 0% in 2020 and 4.5% in 2022) and 25% (2020) and 18% (2022) of patients had a tourniquet applied intra-operatively. Post the education programme, 74% of patients had cell salvage set up with 4% receiving processed cell salvage blood and 52% had a tourniquet applied intra-operatively.

Prior to the education programme, the percentage of patients receiving a blood transfusion was 22% (2020) and 36% (2022) with a mean of 1.6 units (2020) and 1.3 units (2022) transfused per patient episode. Post the education programme, 35% of patients received an allogeneic blood transfusion with a mean of 1.3 units administered.

Figure 1 The effect of a multi-disciplinary education programme on cell salvage use, tourniquet application and post-operative transfusion of allogeneic red cell concentrate in patients undergoing lower limb amputation.



Discussion

Following the introduction of a multi-disciplinary education programme the use of cell salvage for collection of swab wash and tourniquet application during lower limb amputation surgery increased, however the administration of allogeneic blood transfusion in the post-operative period remains unchanged. This may reflect the lack of processing of cell salvage blood and the pre-operative anaemic state of this group of patients. Further education is now being delivered to encourage the processing and return of cell salvaged blood. Routine pre-operative assessment of ferritin levels and intravenous iron infusion is also being considered.

A novel e-learning course on the peri-operative care of the vascular patient

S Samad, P Rudra, C Christou, R Haddon, S Goon, L Grimes, C Sharpe, R Burnstein

Lister Hospital, Bedford Hospital, Cambridge University Hospital, Norfolk and Norwich Hospital. Health Education East of England Blended Learning Team.

Background

The Covid-19 pandemic has had a devastating impact worldwide with the number of lives the virus has affected. Whilst on a much smaller scale, its impact resulted in a loss of training opportunities for doctors. However, the pandemic and the requirements for social distancing has resulted in a rapid adoption and explosion of online distance learning and blended learning platforms.[1] Within anaesthetic training in the England, we identified that whilst there was some learning content online, there was a distinct lack of an organised e-learning course to educate anaesthetist on providing peri-operative care for the vascular patient.

Aims

We sought to create a comprehensive accredited course that would enable an anaesthetist to learn the key elements of vascular anaesthesia via an interactive e-learning platform.

Methods

We utilised the 5 step ADDIE model (Analyse, Design, Development, Implementation and Evaluation) as the template to guide our course design.[2] We ensured institutional alignment by mapping the learning objective of the course to those currently set by the Royal College of Anaesthetist curriculum. Our target audience were anaesthetist preparing to sit their final fellowship examinations and trainees who were learning vascular anaesthesia as part of their training. The course was designed to rely on an adult learning theory model and we ensured that the design of the course would appeal to all learner types such as visual, auditory and kinaesthetic learners. To ensure high quality content, specialist vascular anaesthetist from the East of England deanery were recruited to write and create the content for the course. Once the content had been created by the specialist, we then refashioned the information to make it more interactive and segmented the content into smaller sections to reduce learner cognitive load. We then created the course using the Rise Articulate platform.

Results

Once the course was completed on the platform. The complete course was sent back to the original content creators for review. Once the initial corrections and adjustment were made, we then sent the course to a small pilot group of trainee anaesthetist for review from a learner perspective and edited the course accordingly based on initial feedback. Finally, to ensure high level accreditation and validation, the course was reviewed and edited by the Vascular Society of Great Britain and Ireland and will also be reviewed by the e-learning for healthcare team at the Royal College of Anaesthetist prior to being made available on their e-learning for healthcare platform.

Conclusion

Distant learning and blended learning is becoming ever present in education and with the increasing recognition of the importance of a stable work life balance, it is critical that doctors are able to learn and educate themselves independently at a time that suits their learning needs.[3] We believe that we have created a highly interactive and comprehensive vascular e-learning course with high quality content that will not only engage the learner but provide them with essential knowledge that they can then apply to their daily clinical practice.

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Annual Specialist Registrar Educational Programme (ASPIRE Digital)

VASCULAR SOCIETY OF GREAT BRITAIN AND IRELAND
ASPIRE Digital
Annual Specialist Registrar Educational Programme
WEBINAR SERIES

The Annual Specialist Registrar Educational Programme (ASPIRE) supports the education and development of trainee vascular surgeons throughout their eight years of training, which in turn compliments the national curriculum. The Vascular Society Education and Training Committee develops, manages and delivers the ASPIRE programme.

The Vascular Society GB&I continue to deliver education via the ASPIRE Digital platform. This has resulted in an overwhelming response, and provided a growing resource of education for vascular surgeons.

Each of the recorded sessions are included on the Vascular Society members' website. Here's a list of sessions that are readily available for members of the VS website:

- Management of the Diabetic Foot Attack
- Surgical management of CLTI
- Battle for claudication - exercise vs angioplasty
- Current Management of Acute Aortic Syndrome
- Principles of major lower limb amputation
- How to write a paper
- Strategies for Vascular Trauma
- EVAR planning
- Concept of angiosomes
- Tips and tricks for safe open AAA repair
- Renal Access
- Mesenteric ischaemia
- Carotid Disease Management - Symptomatic and Asymptomatic
- Upper limb ischaemia
- Management of the infected groin
- Managing the rupture AAA - building a team approach
- TOCS
- Why should I consider a career in academic vascular surgery?
- Management of acute / chronic deep venous disease
- Open management of complex AAA
- Options for treating superficial venous reflux
- Endovascular management of complex aortic disease v2
- Iliac intervention - How I do it
- NOTS in vascular surgery
- Radiation Safety in the Hybrid Suite
- New assessments for a new curriculum: The multi-consultant report
- A renal access MDT
- Optimisation of older vascular surgery patients
- Key aspects from the new European Venous Guidelines
- Paediatric Vascular Surgery
- Aortic MDT
- Through – knee amputation
- Thoracic Aortic Disease
- Everything you need to know about to manage AAA except how to fix them
- ASPIRE Digital Fellowships - How to get one, what to get out of it

ALL YOU NEED TO KNOW

To access the above resources, visit the Education section on the Vascular Society members' website www.vascularsociety.org.uk

CIRCULATION FOUNDATION
The Vascular Charity

Our Vision: - is a society free of vascular disease, and its associated suffering.

Our Mission:- is to promote awareness into vascular conditions and to support vital research.

Established in 1992 by vascular surgeons, the Circulation Foundation is the only UK vascular charity dedicated to vascular health. It is the charitable foundation of the Vascular Society of Great Britain and Ireland, run by a committee which is accountable to the Trustees of the Vascular Society of Great Britain and Ireland.

Research

The Circulation Foundation makes three major awards per year to fund vascular research. The value of research funds awarded is currently approximately £1/4 million per year. Like a seed bed, we fund primary research which often goes on to large scale, life-transforming studies. In the last four years the Circulation Foundation has awarded over £500,000 in funds for research, pushing the boundaries in the treatment of vascular disease. Get involved and help us save more lives and limbs through our evolving research programme.

Getting involved

- Donations
- In memory and gift in your will.
- Corporate support
- Ambassador Scheme
- Events - create your own personal event, or sign up for a challenge e.g. London Marathon, Great North Run, RideLondon, Swim Serpentine or the Vitality Big Half

Become a Foundation Ambassador

The Circulation Foundation's goal is to establish a Circulation Foundation Network by having an Ambassador in each Arterial Centre and patient representatives across the UK. We would then be able to work together to increase awareness of vascular conditions, share and repeat fundraising success, increase our research grants and make the Circulation Foundation the support centre for patients.

- **Make a real difference to the lives of people who are affected by vascular disease**
- **Help to raise awareness of vascular disease**
- **Continue to use expertise and knowledge**
- **Learn new skills**
- **Be able to network with like-minded people**
- **Give something back to the vascular community**
- **Be part of a professional and committed charity and a valued member of the team**
- **Recognition on social media, newsletter and on the website**
- **Special recognitions at the Annual Scientific Meeting**

THE BODY WALK

#TheBodyWalk is a national campaign in September to raise awareness of vascular disease and for imperative funding. We are hoping everyone can get to collectively achieve the 60,000 miles that make up the circulatory system! Walk, run, cycle, swim ... it is up to you!

Join us to reach the 60,000 miles and raise funds for Circulation Foundation. Sign up at the stand at the Vascular Soceities' Annual Scientific Meeting!

Circulation Foundation Hoodies, T-shirts and Christmas cards

We have our very own hoodies, T-shirts and Christmas cards available to purchase on the Circulation Foundation stand at the Vascular Soceities' Annual Scientific Meeting - the cards are designed as part of a competition.

Stop by the stand and purchase a hoodie, T-shirt or cards to help raise funds for the Foundation!

To discuss getting involved in the Circulation Foundation by fundraising, legacy donations, becoming an ambassadsor or corporate support, please call 020 7205 7151 or email info@circulationfoundation.org.uk.

Text **CIRCULATION** to **70560** to donate £10. Texts will cost the donation amount plus one standard network rate message.

www.circulationfoundation.org.uk

Charity Number: 1102769

VASCULAR SOCIETY

BACPAR

Society of Vascular Nurses
SVN
www.svn.org.uk

THE SOCIETY FOR VASCULAR TECHNOLOGY OF GREAT BRITAIN AND IRELAND

The Vascular Societies' Annual Scientific Meeting 2023

In conjunction with the Vascular Society of Great Britain and Ireland, the British Association of Chartered Physiotherapists in limb Absence Rehabilitation, the Society of Vascular Nurses and the Society for Vascular Technology of Great Britain and Ireland

SAVE THE DATE

22nd-24th November 2023

The Convention Centre Dublin

www.vascularsociety.org.uk

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