Vascular Sustainable Operating Model, Target Operating Model & Feasibility Assessment

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1. Executive Summary

1.1 Overview

Vascular surgery covers a range of surgical procedures undertaken on arteries and veins with a significant proportion of work relating to reconstructing, unblocking or bypassing arteries that are blocked by atherosclerosis. In undertaking these precision procedures, vascular surgeons restore blood flow to organs of the body helping to reduce sudden death, preventing strokes, restoring movement and reducing the risk of amputation. A further central role for vascular surgery is to address aortic aneurysms, which, when these rupture, can rapidly lead to death.

Advances in techniques and technology over the last three decades have meant it is possible to carry out a greater number of limb and life-saving procedures, even on extremely frail patients leading to an increase in demand for vascular and interdependent services.

There is evidence that significant numbers of vascular patients with critical limb ischaemia, carotid artery disease and aortic aneurysmal disease are not receiving timely investigation and treatment. The current model for the provision of care to vascular patients is unsustainable in the immediate and long term and evidence there are insufficient staff in specialist training to be able to resolve these challenges. The current service model includes centres that do not have sufficient volume of activity to be able to deliver best outcomes and infrastructure and financial constraints are evident.

Under the direction of NHS Scotland's Planning and Delivery Board-Sustainability Reviews, the project brief was to develop a target operating model using a population planning approach for delivery of safe, sustainable and effective vascular surgery within NHS Scotland to meet nationally commissioned outcomes. Recognising the immediacy of action required this was to be a phased approach moving initially to a sustainable operating model (phase 1) with an implementation plan to support moving to a target operating model (phase 2) within two years of commencement.

A population planning approach is crucial for NHS Scotland as it ensures that healthcare services are designed and delivered to meet the needs of the entire population, rather than being confined to specific regions or boundaries. This approach promotes equity and accessibility, allowing all patients to be viewed as NHS Scotland patients, regardless of their location. By breaking down local and regional barriers, it will facilitate more efficient resource allocation, enhance collaboration among different NHS Boards, and support the development of a cohesive, sustainable healthcare system that can adapt to the changing needs and demands of the population.

This report covers phase 1 (planning), the sustainable operating model recommendations and associated feasibility assessment and a summary of the target operating model direction of travel to enable informed decision making. Phase 2 will involve advancing and executing the planning from Phase 1 through the establishment and activation of a system oversight group with the overall responsibility for implementation. The recommended **sustainable operating model** has been developed using a population level planning approach and is data driven, evidence based using the double diamond structure to guide the design process and taking cognises of the direction of travel and principles of the target operating model. **Design Principles | HIS Engage**

The direction of travel for the target operating model involves future proofing the delivery of vascular services with an appropriately staffed and sustainable model which includes strategies for workforce planning, technology integration, and continuous improvement to ensure services remain effective and resilient.

Recommendations from the task and finish group

The task and finish group recommends expanding the vascular network model to establish a North of Scotland Network comprising of two arterial centres to address the remote and rural and current resource and infrastructure locality challenges. It is proposed there would be a lead arterial centre in NHS Tayside working collaboratively with NHS Grampian which will also work as an arterial centre and NHS Highland would cease to be an arterial centre.

The **sustainable operating model** (SOM) (phased approach to TOM implementation) recommendation is that NHS Fife and NHS Highland would also form part of the NoS network as non-arterial (Spoke centres) with the network serving a population of 1.7M.

This would provide 4 networks with 5 arterial centres supporting the population of Scotland. The current resources and footprint are insufficient, necessitating interim network options and staged transfer of care to support capacity in Tayside, Grampian and Fife.

The **sustainable operating model** proposes NHS Fife remain as part of the North of Scotland model whereby transition arrangements will require diverting work from Tayside to NHS Fife to alleviate capacity constraints, for example performing major and minor lower limb amputations in NHS Fife and transferring a proportion of NHS Fife's acute unselected take to NHS Lothian with consultant triage taking place in Fife. This approach will reduce the demand on Tayside, Grampian and Fife given the significantly larger population being covered and support implementation of the TOM.

A gateway review is recommended to be implemented to monitor implementation of the SOM and the TOM. Full delivery of the SOM will require realignment of existing funding and additional funding to support delivery including workforce increases and infrastructure changes.

While consensus was not reached by the task and finish group, the majority agreed that option 5 expanding the vascular network model to establish a North of Scotland network comprising of 2 arterial centres (NHS Tayside (lead) & NHS Grampian) was the most viable option.

Option 5 aims to establish a safe, sustainable network reflecting Scotland's evolving needs. Full delivery of the SOM will require realignment of existing funding and additional funding to support delivery including workforce increases and infrastructure changes.

ACTION: This phased mobilisation will require NHS Fife and NHS Lothian to confirm capacity to support Tayside and Grampian, to facilitate implementation of a NoS network as outlined in option 5.

Target Operating Model

Once the SOM is implemented and to address the population and demand the **Target Operating Model** (TOM) proposes that NHS Fife would align to the Southeast network in line with other regional models. The TOM will require sizeable investment in workforce and infrastructure to deliver.

System Oversight Group

Upon endorsement of the recommendations by the PDB and NHS Executive Group a system oversight group will require to be mobilised to lead on implementation. It is important that the system oversight group continues to refer to the POVs guideline and the Vascular Society Top Tips for Vascular Reconfiguration (vascular-reconfiguration-top-tips-2018.pdf). It is recommended that the System Oversight Group is supported by the independent lead clinician going forward to ensure continuity and impartiality.

Throughout the report important points and recommendations have been highlighted in grey and where there are actions for the **system oversight group** these have been flagged in bold.

2A. DISCOVER – Understanding the problem to be solved

Vascular surgeons address a wide range of conditions, including blocked or narrowed arteries, aneurysms (abnormally dilated arteries), and vein disorders such as varicose veins, venous leg ulcers, and Deep Vein Thrombosis. However, there are significant gaps in the provision of comprehensive vascular surgical services across Scotland.

Up to 50% of vascular patients present as emergency or urgent referrals. Given the complexity of these acute conditions, emergency vascular services are predominantly consultant-delivered. This results in a more demanding out-of-hours workload compared to many other surgical specialties. Therefore, the ability to provide an on-call rota at the consultant level is crucial for maintaining a viable vascular unit.

As treatment options for arterial surgery evolve with new technologies, interventional radiology for vascular disease has become increasingly important. This field involves a range of minimally invasive, image-guided techniques for aneurysmal and narrowed arteries. However, the availability and extent of interventional radiology services vary significantly from hospital to hospital across Scotland. While most sites offer some interventional radiology procedures, the range and utilisation of these services differ greatly.

Additionally, vascular surgical services encompass a broad spectrum of care, including open surgical procedures, endovascular techniques, and hybrid approaches. The integration of these diverse treatment modalities is essential for providing comprehensive care to vascular patients. However, disparities in the availability of these services are leading to inconsistent patient outcomes.

It is also important to recognise that vascular surgical services support other specialties beyond vascular care, including renal, liver, and gastrointestinal surgery. Addressing the disparities in vascular surgical services is essential to ensure comprehensive, highquality care for all patients across Scotland. By implementing a target operating model (TOM) aligned to our population requirements, we can improve patient outcomes, reduce the burden on emergency care, and ensure equitable access to advanced vascular treatments.

2A.1 Case for change

The current model for the provision of care to vascular patients within NHS Scotland is unsustainable in the immediate and long term. Service sustainability within the vascular services in Scotland has reached crisis point. The current model of delivery is no longer sustainable, and mutual aid has already been enacted.

Drivers for change:

- **Population factors** including demographic pressures, substantial increases in both incidence and prevalence of diabetes and peripheral arterial disease.
- **Improving patient care and outcomes** the need to provide equitable access to vascular expertise in collaboration with clinical teams and to concentrate complex surgical procedures in fewer centres to deliver better patient outcomes.
- Service delivery factors sustainability and availability of access to clinical expertise including on call, surgical specialty training, the benefit of multidisciplinary team working and other issues which require a change in the way care is currently delivered.

In 2012, vascular surgery was formally recognised as a specialty in its own right, having previously been a subspeciality of general surgery. Around the same time, proposals were published to establish vascular surgery networks, consisting of arterial centres (hubs) – hospitals serving as a regional centre for vascular surgery, that have the resources to provide surgery 24x7 – that work with non-arterial centres (spoke) -

hospitals, which can conduct outpatients' services including screening and some minor surgical procedures. A growing number of hospitals are now part of a vascular network, but the model defined in Provision of Vascular Services 2021 (**POVS 2021**) has not yet been fully established in Scotland.

The challenges faced by vascular services, while significant, are not unique to this speciality. These include:

- 1. Increasing Demand: The aging population and rising prevalence of vascular diseases are putting unprecedented pressure on vascular services.
- 2. Resource Constraints: Limited financial and human resources are straining the ability to provide timely and effective care.
- 3. Variability in Service Delivery: There are inconsistencies in the quality and availability of vascular services across different centres, leading to disparate patient outcomes.
- 4. Technological Advancements: Rapid advancements in medical technology require continuous updates to service delivery models to ensure the best patient care.
- 5. Infrastructure limitations: access to theatre, ward and diagnostic space curtails the ability to meet all the demands being placed therefore delivery in a different way will be required going forward.
- 6. Variation in outcomes: there are noticeable differences in the rates of vascular procedures and outcomes between different centres, for example some areas have higher rates of amputations due to peripheral arterial disease, while others have better access to preventative care and early interventions.
- 7. Variability in access to specialised vascular services such as endovascular aneurysm repair (EVAR) in hybrid operating theatres.

In the North, the configuration of Vascular Services is not reflective of how services are provided in the rest of Scotland (or the UK). Whilst there is a limited degree of ad hoc support and cross cover, the North region does not currently operate as a single network, with each Health Board in the North of Scotland providing independent Vascular services. The challenging situation within NHS Highland was prioritised by the task and finish group as Highland are no longer able to operate as an arterial centre.

The situation in Highland is summarised below:

- 1. Consultants are currently operating on a 1:2 on call rota, moving to 1:1 from January.
- 2. The current consultant vascular surgeons are predominantly in the older age categories. Persistent recruitment challenges have led to an inability to recruit registrars, newly qualified or locum consultants, jeopardising the long terms sustainability of the service.

- 3. Board escalation processes have been followed by NHS Highland and business continuity plans and mutual aid are currently enacted.
- 4. NHS Highland have made their Board aware that they will not continue to be an arterial centre moving forward.
- 5. NHS Highland are not compliant with the minimum requirements set out by Vascular Society of Great Britain and Ireland (VSGBI) for an arterial centre. The other centres have been benchmarked against this to inform development of the TOM and monitor improvements.

Furthermore, variation is apparent across Scotland such as in the provision of varicose vein surgery with NHS Lothian operating on a higher degree compared to rest of Scotland, this was highlighted at a recent exceptional referral protocol meeting.

Development and implementation of a phased target operating model to allow the necessary volumes of elective activity to exist alongside emergency and on call provision to deliver the highest quality outcomes for the Scottish population is therefore a priority.

Vision for the Future

The vision for the future of vascular services in NHS Scotland is to create a patientcentred, efficient, and high-quality service that leverages modern technology and best practices. The TOM will serve as a blueprint to achieve this vision by addressing current challenges and setting a clear path for improvement through delivery of a sustainable operating model whilst transitioning to the TOM.

Transitioning to a sustainable operating model before moving to a target operating model (TOM) is crucial for several reasons:

- 1. Foundation for Long-Term Success: SOM will address immediate issues such as resource constraints, regulatory compliance, and will create a stable foundation for more ambitious changes.
- 2. **Risk Mitigation**: By focusing on sustainability first, we can identify and mitigate risks. This reduces the likelihood of disruptions and enhances stakeholder trust.
- 3. **Incremental Improvement**: Implementing a sustainable operating model allows for incremental improvements. This step-by-step approach makes it easier to manage change, measure progress, and make necessary adjustments before moving to a more comprehensive TOM. It also allows learning and adjustment as necessary to minimise the impact of change.
- 4. **Resource Optimisation**: Focusing on sustainability helps optimise the use of resources, including financial, human, infrastructure and technological assets. This optimisation is essential for supporting the more complex and resource-intensive changes required by a TOM.
- 5. **Stakeholder Engagement**: Engaging stakeholders in the transition to a sustainable operating model builds support and buy-in for future changes. It

demonstrates the commitment to responsible practices and prepares stakeholders for the more significant transformations associated with a TOM.

2A.2 Approach

The double diamond approach, a structured design process that emphasises understanding and solving complex problems through four key phases:



- 1. Discover
- 2. Define
- 3. Develop
- 4. Deliver

This approach was informed by population health data to ensure the service planning is comprehensive, patient centred and fit for the population of NHS Scotland.



DEVELOP	In this phase potential options to address the identified challenges were generated to address the identified challenges as part of the phased planning approach (Sustainable Operating Model (SOM) to Target Operating Model (TOM). This phase involved collaborative workshops with stakeholders to co-create the SOM and the TOM and undertake the first phase of the feasibility of implementation assessment of the recommended options. Solutions that are scalable, sustainable and aligned with population health needs were prioritised.
DELIVER	 Finally, in this phase, a system oversight group will be mobilised and will provide an implementation plan and monitor the impact on patient outcomes and service efficiency. This will include establishing robust evaluation frameworks to measure success and identify areas for further refinement. The system oversight group will also take forward the identified actions from the planning phase and summarised throughout this report including phase 2 of patient and public engagement. Continuous feedback from stakeholders will be integral in this phase to ensure services remain responsive to evolving population health needs.

To ensure long term success the approach focuses on delivering sustainable solutions that adapt to future changes in population needs and healthcare advancements. This involves development of a TOM that outlines the optimal structure, processes and resources required to maintain high quality vascular services. The TOM will include strategies for workforce planning, technology integration, and continuous improvement to ensure the services remain effective and resilient.

By utilising the double diamond approach and focusing on sustainability, the aim is to create a more equitable, effective, and patient centred vascular surgical service that meets the needs of our population.

Governance

Recommendations from the task and finish group will report via the Planning & Delivery Board (PDB) to the NHS Executive Group and then contribute into the SG Reform Executive Group.

Clinical Advisory Group (Task and Finish Group)

As tasked by the PDB a task and finish group consisting of members identified by the stakeholder mapping exercise and endorsed by the PDB was established with the responsibility to undertake population level planning to recommend a sustainable and

target operating model. Upon endorsement of the recommendations by the PDB and Executive Group a system oversight group will mobilise to lead on implementation.

In line with The Vascular Society Top Tips for Vascular Reconfiguration (<u>vascular-reconfiguration-top-tips-2018.pdf</u>) this group comprised of subject matter expertise from across the pathway (Appendix 8.3). The group was chaired by the Medical Director of Forth Valley who has experience of previous vascular reconfiguration into a network model being one of the Boards affected and also an independent vascular consultant.

The first stage in the process was to get agreement in principle on the clinical model and what we are trying to achieve. This process was led by the vascular task and finish group and informed by:

- Provision of services for people with vascular disease 2021 (POVS 2021) (<u>https://vascularsociety.org.uk/_userfiles/pages/files/povs/povs-2021.pdf</u>).
- Royal College of Radiologists and British Society of Interventional Radiology Provision of Interventional Radiology Services (POIRS 2014).
- NHS England National Vascular Service Specification (Specialised Vascular Services).
- Previous reconfiguration work undertaken in the West and lessons learned to allow movement at pace given the fragility of the current model.
- Data provided from hospitals currently providing vascular services, the vascular registry, PHS, HIS, SAS and SMR01.

The guidelines from the Vascular Society for the Provision of Vascular Services (POVS **2021**) provide comprehensive specifications for both arterial and non-arterial centres within a vascular network. These guidelines emphasise the importance of integrated vascular networks to ensure high quality and safe vascular care. They cover aspects such as specialist teams, multi-professional collaboration, and the need for timely intervention.

In arterial centres, high-volume and complex interventions are performed, while nonarterial centres focus on less complex procedures, outpatient clinics, diagnostic radiology and rehabilitation. This structure ensures that patients receive comprehensive and safe vascular care, balancing accessibility with the need for specialised treatment. Therefore, the task and finish group recommended using these guidelines as a baseline for developing a robust target operating model.

The task and finish group were also mindful of the TOM while developing a sustainable operating model to ensure:

- alignment with long term goals.
- all components of the service work together seamlessly.
- efficient allocation of resources and investments in areas with the most significant impact.
- It was adaptable and resilient to future challenges.

2A.3 Scope

To define a target operating model for delivery of safe, sustainable and effective vascular surgery within NHS Scotland to meet nationally commissioned outcomes, and a plan to support delivery of this within two years of commencement.

This will be completed through a phased approach. Phase 1 - recommendations for a Target Operating model through a phased approach moving to a Sustainable Operating Model initially which will address the immediate, short-term risks to service continuity.

This report outlines the principles of the sustainable and target operating model and includes the first phase of the feasibility assessment.

Out of scope

- Implementation.
- Resourcing to deliver, this will remain the role and responsibility of provider Boards.
- Scheme of delegation that sets out which decisions specific groups and individuals can make.
- Resolving identified issues with interdependent services however these will be noted within the report.

2B. DISCOVER – Current Operating Model & Readiness for change

2B.1 Service Providers

Within Scotland there are currently six vascular arterial centres (Appendix XX) supporting NHS Scotland population demand for vascular services as shown below:

Figure Z shows the population size of each Board and the overall population covered by the service provider (denoted in blue). For example, the Southwest of Scotland network covers NHS Lanarkshire, Dumfries and Galloway and Ayrshire and Arran from its base at Hairmyres, East Kilbride.



Figure Z: Current operating model

According to the guidelines (POVS **2021**) eight hundred thousand people has become the established minimum population for UK vascular networks (an arbitrary figure from the AAA screening programme):

- Across most of the UK, a network population size of >1.2 million people is needed to provide the volume of aortic cases to drive better outcomes and
- At least 3 UK vascular networks serve populations of around 2 million people.

Figure Z highlights that reconfiguring the North of Scotland into a network will help align closer with these guidelines and also indicates that with a population of over 5 million, the resource and infrastructure locality and availability, and the unique remote and rural challenges faced in Scotland, the network model with single arterial centres within each vascular network may require to be adapted. For example, 2 arterial centres working in a network may be required as part of a target operating model in the North of Scotland which does deviate from true adherence to the guidelines albeit key to unlocking the unique challenges faced.

To inform planning the sustainable and target operating models the current provision and network arrangements were collated and are summarised in Figure Y:

NHS Region	Services	Specialisation/Notes	Network Arrangements
NHS Lothian	Full range of vascular surgical services, including emergency, urgent, and routine care	National centre for managing thoraco- abdominal aortic disease and providing a dedicated specialist service	South-East Scotland Vascular Network
NHS Greater Glasgow and Clyde	Full range of vascular surgical services, including emergency, urgent, and routine care	The largest health board in Scotland, handling a significant volume of vascular cases	West of Scotland Vascular Network
NHS Lanarkshire	Full range of vascular surgical services, including emergency, urgent, and routine care	Specialises in comprehensive emergency and elective care—including aortic aneurysms, limb ischaemia, diabetic foot complications, and carotid disease—delivered through a consultant-led, regionally networked model.	South-West Scotland Vascular Network
NHS Tayside	Full range of vascular surgical services, including emergency, urgent, and routine care	Experience in complex endovascular aortic surgery	Works collaboratively with NHS Fife
NHS Highland	No longer able to operate as an arterial centre.	Faces unique challenges due to the rural and remote nature of the region, impacting service delivery	Does not currently work in a network model
NHS Grampian	Full range of vascular surgical services, including emergency, urgent, and routine care	Faces challenges recruiting consultant vascular surgeons	Does not currently work in a network model
NHS Fife	Provides a spoke service with index arterial cases undertaken by Fife surgeons in NHS Tayside. Not an arterial centre	Full range of spoke services including outpatient clinics, renal access, varicose vein interventions	Works collaboratively with NHS Tayside

Figure Y:

*All centres are experiencing varying degrees of resourcing challenges relating to vascular consultants, Interventional radiologists and specialist nursing.

Currently there is a West of Scotland (WOS), South-West and South-East of Scotland network arrangement with no North of Scotland network currently in place. NHS Tayside works collaboratively with NHS Fife. The current operating model is shown in Figure COM.

Figure COM-Current Operating Model:



2B.2 Key Stakeholders

Patient and public engagement phase 1

The fourteenth Citizens' Panel survey was recently published at the time of this workstream, and citizens were specifically asked questions around NHS reform which was helpful given the specialist nature of some vascular procedures in informing our

approach. To make sure we understand what patients, carers and the public think and give them the chance to shape services we will pivot into the citizens panel engagement that has been listening to what matters to people in developing the TOM. The Major Service Change Framework (published in October 2024) will also be reflected.

Within the panel survey it was explained that sometimes it is safer to provide services in a specialist unit to ensure a patient receives the highest quality care with the best outcomes. 84% of respondents strongly agreed or agreed they were willing to travel further for specialist services if it will result in better outcomes for them which is positive given the model being proposed.

Panel members were asked how long they would be prepared to travel to receive a range of services. Respondents were most likely to be willing to travel regionally for routine inpatient hospital care where a stay in hospital is needed for immediate care (55%) and to access outpatient hospital services (62%). With regards to specialised outpatient and inpatient hospital services, respondents were most likely to say they would be willing to travel regionally (43%), while 33% said they would be willing to travel nationally anywhere in Scotland and 24% said they would only be willing to travel locally to access this type of service. Given the geography of Scotland travel times are important and were raised as a key matter. Links to the Transport for Health programme are established within the context of remote, rural and island framework and this will be strengthened for the TOM through the system oversight group.

The panel were also asked about how they think access to services should be maintained when the NHS faces workforce shortages. Respondents were provided with a list of options and asked for their top two preferences. For 9 in 10 respondents (90%) expanding the range of NHS health and care professionals who provide services, while ensuring they have appropriate training and clinical support, was a top or second top priority. This was followed by providing services in the same locations but for reduced hours (60%) and reducing the number of locations at which services are provided. This again is positive and demonstrates a realistic approach from our citizens moving forward given the challenges with recruitment and retention and, despite initiatives undertaken to date, the inability to maintain NHS Highland as an arterial centre.

Proposed Benefits of a Target Operating Model

The benefits we expect for patients are:

- Improvement of the clinical outcomes, in particular improved KPIs and lower limb amputation rates, working towards achieving the best rather than average performance
- Development of robust MDMs enabling patients to make informed decisions and better able to manage their condition and recovery.
- A transparent and effective vascular network, that benefits from shared clinical expertise and clear effective pathways of care.
- Increased access to outpatient clinics in spoke units with the potential to deliver digitally.
- Improved sustainability of the existing vascular services.

- Clear lines of accountability and clinical governance across the network that puts clinicians and patients at the heart of performance monitoring and service development.
- A sustainable specialist workforce: consultant surgeons, IR consultants, specialist nurses and podiatrists included in the wider multi-disciplinary team.
- Standardised methods and promotion of best practice across the clinical teams.
- A more productive and efficient service (minimisation of duplication and waste).
- Improved opportunities for training, research and innovation.
- Reduced length of stay for patients and more effective pathway links with community providers to support timely repatriation of patients following surgery.

The Nationally Instigated Service Change approach and the position we have established in relation to vascular will be reflected in mapping out the next steps we now need to take to apply this and bring forward a plan. This work will be taken forward through the system oversight group upon endorsement of the task and finish group recommendations. Appendix 8.2 provides further detail on actions taken to date and the actions. This plan was shared with HIS and incorporates feedback and actions the **System Oversight Group** require to take forward.

2B.3 Service Parts

In considering development of the SOM and TOM interdependent services play a crucial role in the effective delivery of vascular services and require careful consideration when population health planning. Details on the following services were collated and the challenges that require consideration as part of the TOM are detailed below.

Co-located services	Interdependent services
 Emergency Department Intensive care / Critical care Interventional vascular radiology Anaesthetics Vascular Laboratory Vascular diagnostic radiology 	 Stroke service Diabetes specialist hospital services and diabetic community services Renal inpatient and outpatient units Interventional cardiology including TAVI (trans aortic valve implantation Cardiac surgery Major trauma centres and trauma units Scottish Ambulance Services (SAS)
 Related services Rehabilitation services Prosthetic service Podiatry Orthotics Community AHP & Social Work placement 	 Relevant networks and screening programmes include: Cardiac/Stroke networks Renal networks Critical Care networks Trauma networks AAA screening programme

POVS 2021 highlights the integration needed between vascular services and a wide range of other medical specialities therefore by understanding the current arrangements we can develop the TOM.

Scottish Ambulance Service (SAS)

The Ambulance Service will play a pivotal role in delivery of the newly proposed sustainable operating model and target operating model for vascular services.

The new operating models will fundamentally change the way in which vascular patients are being managed within the North and East Region moving forward, and this will require SAS to adapt resourcing levels and model to ensure they are able to manage the changing demand on services whilst maintaining a safe responsive service to patients presenting with other Emergency and Urgent care needs.

In the North of Scotland for patients that required vascular services, SAS have historically conveyed patients to Raigmore in Inverness. Implementation of the new target model will result in non-emergency patients initially being taken to Raigmore and then subsequently onward transferred to Ninewells in Tayside. This will result in additional inter-hospital emergency transfers and in some instances, secondary transfers and will require emergency ambulance resources to be 'out of the inverness area' for considerable periods of time on return journeys to and from hospital (Raigmore Hospital – Ninewells Hospital). There is therefore a requirement to ensure that there are sufficient resources in place to cover existing demands within the area. SAS were key members of the task and finish group.

Modelling work has been carried out using AmbSim specialist software, to identify the resources required to deliver the new North of Scotland model and maintain current response times to patients.

Modelling has indicated that there would be a requirement for an additional double crewed A&E Ambulance 24/7 located in or around the Inverness areas.

Alongside the additional demands on SAS capacity in the North, there will also be the requirement to provide emergency transfers from within the Fife sub-region to both Ninewells hospital and the Royal Infirmary which will see a reduction in available resources within the East Region as well and a potential impact on patient response times. The impact of this is currently being modelled and will require taken forward by the **System Oversight Group**.

If the Planning and Delivery Board were to endorse the recommendations, a full risk assessment would also be required which would be the responsibility of the Scottish Ambulance Service as part of standard processes.

EMRS & Air Teams considerations

SAS colleagues have advised....

Vascular patients are a group with high rates of co-morbidity and vascular emergencies can present with critical illness. This may therefore result in additional professional to professional clinical advice calls and requests for escorted transfers using Scot STAR EMRS North and West teams. This is work that is outside current funded remit and may, depending on demand levels, require additional funding.

For the time-critical vascular emergencies (leaking abdominal aortic aneurysm, acute ischaemic limb, acute intestinal ischaemia) then helicopter transfer would be a reasonable option with or without a Scot STAR EMRS team. It will be important to assess potential demand and funding required to cover the costs associated with the use of air assets.

If air assets were required, it is important to note that there are also challenges in flying into Dundee by either rotary or fixed wing. Dundee airport does not have out of hours cover. Search and Rescue (SAR) may not fly into Ninewells, this would need to be assessed. If this is feasible, there would be additional costs associated for the use of SAR.

More widely for SAS the increased burden of long-distance road transfers is significant with both ARI and Ninewells being 2-2.5 hours by road, and the journey may need to be on 'blue lights'. This could potentially increase shift overruns, overtime payments, and also impact staff wellbeing.

There could be potential risk of an increase in moral injury and distress for staff in moving patients in whom time is critical.

Consideration as part of the TOM was given to a clinical and geographic bypass criteria for certain patients with unequivocal vascular emergencies who might be better being moved directly to the vascular centre. The task and finish group recommended that to facilitate bypass decisions direct communication with hub senior vascular surgeons will be required. The **system oversight group** will be required to put processes in place in relation to this and develop business cases to seek appropriate funding to support implementation.

Current operating model challenges:

- 1. **Workforce Shortages**: There is a significant shortage of specialised healthcare professionals, including vascular surgeons, interventional radiologists, specialist vascular nursing, and vascular scientists. This shortage impacts the ability to meet the growing demand for vascular services. Recruitment and retention have been a key issue, particularly in the North of Scotland.
- 2. **Increasing Demand**: The aging population and the rise in chronic conditions such as diabetes and hypertension have led to an increased demand for vascular services. This puts pressure on existing resources and has led to longer waiting times for patients.
- 3. **Geographical Disparities**: Ensuring equitable access to specialised vascular care across different regions of Scotland has been challenging. Patients in remote or rural areas are facing difficulties in accessing timely and specialised care.
- 4. **Technological Advancements**: Keeping up with rapid advancements in medical technology and ensuring that appropriate healthcare facilities are equipped with the latest tools and equipment are a logistical and financial challenge.

5. **Infrastructure locality and access**: There is a disparity in availability of hybrid theatres, access to theatres and postoperative ICU beds. Establishing and maintaining specialised infrastructure requires substantial investment therefore ensuring the right resource in the right place is appropriately funded to deliver for the population is essential.

Addressing these challenges requires strategic planning, investment in workforce development, and ongoing efforts to improve service delivery and patient care, to deliver the target operating model.

To understand availability of resource and infrastructure across NHS Scotland information was collated. Within the current model NHS Scotland employs a regional vascular network model with associated arterial centres in the West, Southwest and Southeast to deliver vascular services. In the North there is no functional network although collaborative working does take place. The network models in the Southeast and Southwest and West of Scotland ensures that specialised care is accessible across different regions through collaboration between hospitals and healthcare providers.

The current status across NHS Scotland on what arterial centres should provide in relation to staffing and infrastructure is shown below and has been mapped against the guidelines (POVs2021).

Staffing	Infrastructure
24/7 Consultant vascular surgeon on call rota	Level 3 critical care beds
24/7 Consultant interventional radiologist on call rota	Dedicated ward for vascular patients (GIRFT supports provision of monitored recovery beds on the vascular ward
24/7 Operating theatre, 'hybrid theatre' and interventional radiology room readily available and appropriately staffed	Access to sessions in a second theatre (GIRFT recommend that this is 7 days a week)
	Hybrid operating theatre compliant with MHRA guidance for performing aortic procedures
	Dedicated interventional radiology suite with day care beds
	Vascular laboratory (or equivalent)
	Blood transfusion laboratory

This is summarised in the following radar diagrams:



Workforce

The West, Southwest and Southeast of Scotland have a workforce more in line with the guidelines.

In contrast NHS Grampian, Tayside and Highland are in a more vulnerable position under the current delivery model.

Infrastructure

This is a similar situation to workforce in that those working in a network model are more in line with the guidelines.



Workforce-COM





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RECOMMENDATION 1: The task and finish group recommend that by forming a North of Scotland network, NHS Grampian, Highland and Tayside can enhance access to staffing and infrastructure, ensuring better alignment with the guidelines across the network.

VSGBI Staffing Axis Non-compliant Compliant



2B.4 Patient Pathways & Systems Mapping

To understand the impact of any changes and develop the TOM the pathways have been mapped and the recommendations from the task and finish group for the TOM are summarised below:

	Stages	PAD Pathway	AAA Pathway	Carotid Artery Disease Pathway	CLTI Pathway	Venous Leg Ulcer Pathway	Carotid Endarterectomy	Emergency Open Surgical AAA Repair	Elective Open Surgical AAA Repair	Emergency Endovascular AAA Repair (EVAR)	Elective Endovascular AAA Repair (EVAR)	Lower Limb Revascularisation	Major Lower Limb Amputation	Combined AAA Elective Procedures	Varicose Veins	Thoraco-abdominal Aortic Aneurysm (TAAA)	Endovenous Laser Treatment (EVLT)	Renal Access Procedures	Thoracic Endovascular Aortic Repair (TEVAR)	Current Model
DIAGNOSIS	Screening		✓																	Hospital
	Initial Assessment	\checkmark		\checkmark	✓															Hospital
	Urgent Assessment				\checkmark															Hospital
	Diagnostic Imaging (locally)	\checkmark			√	√														Hospital
	Multidisciplinary Team (MDT) Review				✓															Hospital
TREATMENT	Elective Repair		✓						\checkmark		\checkmark									Hospital
	Surgical Intervention			\checkmark	✓		√						✓							Hospital
	Compression Therapy					✓														Primary
	Risk Factor	\checkmark		\checkmark																Primary
	Modification Medical Management	\checkmark																		Care Hospital
																				Primary Care
IREAIMENI	Supervised Exercise	\checkmark																		Hospital
	Surveillance		✓																	Hospital
	Revascularisation	\checkmark		\checkmark	√							✓								Hospital
	Emergency		√					√		\checkmark										Hospital
	Wound Care				✓	\checkmark														Primary
	Rehabilitation																			Care Primary
	Post Operative Care																			Care
	Post-operative Care										V									nospital
Follow Up	Long-Term Follow-Up	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	1	\checkmark	\checkmark	\checkmark		\checkmark	Care



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2B.5 Core Information and Standards

Policies and initiatives aimed at improving vascular health, such as the Heart Disease Action Plan by the Scottish Government, have emphasised the importance of early detection and continuous management. These initiatives have driven an increase in outpatient visits. The impact of this will require consideration by the **service oversight group** as to the effect on primary care and requirements to ensure effective implementation of the target operating model.

The approach taken has developed models that reflects the agreed population planning approach, as set out in the National Clinical Strategy. Current UK guidelines indicate a minimum of 800k of a population is recommended for a vascular centre although >1.2m is needed to provide the volume of aortic cases to drive better outcomes.

Many centres in the UK are serving populations of 2m people and it is published that higher volume arterial centres provide better outcomes for most interventions.

In time the model will align to meet the National Service Specification and aligned standards.

National Service Specification

The national service specification for vascular services notes that the overarching aim of elective and 24/7 emergency vascular services is to provide evidence-based models of care that improve patient diagnosis and treatment and ultimately improve mortality and morbidity from vascular disease.

Key features of the national specification include:

- All trusts (*Boards in Scotland*) delivering vascular services must belong to a provider vascular network
- Arterial surgery should be delivered in an arterial centre The pathway for vascular services to include Diagnosis /Assessment /Outpatient activity / Inpatient activity / Day case activity / Rehabilitation care. • Non arterial surgery and day care should receive specialist vascular care locally with agreed protocols including emergency transfers to the arterial centre.
- Adequate population volumes: A minimum population of 800,000 but for a world class service a larger catchment area will be required.
- Adequate volumes of core vascular procedures. (> 60 AAA procedures, > 50 Carotid Endarterectomies and commensurate lower limb procedures)
- 24/7 arterial surgery 24/7 interventional radiology available Acceptable on call rota requirements, i.e. consultants being on call no more frequently than every six weeks.
- A minimum of six services arterial surgeons and six Interventional radiologists.
- Provision of vascular surgery by specialist vascular surgeons.
- Provision of vascular interventional radiology by specialist IR consultants.
- Provision of vascular service by a specialist multi-disciplinary team.

2B.6 Gaps

The accuracy of vascular surgical procedure data from NHS Scotland, the National Vascular Registry (NVR) and the service providers varies from quite good to poor and there are some known limitations which are detailed below.

1. Data Collection and Reporting:

a. The NVR and NHS Scotland dashboards rely on accurate data entry from hospitals and healthcare providers. Variations in data collection practices and reporting standards can lead to inconsistencies and under reporting of procedures. To overcome known areas of poor compliance each centre was asked to supply validated data. This was then sense checked by IMS, with issues queried with the service providers. Where relevant other sources of data were reviewed by IMS to sense check the data.

2. Impact of the COVID-19 Pandemic:

a. The COVID-19 pandemic disrupted healthcare services, including elective surgeries. This led to a temporary reduction in the number of procedures performed and reported, which may affect trend analysis

3. Surveillance and Inclusion Criteria:

a. Certain procedures, such as planned major vascular surgeries, are included in mandatory surveillance programs. However, there may be delays in achieving robust data collection across all NHS boards

4. Surgical Site Infection (SSI) Surveillance:

a. The Scottish Surgical Site Infection (SSI) surveillance program includes vascular procedures, but there may be gaps in data for specific procedures until comprehensive data collection is established

5. Regional Variations:

a. Differences in healthcare access and service provision across regions can lead to variations in the number of procedures performed and reported

Overall, while the data provides valuable insights, it's important to consider these factors when interpreting the data. The service oversight group will require to factor this in as part of implementation and ensure robust plans are in place for future data collation. The task and finish group recommends mandatory input to the vascular registry and that Boards are held to account for compliance.

These gaps have been factored in during interpretation and analysis of the data and have been updated following the task and finish group meetings. Data accuracy is now likely to be reasonably accurate and the best available information at this point in planning.

3A. DEFINE – What does the data tell us?

3A.1 Epidemiological Data

Population Data:

Scotland (2025): 5,479,700

Prevalence and Incidence:

- 1. Peripheral Arterial Disease (PAD):
 - a. Prevalence: Approximately 200,000 people in Scotland are living with PAD
 - b. Incidence: The annual incidence rate of PAD is around 1.5% among adults aged 50 and older.
- 2. Abdominal Aortic Aneurysm (AAA):
 - a. **Prevalence**: The prevalence of AAA in Scotland is about 1.3% in men aged 65 and older.
 - b. Incidence: The incidence rate of AAA is approximately 0.4% per year in the same demographic
- 3. Carotid Artery Disease:
 - a. Prevalence: Around 5% of adults aged 65 and older in Scotland have significant carotid artery stenosis
 - b. **Incidence**: The annual incidence rate of carotid artery disease is about 0.5% in this age group.

Data Sources:

- 1. Public Health Scotland's Scottish Burden of Disease Study
- 2. British Heart Foundation (BHF) Scotland CVD Factsheet

3A.2 Service Utilisation

Current model general trends observed in hospital admissions for vascular conditions:

Admission Rates

- **NHS Highland**: Moderate rate of hospital admissions for vascular conditions, with a significant portion of the population living in rural areas, which can impact access to healthcare services. Focus on reaching rural populations through mobile clinics and telehealth services.
- NHS Tayside: Relatively high rate of admissions, partly due to the presence of major urban centres like Dundee, which have higher population densities and associated risk factors
- NHS Lothian: Encompassing Edinburgh, has one of the highest rates of hospital admissions for vascular conditions. This is attributed to its large and diverse population, including a significant number of elderly residents
- NHS Greater Glasgow & Clyde: This region has the highest rate of hospital admissions for vascular conditions in Scotland. The high population density, combined with socioeconomic factors, contributes to the elevated rates
- **NHS Lanarkshire**: Also reports high admission rates, influenced by both urban and semi-urban populations with varying levels of access to healthcare services
- NHS Grampian: which includes Aberdeen, has moderate to high admission rates. The region's mix of urban and rural areas affects the overall rates of hospital admissions for vascular conditions

New Outpatient Appointments

There has been a steady increase in new outpatient appointments for vascular health over the past few years. This rise is attributed to enhanced screening programs and increased awareness of vascular conditions. The centres provided the following information





Per 100,000 population NHS Highland is a high outlier when compared to the rest of NHS Scotland.

Follow-Up Visits

Follow-up visits whilst nationally there is a reported upward trend, reflecting the need for ongoing management and monitoring of chronic vascular conditions such as peripheral arterial disease and diabetes the scale of the demand for follow up visits has been unable to be accurately reported/compared across the centres. It is recommended that this data is collated consistently across the centres going forward to inform future need/developments.

Admissions

The following chart shows the elective, emergency (in hours), emergency (out of hours) admissions averaged over the last 5 years.



*Data supplied by the vascular centres and validated by NSD IMS data team

Elective admissions



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Emergency admissions (in hours)



Emergency admissions (OOH)



The funnel plots highlight NHS Tayside and Lanarkshire as low outliers and Lothian and NHS GGC as high outliers per 100K population for elective admissions whereas Grampian and Lanarkshire are high outliers for emergency in hours admissions and NHSGGC are low outliers per 100k population. Finally, for out of hours emergency admissions Tayside is a high outlier and Lothian and Grampian are low outliers per 100K population.

Procedures

Trends indicate a shift towards less invasive procedures. Less invasive endovascular procedures in patients with peripheral vascular disease can improve blood flow without the need for open complex surgery. Similarly in patients with aneurysmal disease endovascular stent repair can reduce the need for open surgery. Occasionally a combination of open and endovascular techniques are required and the choice of treatment requires an informed discussion by the multidisciplinary meeting.

The yearly average demand by Board of treatment for elective and emergency procedures (averaged over the last 5 years) are shown in the following graph.



*Data supplied by the vascular centres and validated by NSD IMS data team

Elective Procedures



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Emergency Procedures



NHS Grampian and Lanarkshire are high outliers for elective procedures whereas Tayside and Lothian are high outliers for emergency procedures per 100K population. In contrast NHS Tayside and NHS GGC are low outliers for elective and NHS Highland and NHS Lanarkshire are low outliers for emergency procedures.

Appendix 8.6 summarises procedure types, demand, importance and if Interventional Radiologist support is required to inform planning.

The aforementioned data has been collated and validated through a number of NHS Scotland sources including Public Health Scotland (PHS), SMR01, the Scottish Atlas of Variation, the Scottish Surgical Site Infection (SSI) surveillance program and from the service providers. The National Vascular Registry (NVR) has also been reviewed and the figures for Scotland extracted from this broader dataset to ensure they specifically represent NHS Scotland. The data has then been carefully categorised to avoid double counting and to ensure the data is as robust as it can be. This information has been collated into a bespoke population level planning dashboard created by NSD's IMS team.

The vascular procedures projected to experience the most notable growth:

- 1. Lower Limb Revascularisation: This includes bypass surgery, angioplasty and stenting for peripheral artery disease (PAD). The demand is expected to rise due to the increasing prevalence of PAD and diabetes.
- 2. Major Lower Limb Amputation: The number of these procedures has been increasing, partly due to complications from diabetes. Recent reports indicate a significant rise in diabetes-related lower limb amputations in the UK.
- 3. Aortic Procedures: Although incidence of AAA is slightly reducing Aortic dissection is increasing with a variety of treatment options available.

Anticipated Future Demand

To determine a target operating model, it is important to understand the forecast increase in demand and understand the estimated percentage of the population who may require each procedure type over the next 5 years.

According to the National records of Scotland (NRS) Scotland's population for the next 5 years is anticipated to increase to 5.7 million mainly related to inward migration and age i.e. the number of people aged 75 and over is projected to increase meanwhile the number of children and young adults are both projected to fall. (*Projected Population of Scotland: - National Records of Scotland (NRS)*).

To aid the design of the target operating model the forecasted incidence increases for each vascular procedure type have been collated specifically for the Scottish population (Table W). These estimates are based on historical data analysis, statistical modelling, and expert input including data from PHS, National Vascular Registry (NVR) and the Vascular Services Quality Improvement Programme (VSQIP), which include detailed insights and forecasts for NHS Scotland.

Table W-Anticipated procedure demand increase

Procedure	Approx. Incidence Rate (per 100,000)	Estimated Number of Procedures -low to high (Current population)	Estimated Number of Procedures (Anticipated future population – 5.7M)
Carotid Endarterectomy	1.2 – 8.6	66 – 471	68 - 490
Abdominal Aortic Aneurysm (AAA) Repair	5.0 - 10.0	274 - 548	285 - 570
Emergency Open Surgical AAA Repair	1.0 - 2.0	55 - 110	57 - 114
Elective Open Surgical AAA Repair	2.0 - 4.0	110 - 220	114-228
Emergency Endovascular AAA Repair (EVAR)	1.0 - 2.0	55 - 110	57 - 114
Elective Endovascular AAA Repair (EVAR)	2.0 - 4.0	110 - 220	114 - 228
Lower Limb Revascularisation	15.0 - 20.0	822 - 1,096	855 - 1140
Major Lower Limb Amputation	5.0 - 10.0	274 - 548	285 - 570
Combined AAA Elective Procedures	4.0 - 8.0	220 - 439	228 - 456
Varicose Veins	20.0 - 30.0	1,096 - 1,644	1140 - 1710
Thoraco-abdominal Aortic Aneurysm (TAAA)	0.5 - 1.0	27 - 55	28 - 57
Endovenous Laser Treatment (EVLT)	5.0 - 10.0	274 - 548	285 - 570
Renal Access Procedures	10.0 - 15.0	548 - 822	570 - 855
Thoracic Endovascular Aortic Repair (TEVAR)	1.0 - 2.0	55 - 110	57 - 114

Data on diabetic foot procedures, excluding amputations, could not be extrapolated. However, actual data from the centres suggest that the incidence rates tend to align more closely with the higher end of the estimated range.

Upon comparison with the data presented in the National Vascular Registry (NVR), it is apparent that Scotland is not reporting all cases (Table: NVR Dashboard). The Task and Finish Group has therefore recommended the enforcement and monitoring of mandatory reporting moving forward. The **Service Oversight Group** should assume responsibility for the implementation and implementing future compliance verification mechanisms as part of the transition to business as usual.

Table: NVR Dashboard

Procedure	Time period	No. of cases in NVR	Case ascertainment
Elective infrarenal AAA repairs	2023	160	55%
Emergency repair of ruptured AAA	2021- 2023	63	76%
Carotid endarterectomy	2023	174	60%
Lower limb angioplasty/stenting	2023	14	1%
Lower limb surgical revascularisation	2023	391	42%
Major lower limb amputation	2023	305	45%

Understanding the incidence rate per 100,000 population and the estimated increase in the number of procedures is crucial for several reasons in population planning:

- 1. **Resource Allocation**: Accurate incidence rates help allocate resources effectively, ensuring that hospitals and clinics have the necessary staff, equipment, and facilities to handle the expected number of procedures.
- 2. **Budget Planning**: Knowing the expected number of procedures allows for better financial planning and budgeting, ensuring that funds are available to support.
- 3. **Capacity Planning**: Estimating future procedure numbers helps in planning the capacity of healthcare services, including the number of beds, operating rooms, and recovery facilities needed.
- 4. **Training and Staffing**: Understanding the demand for specific procedures informs the training and hiring of healthcare professionals, ensuring that there are enough skilled practitioners to meet the needs of the population.
- 5. **Public Health Strategies**: Incidence rates inform public health strategies and interventions aimed at reducing the prevalence of conditions that require these procedures, such as promoting healthy lifestyles to prevent vascular diseases.
6. **Policy Making**: Data-driven insights support policymakers in making informed decisions about healthcare policies, funding, and initiatives to improve overall health outcomes.

By combining these two types of data, we can design a target operating model that addresses both current and future healthcare needs, ensuring a robust and responsive healthcare system.

3A.3 Outcomes and Disparities

Comparison of Clinical Outcomes Over Time in NHS Scotland

Based on the latest data from the National Vascular Registry (NVR):

Angioplasty / Stents: The adjusted rate of postoperative in-hospital death for lower limb angioplasty/stents in NHS Scotland was within the expected range of the national average of 1.6% for 2021-2023. However, it is widely accepted that the number of procedures performed is much greater than those registered on NVR.

Bypass / Open Procedures: The adjusted postoperative in-hospital mortality rates for bypass/open procedures in NHS Scotland were within the expected range given the volume of cases performed, with a national average of 2.9% for 2021-2023. Variations are to be expected as the decision to attempt revascularisation in patients who are often frail, elderly and have significant comorbidities, is complex.

Overall, NHS Scotland's performance aligns closely with the national averages, with some variations in specific categories.

The following regional disparities in mortality and morbidity are evident based on the latest data from the National Vascular Registry (NVR):

Mortality Rates

- NHS Greater Glasgow and Clyde: Higher-than-expected mortality rates for non-elective lower limb bypass procedures.
- NHS Lothian: Instances of higher mortality rates for elective lower limb angioplasty/stents.
- NHS Tayside: Higher mortality rates for non-elective lower limb angioplasty/stents compared to the national standard.

Morbidity Rates

- NHS Highland: Morbidity rates for elective lower limb bypass procedures are slightly higher than the national average.
- NHS Fife: Higher morbidity rates for non-elective lower limb angioplasty/stents.

Complication Rates

• NHS Grampian: Higher complication rates for non-elective lower limb angioplasty/stents.

Data Source: 2024 NVR State of the Nation Report - VSQIP - Vascular Services Quality Improvement Programme

The task and finish group have highlighted that the aforementioned comments should be interpreted with caution as undertaking procedures in high risk cases can lead to an apparent increase in mortality and morbidity as a result of case selection which varies between units. This view is supported by the independent vascular consultant.

It is important to note that regional disparities in mortality, morbidity, and complications for vascular surgical services across NHS Scotland are influenced by socioeconomic factors, geographical challenges, variations in clinical practices, resource allocation, and patient comorbidities. For instance, NHS Greater Glasgow and Clyde has higher-than-expected mortality rates for non-elective lower limb bypass procedures, while NHS Lothian and NHS Tayside show higher rates for elective and non-elective angioplasty/stents, respectively, however case mix and co-morbidities are important factors that influence this. Additionally, disparities in data submission to the National Vascular Registry (NVR) contribute to these variations, with NHS Scotland achieving an estimated case ascertainment rate of only 60%, compared to 93% for England and 100% for Wales and Northern Ireland.

Unfortunately, it is currently difficult to obtain accurate data on numbers of index procedures performed and subsequent clinical

outcomes due to poor compliance with the National Vascular Registry in Scotland. This has been highlighted regularly at the annual meeting of Scottish Vascular surgeons where lack of audit support has been identified as a significant problem. This has led to the recommendation from the task and finish group to mandate entry to the NVR.

Elective AAA



Other Aortic



Risk-adjusted in-hospital mortality in 2021-2023

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Carotid Endarterectomy



Risk-adjusted 30-day stroke and/or death rate in 2021-2023

Surgical lower limb revascularisation



Risk-adjusted in-hospital mortality in 2021-2023

Number of operations

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In addition to the above data the National Centre for TAAA and complex aortic disease in Lothian continues to undertake major intervention for these complex conditions, The annual report from the National centre highlights the excellent results achieved. The Pan Scotland MDT in which all arterial centres can present and discuss complex aortic cases ensures equity of access for patients.

The 2024 NVR State of the Nation Report from the Vascular Services Quality Improvement Programme (VSQIP) suggests a correlation between the number of procedures performed and a reduction in associated mortality and morbidity. Regions with higher procedure numbers tend to have lower rates of complication, which would appear to be due to the greater volume of cases treated.

These trends highlight the importance of understanding regional variations in clinical outcomes to improve vascular care services across NHS Scotland, therefore we need to look at wider data and evidence to support health planning.

In summary the State of the Nation report highlights a number of important aspects of vascular care across the UK that are important for population health planning and development of a TOM. Firstly, the mix of procedures continues to change. Over the last three years, the number of procedures for elective infra-renal AAA repair and repair of ruptured AAA have decreased. The number of carotid endarterectomies has remained stable since 2021 but is almost half of the number performed in 2014. A greater number of lower limb endovascular revascularisations are being entered onto the NVR, but the case-ascertainment rate could be improved.

The State of the Nation report recommends that NHS vascular units and vascular networks should aim to identify barriers and facilitators to the efficient collection of data on all index cases in particular endovascular revascularisation, and any centres performing lower limb endovascular procedures should enter them on the NVR. It is of note that a new NVR outlier policy will operate from 2025, and units that do not submit any data on eligible procedures will be considered an outlier.

Addressing these disparities requires targeted interventions, including improving access to care in deprived and rural areas, standardising clinical practices, and ensuring equitable resource allocation across NHS Scotland.

Data Source: 2024 NVR State of the Nation Report - VSQIP - Vascular Services Quality Improvement Programme

3B. DEFINE - Population Needs Assessment

3B.1 Population Demographics

As of 2025, Scotland's population is approximately 5.48 million⁴. Based on the population projections and relevant literature, the vascular procedure demand is forecast to increase over the next five years driven by an aging population and the prevalence of risk factors like diabetes and high blood pressure. Scotland's trends are in line with the broader UK trends, though the growth rate may be slightly higher due to demographic factors such as Scotland's aging population and higher prevalence of certain risk factors ^{3, 7, 9}.

Population Demographics in Scotland and Their Impact on Vascular Surgical Service Requirements

1. Age Distribution:

- **Current Data**: The population of Scotland is ageing, with a significant increase in the number of people aged 65 and over. As of 2025, the population distribution by age group is as follows:
 - o 0-14 years: 850,000
 - o 15-24 years: 650,000
 - o 25-44 years: 1,350,000
 - o 45-64 years: 1,250,000
 - o 65-74 years: 700,000
 - o 75+ years: 600,000
- **Impact**: The ageing population leads to a higher prevalence of vascular diseases such as peripheral arterial disease (PAD), abdominal aortic aneurysm (AAA), and carotid artery disease. This increases the demand for vascular surgical services, including revascularisation procedures and aneurysm repairs.

2. Gender Distribution:

- **Current Data**: The gender distribution in Scotland as of 2025 is approximately:
 - o Male: 2,700,000
 - o Female: 2,800,000
- **Impact**: Men are generally at a higher risk of developing vascular diseases, which means a higher demand for vascular surgeries among the male population. However, women also require significant vascular care, especially as they age.

3. Socioeconomic Status:

- Current Data: The population distribution by socioeconomic status in 2025 is:
 - o Low Income: 1,500,000
 - o Middle Income: 2,500,000
 - o High Income: 1,500,000
- **Impact**: Lower socioeconomic status is associated with higher rates of risk factors such as smoking, diabetes, and hypertension, leading to increased vascular disease prevalence and surgical needs. Access to healthcare and preventative measures can also vary by socioeconomic status, affecting overall demand for services.

4. Geographic Distribution:

- **Current Data**: The geographic distribution of the population in Scotland in 2025 is:
 - o Urban: 4,000,000
 - o Rural: 1,500,000
- **Impact**: Urban areas tend to have better access to healthcare facilities, including vascular services. However, rural areas may face challenges in accessing timely vascular care, leading to potential delays in treatment and increased demand for emergency interventions.

Data Source: National Records of Scotland (NRS)

3B.2 Risk Factors

Key risk factors for vascular diseases include diabetes, smoking, high cholesterol, and high blood pressure ⁵ and the aging population in Scotland will also contribute to the increasing demand for vascular procedures ⁶.

1. Smoking:

- **Prevalence**: Smoking remains a significant risk factor for vascular diseases. In Scotland, around 15% of adults smoke.
- Impact: Smokers are at a higher risk of developing peripheral arterial disease (PAD), abdominal aortic aneurysm (AAA), and carotid artery disease. Smoking cessation programs are crucial in reducing the incidence of these conditions and the need for ourginal intervantiane.

surgical interventions.

2. Diabetes:

- Prevalence: The number of people with type 2 diabetes in Scotland continues to increase (Fig.x). As of the latest data, over 320,000 people have been diagnosed with diabetes in Scotland ¹. Around 11% of these individuals have type 1 diabetes, while the remainder have type 2 diabetes ¹. This represents a significant increase from previous years, reflecting the ongoing rise in diabetes cases. The trend is closely linked to rising rates of obesity, suggesting that the incidence and prevalence of type 2 diabetes will continue to grow, necessitating increased access to vascular expertise ¹.
- **Impact**: Diabetes significantly increases the risk of vascular complications, including PAD and diabetic foot ulcers. This leads to a higher demand for revascularisation procedures, management of foot sepsis and, in severe cases, amputations.

Figure X: Prevalence of Diabetes in Scotland



3. Hypertension:

- **Prevalence**: Approximately 30% of adults in Scotland have hypertension.
- **Impact**: Hypertension is a major risk factor for atherosclerosis, which can lead to conditions requiring vascular surgery, such as carotid artery disease and AAA. Effective management of blood pressure is essential to reduce the need for surgical interventions.

4. Obesity:

- **Prevalence**: Around 29% of adults in Scotland are classified as obese.
- **Impact**: Obesity is closely linked to the development of type 2 diabetes and hypertension, both of which increase the risk of vascular diseases. This results in a higher demand for vascular surgeries, including revascularisation and aneurysm repairs.

Data Source-Public Health Scotland, Scottish Diabetes Survey, British Heart Foundation (BHF) Scotland, Scottish Health Survey.

These risk factors collectively contribute to the increasing demand for vascular surgical services in NHS Scotland.

Aging Population

• **Prevalence**: The population is ageing, with a significant increase in the number of people aged 65 and over. This trend is expected to continue, impacting healthcare and social services ².

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Change in Population Demographics in Scotland (2015 to 2025)

Data Source: National Records of Scotland

Impact[:]

- **Major Lower Limb Amputation**: The incidence of major lower limb amputation is higher in older adults, particularly those with diabetes and severe PAD ³.
- **Carotid Endarterectomy**: Carotid artery stenosis, which can lead to the need for carotid endarterectomy, is more prevalent in people over 65 ³.

Comorbidities by region across NHS Scotland, based on the latest data from the Scottish Health Survey and the Scottish Burden of Disease Study highlights:

Cardiovascular Conditions

- NHS Greater Glasgow and Clyde: Higher prevalence of cardiovascular conditions, with approximately 15% of the population diagnosed with heart disease.
- **NHS Lothian**: Around 12% of the population has been diagnosed with cardiovascular conditions.

Diabetes

- **NHS Tayside**: Higher rates of diabetes, with about 8% of the population diagnosed.
- NHS Fife: Approximately 7% of the population has diabetes.

Respiratory Conditions

- NHS Ayrshire and Arran: Higher prevalence of respiratory conditions, with around 14% of the population diagnosed with asthma
- 0000
- or COPD.
- **NHS Highland**: About 12% of the population has respiratory conditions.

Hypertension

- **NHS Lanarkshire**: Higher rates of hypertension, with approximately 20% of the population diagnosed.
- **NHS Borders**: Around 18% of the population has hypertension.

These statistics highlight the regional variations in comorbidities, which can impact the outcomes of vascular surgical services, therefore the TOM needs to take cognises of these.

Data Source- statistics.gov.scot; Scottish Health Survey-Local area level data



Implications for Vascular Services

The number of people with type 2 diabetes has significantly increased, alongside an ageing population with a higher risk of cardiovascular disease. Many of these individuals require access to vascular clinicians who collaborate with other local experts, such as podiatrists, diabetologists and renal physicians. Early identification and management of problems can help prevent unnecessary procedures or hospital admissions and therefore it is important the TOM considers these.

3C. DEFINE - Resource Assessment

3C.1 Workforce

The availability and distribution of funded WTE versus in post vascular healthcare professionals is outlined in Figure WF below (WTE = 10PAs):

Vascular Consultant	Interventional Radiology	Vascular Specialist Nu	rsing
Funded 48.6	Funded 35.1	Funded 20.2	In Post 15.2
		Vascular Scientist	
In Post 40.1	In Post 33.7	Funded 17.1	In Post 15.8

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Interventional Radiologists	6	0.51	5	0.43			Glasgov	Faltry - COOD	Eyon k-upon-Tweed	Holy I	Va: Sci	scular ientists	4	0.51	4	
Vascular Scientists	2	0.30	2	0.17		Port Ellen * 3 Malin Head Campbell	town + Crycle +Art	nock Tiv and	Microse The	Cheviot	Va: Sp	scular Nurse ecialists	3	0.38	2	
Vascular Nurse Specialists	5	0.43	2	0.17		Rathlin I.	Mull of Cirvan - 101 3	A Motat	HEVIOTHILS	Morneth	10000					
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POVS 2021 guidelines			
Vascular Specialist	POVS 2021 guidelines	Current in post	Current funded
Vascular Consultant	Approx 55 WTE for Scotland	40.1 WTE	48.6 WTE
Interventional Radiologists	Between 27 to 55 WTE	33.7 WTE	35.1 WTE
Vascular Scientists	3 WTEs at each arterial unit	15.8 WTE	17.1 WTE (Sufficient to support 5 arterial centres)
Vascular Nurse Specialists	Approx. 55 WTE for Scotland	15.2 WTE	20.2 WTE

NHS Highland

PopIn: 320K

Vascular

/ascular Specialist	WTE funded	Per 100K popin cover	WTE in post	Per 100K popin cover
/ascular Consultant	3	0.94	2	0.63
nterventional Radiologists	3	0.94	0.6	0.19
/ascular icientists	0	0	0	0
/ascular Nurse Specialists	1	0.31	1	0.31

Vascular Specialist	WTE funded	Per 100K popla cover	WTE in post	Per 100K popin cover
Vascular Consultant	7.5	1.18	4.5	0.71
Interventional Radiologists	4.6	0.72	3.6	0.57
Vascular Scientists	2.5	0.39	2.5	0.39
Vascular Nurse Specialists	1	0.16	1	0.16

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Vascular Specialist	WTE funded	Per 100K popin cover	WTE in post	Per 100K popin cover
Vascular Consultant	8	1.01	9	1.14
Interventional Radiologists	6	0.76	6	0.76
Vascular Scientists	4	0.51	4	0.51
Vascular Nurse Specialists	3	0.38	2	0.25

Popin: 1.05M

Vascular Specialist	WTE funded	Per 100K popin cover	WTE in post	Per 100K popin cover
Vascular Consultant	8.2	0.78	8.2	0.78
Interventional Radiologists	6.5	0.62	6.5	0.62
Vascular Scientists	6.6	0.62	5.6	0.53
Vascular Nurse Specialists	7.2	0.68	6.2	0.59

Vascular Consultant

According to the current UK estimate there is 1 vascular surgeon per 129,000 population.

POVS 2021 recommends that there should be provision of 1 vascular surgeon per 100,000 of population. At the time of data collection there were 48.6 WTE (WTE = 10PAs) funded posts across Scotland with 40.1 WTE in post. Based on the population of Scotland 1 consultant per 100,000 would indicate that 55 WTE vascular consultants are required. Funded posts across Scotland are for 48.6 WTE posts which is 1 consultant per 113,268 of the population. Whilst less than the guidelines this is greater than the UK average. It is important to note that from January 2025 the position in Highland in terms of in post has worsened. Vascular surgeons should be employed by the NHS Board hosting the arterial centre with up to 40% of their time spent at network.

Although the VSGBI POVS 2021 recommendation of one consultant per 100,000 population is helpful, the number of consultant vascular surgeons required for a particular health care system is difficult to define precisely. Index arterial procedures performed at hub centres require the presence of a consultant, however many activities at spoke centres can be undertaken by vascular nurse specialists, podiatrists and vascular scientists, supporting less frequent attendance by a consultant. Travel times for consultants to spoke or hub centres will require appropriate numbers of consultants as will the increasing practice for joint consultant operating in

some index cases. Job plans will also vary, including facilitating job share arrangements however consultant numbers should not be increased to the point where deskilling due to reduced case numbers can occur. Based on discussions at the T&F group one consultant per 110,000 population was deemed a reasonable target.

As of the final T&F group the SW of Scotland in post position has improved and they are up to 7 consultant, 4 Vascular nurse specialists and 1 ANP across the network. There are also 6 vascular scientists across the network now too.

Figures VC-IP and VC-F show the distribution of vascular consultants across NHS Scotland per 100,000 population in post and funded

Figure VC-IP



Figure VC-F



Recommendation from the task and finish group:

It is crucial to focus on recruitment, retention, training, and succession planning to address inequities across the healthcare system. By adopting a network model in the North, we can create more opportunities and make roles more appealing for trainees and other healthcare professionals. It will be impossible to recruit young consultants to Grampian as long as they spend their final years of training in the central belt therefore the training programme requires to address this as part of implementation of the SOM and TOM. This approach ensures that resources are used effectively to promote equity and improve overall service delivery. To meet increasing demand and as per advice from the vascular task and finish group it is recommended the number of vascular trainees should be increased. This requires taken forward by the **Service Oversight Group** as part of implementation.

Interventional Radiologists

The current estimate is that there is 1 interventional radiologist per 100,800 population in the UK.

The BSIR recommends that there should be >1 interventional radiologist per 64,000 of UK population, however this is based on the increasing number of medical and surgical specialties requiring IR procedures. It should be noted that while demand for elective vascular IR is significant the emergency requirement for vascular patients requiring IR out of hours is much less than for other specialties. To cover vascular surgical services specifically, the recommended number of interventional radiologists should be between 0.5 to 1 per 100,000 population. Given Scotland's population this translates to between 27 to 55 interventional radiologists dedicated solely to vascular services. Currently there is 0.6 radiologists per 100,000 people in Scotland

At the time of data collection, the centres providing vascular surgical centres reported 33.7 WTE (WTE = 10PAs) interventional radiologists in post versus 35.1 funded. This is low given the remote and rural challenges faced in Scotland and access to IR has been identified as a significant issue by the task and finish group. A move to a North of Scotland network would again support recruitment and retention and the **Service Oversight Group** will require to progress funding and recruitment to support implementation of the TOM.



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Vascular Nurse Specialists

According to the Provision of Vascular Services (POVS) 2021 guidelines, the recommended number of vascular specialist nurses is **1 per 100,000 population**. This ensures that there are enough specialised nurses to provide high-quality care, support multidisciplinary teams, and improve patient outcomes. For Scotland, with a population of approximately 5.48 million, this translates to needing about **55 vascular specialist nurses (VNS)** across the country.

To provide an adequate level of service, there should be a minimum of 2.0 whole time equivalent (WTE) vascular nurse specialists (VNSs) attached to the arterial centre, and 1.0 WTE VNS per network hospital (WTE = 10PAs).

At present the centres have reported 20.2 funded posts with only 15.2 in post. At present vascular specialist nurses are supported by general nursing staff or specialist staff in HDU/ICU. Investment in this area will be required to move to a target operating model as evidence indicates vascular specialist nurses as trained specialists help reduce complications, improve recovery times and enhance patient outcomes.

The Service Oversight Group will require to progress funding and recruitment to support implementation of the TOM.

Clinical Vascular Scientist

There are 263 clinical vascular scientists registered with the SVT in the UK (1 per 253,000 population). To provide a sustainable service it is recommended by the POVS 2021 guidelines there should be 3.0 WTEs (or equivalent staff) at each arterial centre (WTE = 10PAs).

Funding is sufficient to support 5 arterial centres, however the current location does not support 3 WTEs at each unit. Vascular scientists have an important role in providing diagnostic procedures at spoke hospitals and more complex scanning at arterial hubs.

The Service Oversight Group will require to progress to support implementation of the TOM.

On call rotas

The importance of emergency vascular on-call rotas is well-documented. These rotas are essential to ensure that patients with acute vascular conditions, such as ischemic limbs, ruptured abdominal aortic aneurysms, and vascular trauma, receive timely and specialised

care. The Vascular Society of Great Britain and Ireland (VSGBI) emphasises that a 24/7 consultant on-call rota for vascular emergencies, ideally with a frequency of 1 in 6 or greater, is crucial for providing adequate care, therefore this needs to be factored into the TOM.

This setup ensures that there is always a specialist available to handle complex emergencies, which can significantly improve patient outcomes. The number of consultants required for safe and sustainable on-call rotas in each vascular network will depend on the population size and skill mix. Additional commitments, such as major trauma, renal transplant, specialist aortic procedures, and non-vascular commitments for interventional radiologists, may necessitate less frequent rotas due to higher volumes of out-of-hours work. For staff aged over 55, it is beneficial to consider reducing on-call commitments during the later stages of their careers.

In the SOM and TOM there will require to be specific vascular surgical on call rotas in place in all arterial centres.

The Service Oversight Group will require to progress to support implementation of the TOM.

To assist the Service Oversight Group the task and finish group has summarised the responsibilities of each role and whether the role needs to be at the arterial centre, non-arterial centre or other location (Appendix 8.7)

3C.2 Infrastructure

Based on the POVS 2021 guidelines the requirements for arterial and non-arterial centres are summarised below:

Requirement	Arterial Centre	Non-Arterial Centre
Specialist Teams	Multidisciplinary team including vascular surgeons, interventional radiologists, and vascular anaesthetists.	Access to vascular specialists via network arrangements
Facilities	Dedicated vascular operating theatres including hybrid theatres equipped for both open and endovascular procedures, and interventional radiology suites for minimally invasive procedures	General surgical facilities with access to advanced imaging
Emergency Services	24/7 emergency vascular surgery and interventional radiology services	On-call vascular services with transfer protocols to arterial centres
Intensive Care	Access to intensive care units (ICU) with vascular expertise	High dependency units (HDU) with protocols for transfer to ICU if needed
Diagnostic Services	Comprehensive diagnostic services including CT, MRI, and duplex ultrasound	Basic diagnostic services with access to advanced diagnostics via network
Outpatient Services	Dedicated vascular outpatient clinics and rehabilitation services	General outpatient services with referral pathways to arterial centres
Training and Education	Facilities for training and education of vascular specialists	Participation in network-wide training programs
Governance and Audit	Robust clinical governance and participation in national audits	Adherence to network governance and audit protocols

Access to hybrid theatres is crucial in modern vascular surgical services for several reasons:

- **Combination of Techniques:** Hybrid theatres integrate the capabilities of a traditional operating room with advanced imaging ٠ technology. This allows surgeons to perform both open and minimally invasive procedures in the same setting, enhancing flexibility and precision. Joint procedures with IR can also be facilitated
- **Improved Patient Outcomes**: By enabling complex procedures with real-time imaging, hybrid theatres can reduce the need for ٠ some open surgeries. This minimises the risk of complications and shortens recovery times, leading to better overall patient outcomes
- Efficiency and Safety: The requirement to switch between operating theatres and interventional radiology rooms is no longer required, reducing the time under anaesthesia, the risk of infection and radiation protection issues. This improves the safety and efficiency of surgical interventions
- **Cost-Effectiveness**: Although hybrid theatres require significant investment, they can be more cost-effective in the long run. They reduce the need for multiple procedures and hospital stays, ultimately saving resources
- Multidisciplinary Collaboration: Hybrid theatres facilitate collaboration among vascular surgeons, interventional radiologists, and anaesthesiologists. This multidisciplinary approach ensures comprehensive care and immediate response to any complications.

Overall, hybrid theatres represent a significant advancement in vascular surgery, providing a safer, more efficient, and patient-centred approach to complex surgical care.

As part of moving to a TOM it is important that the number of hybrid theatres required to support the population of Scotland is identified.

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	wos	SW of Scotland	SE of Scotland	NHS Fife	NHS Grampian	NHS Tayside	NHS Highland
Theatre Capacity (no or theatres)	2	2	1.5	1 all day list per week	2	5	2
Bed capacity (No. of beds)	47	36	36	TBC	16	24	12
IR (Dedicated angio-suite – no of rooms)	2	1	0	1	0	0	0
IR capacity (Mixed IR use)	4	1	2	0	2	2	1
Hybrid Theatres (No.)	2	1	0	0	0	0	0

The current arrangements across NHS Scotland are summarised below:

The task and finish group recommends that NHS Fife and NHS Lothian confirm the capacity they have to free inpatient capacity for NHS Tayside & NHS Grampian to support NOS network mobilisation and a move to the sustainable operating model.

3C.3 Financial Resources

Whilst funding of future developments within vascular surgery is outside the scope, failure to recognise the reality of ongoing funding restrictions would risk offering naïve aspirations that would ultimately fail to gain traction. The need to demonstrate value for money, improved Quality of Life, longevity of intervention and efficacy in delivery are key components when considering the future of vascular surgery.

Financial Data

Currently NHS Scotland spend £69.27m on vascular surgery according to the cost book of 23/24, with wide variation in the in-patient, day case and outpatient cost per case across Boards. The following is an extract which displays all costs on a cost per case basis.

Speciality Name	SAA20	SDA02	SFA20	SGA20	SHA20	SLA20	SNA20	SRA01	SSA20	STA20	SVA20	SWA01	SYA20	SZA01
	NHS Ayrshire <u>&</u>	National Waiting Times Centre (Golden	NHS Fife	NHS Greater Glasgow & Clyde_	NHS Highland	NHS Lanarkshi re	NHS Grampia n	NHS Orkney	NHS Lothian	NHS Tayside	NHS Forth Valley	NHS Western Isles	NHS Dumfries & Gallow <u>av</u>	NHS Shetland
Cost per Case 📑	Arran	Jubilee 🔻	•	· · ·	•	•	•	•	•	•	•	•	•	•
Vascular surgery	467	0	516	1,220	1,127	1,659	2,432	0	2,215	2,611	296	0	692	0

NHS Highland currently spend a high amount on locums and will experience a potential reduction in their supplementary staffing if the sustainable model is adopted although to ensure place-based access given their recruitment and retention challenges this may be limited.

A fair pricing approach should be taken, and NHS Highland will require to pay on a cost per case basis for all out of area activity. When patient level information and costing system (PLICS) is rolled out this will replace the fair pricing approach.

All Boards will be appropriately funded for the activity they are undertaking on behalf of another Board, and this will be clearly described through a service level agreement. The task and finish group recommend there is clear specification and service level agreement developed to ensure smooth implementation of the TOM. The service oversight group will assume responsibility to develop a specification and service level agreement to facilitate implementation.

The service oversight group will be responsible for clarifying to Boards the specific financial impact:

- Cost of Care: Information on the costs associated with providing vascular services, including direct medical costs and indirect costs.
- Funding Sources: Data on funding sources and financial sustainability of vascular services and a cost-benefit analysis will
 require undertaken to compare the expected benefits of the new model against current costs.
- Implementation: Costs for implementation of a co-ordinated approach across NHS Scotland.

The rising demand for vascular procedures in Scotland is expected to lead to substantial increases in healthcare costs. These cost increases will vary by procedure type, with major lower limb amputations likely seeing the most significant rise due to complications from conditions like diabetes.

Effective resource allocation and strategic planning are crucial to managing these rising costs and ensuring that the healthcare system can meet the growing demand. This involves optimising the use of resources, investing in preventive care, and planning for future healthcare needs as part of the TOM. Effective resource allocation and strategic planning are crucial to managing these rising costs and ensuring that the healthcare system can meet the growing demand. However, it is recognised that a move to the TOM will require investment in terms of resource and infrastructure changes. The recommendations from the task and finish group provided in this report will support the **service oversight group** in collating business cases to support implementation of the SOM and TOM.

Forecasting the percentage increase in costs for vascular procedures based on the rising demand involves considering several factors, including the cost of medical supplies, staff salaries, transport and hospital operating expenses.

Resource allocation for vascular services in NHS Scotland is guided by the **National Resource Allocation Formula (NRAC)**. This formula considers factors such as population size, age, morbidity, and deprivation levels to ensure equitable distribution of resources.

Key points include:

- Budget Allocation: Approximately 70% of the total NHS budget is allocated based on the NRAC formula.
- Geographical Considerations: The formula adjusts for the higher costs of delivering services in remote and rural areas.
- **Target Shares**: Each NHS board receives a target share of the budget to plan and deliver services effectively.

Comparing the average costs of specific vascular procedures within NHS Scotland, NHS England, and private healthcare is important as benchmarking these costs helps assess the benefits of any proposed changes.

Average costs for specific vascular procedures within NHS Scotland:

- Lower Limb Revascularisation: Costs around £7,000 to £10,000 per case currently in NHS Scotland. Private healthcare ranges from £10,000 to £15,000, and NHS England costs approximately £8,000 to £12,000 per case.
- Aortic Aneurysm Repair: Endovascular aneurysm repair (EVAR) costs between £12,000 and £15,000 in NHS Scotland, while open surgical repair ranges from £15,000 to £20,000. Private healthcare costs between £20,000 and £30,000. NHS England costs around £15,000 to £25,000 for EVAR and £20,000 to £30,000 for open surgical repair.
- **Carotid Endarterectomy**: Costs between £5,000 and £8,000 per case. Private healthcare costs around £8,000 to £12,000, and NHS England costs typically range from £6,000 to £10,000 per case.

These costs vary based on procedure complexity, patient condition, and the specific health board. Private healthcare is generally more expensive due to higher operational costs and additional services. Costs in NHS England are slightly higher than in NHS Scotland, reflecting regional variations in healthcare expenses and resource allocation.



Comparison of Average Costs for Vascular Procedures

Carotid Endarterectomy

• Costs: NHS Scotland: £5,000 to £8,000; Private Healthcare: £8,000 to £12,000; NHS England: £6,000 to £10,000.



• **Outcomes**: This procedure helps prevent strokes by removing blockages in the carotid artery. The costs are associated with the precision required for the surgery, and successful outcomes significantly reduce the risk of stroke.

Data source: NHS England commissioners, cost book and private provider estimates

Evidence supports that the outcomes of these procedures justify their costs by providing significant health benefits and reducing the need for more expensive or extensive treatments in the future.

For **Lower Limb Revascularisation**, the high costs are justified by the substantial improvement in patient mobility, quality of life and ability to live independently at home. Effective revascularisation reduces pain and the need for alternative treatments like amputation or long-term wound care, which can be more costly and less effective.

For **Aortic Aneurysm Repair**, the costs reflect the complexity and critical nature of the procedure. Successful repair significantly reduces the risk of life-threatening ruptures, leading to increased survival rates. The benefits of preventing such catastrophic events outweigh the high costs of the procedure.

For **Carotid Endarterectomy**, the costs are justified by the precision and expertise required for the surgery. Preventing strokes through this procedure leads to significant long-term health benefits, reducing the need for extensive stroke rehabilitation and long-term care. This makes the procedure cost-effective by improving patient outcomes and reducing overall healthcare costs.

Overall, investing in these procedures can lead to better patient outcomes, reduced long-term healthcare costs, and improved quality of life, making them cost-effective in the long run.

3D. DEFINE - Population Health Needs

The data has been used to model future demand and inform the development of sustainable and target operating models. Key healthcare planning requirements include allocating appropriate resources, providing specialised training and education for healthcare professionals, and addressing potential increases in wait times. For patients, ensuring access to timely care, improving quality of life through effective procedures, and emphasising preventive measures are crucial. Public health policy should focus on preventive health programs, increased funding and investment in vascular health services, and continuous data collection and research to monitor trends and plan for future needs.

Future Demand Planning

Forecasting the demand for vascular procedures in Scotland over the next five years involves considering the population size, the prevalence of risk factors, and historical trends in procedure rates.

The anticipated increase for each of the vascular procedures (**Table Y**) in NHS Scotland over the next 5 years have been calculated using a combination of methods such as historical data analysis to identify trends, statistical modelling, and expert input. While these methods aim to provide reliable forecasts, it's important to note that unforeseen factors, such as sudden changes in healthcare policy, unexpected advancements in medical technology, or significant shifts in population health trends, can impact the accuracy of these projections. These forecasts are based on the most current and reliable information available at this point in time. As highlighted, it is important to acknowledge the data limitations flagged by the task and finish group and recorded within this report.

Summary of Demand for Vascular Procedures

Based on the literature review, historical data, information from subject matter experts within the task and finish group and taking account of the prevalence of risk factors, the demand for various vascular procedures in Scotland is expected to increase.

The vascular procedures projected to experience the most notable growth:

- 1. Lower Limb Revascularisation: This includes angioplasty and stenting for peripheral artery disease (PAD). The demand is expected to rise due to the increasing prevalence of PAD and diabetes.
- 2. **Major Lower Limb Amputation**: The number of these procedures has been increasing, partly due to complications from diabetes. Recent reports indicate a significant rise in diabetes-related lower limb amputations in the UK
- 3. Aortic Procedures: While the incidence of AAA is decreasing the diagnosis of acute aortic dissection appears to be increasing
- 4. Carotid Endarterectomy: Although the number of procedures is falling timely intervention to prevent stroke requires significant

resources

 Endovascular Procedures: Procedures like Endovascular Aneurysm Repair (EVAR) and Thoracic Endovascular Aortic Repair (TEVAR) have increased as technology has improved the availability of devices to treat conditions previously unsuitable for conventional surgery.

These projections are based on factors such as demographic changes, the rising prevalence of chronic conditions like diabetes, and advancements in medical technology.

The rationale for the forecast increase includes:

- 1. **Population Projections**: The total population of Scotland is expected to rise slightly before declining ^{4,8}, however, the number of people aged 65 and older is projected to increase significantly ^{4,8}.
- 2. **Disease Burden Forecasts**: The burden of cardiovascular diseases, diabetes, and other chronic conditions is expected to rise due to the ageing population ^{3, 8, 9}.

3. Advancements in medical technology

The overall growth in demand for vascular procedures in the UK, including Scotland, is expected to be sustained over the next several years ^{3, 8, 9}.

Table Y: Estimated increase in nul	mber of procedures	over the next 5 years (range low to high)
Procedure	Approx. Incidence Rate (per 100,000)	Estimated Number of Procedures -low to high (Current population)	Estimated Number of Procedures (Anticipated future population – 5.7M)
Carotid Endarterectomy	1.2 – 8.6	66 – 471	68 - 490
Abdominal Aortic Aneurysm (AAA) Repair	5.0 - 10.0	274 - 548	285 - 570
Emergency Open Surgical AAA Repair	1.0 - 2.0	55 - 110	57 - 114
Elective Open Surgical AAA Repair	2.0 - 4.0	110 - 220	114-228
Emergency Endovascular AAA Repair (EVAR)	1.0 - 2.0	55 - 110	57 - 114
Elective Endovascular AAA Repair (EVAR)	2.0 - 4.0	110 - 220	114 - 228
Lower Limb Revascularisation	15.0 - 20.0	822 - 1,096	855 - 1140
Major Lower Limb Amputation	5.0 - 10.0	274 - 548	285 - 570
Combined AAA Elective Procedures	4.0 - 8.0	220 - 439	228 - 456
Varicose Veins	20.0 - 30.0	1,096 - 1,644	1140 - 1710
Thoraco-abdominal Aortic Aneurysm (TAAA)	0.5 - 1.0	27 - 55	28 - 57
Endovenous Laser Treatment (EVLT)	5.0 - 10.0	274 - 548	285 - 570
Renal Access Procedures	10.0 - 15.0	548 - 822	570 - 855
Thoracic Endovascular Aortic Repair (TEVAR)	1.0 - 2.0	55 - 110	57 - 114

Table V. Estimated increase in number of	nrocedures over the next 5	vears (range low to high)

The SOM (Service Operating Model) and TOM (Target Operating Model) must incorporate resilience to effectively handle the anticipated increase in demand, particularly as activity is leaning more to the high number of procedures in the range.

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4A. DEVELOP - Proposed Sustainable and Target Operating Models

Prescription: What are we going to do about it?

With the problem clearly stated and data collated and analysed, the task and finish group identified and discussed possible solutions to co-create the SOM and TOM. Building on the work undertaken in 2011, which strengthened the West of Scotland network and centralised services, and incorporating lessons learned from relevant literature and reconfiguration undertaken in Northern Ireland, the task and finish group explored various options to identify recommendations.

4A.1 Options Considered

Option	Option Strengths Weaknesses		Decision / Rationale	
Option 0: Do nothing	No additional investment required.	 NHS Highland no longer able to maintain vascular services for NHS Scotland patients, mutual aid enacted Equity of access for NHS Scotland patients Older age profile of consultant vascular surgeons in Scotland with long-term recruitment challenges in some centres Need to achieve sustainable on call arrangements 		
Option 1: Division of workload by vascular condition	-	 Difficult to implement. Group agreed it was not a feasible model. 	DISCOUNTED This early suggestion aimed to alleviate immediate pressures but was discounted due to implementation challenges.	
Option 2: Highland demand covered on rotational basis between Major Trauma Centres (MTCs)	 Immediate implementation. Clear division of responsibilities. Potential equity of resource allocation. 	 Substantial resource requirements. Potential for unfair practices (e.g., avoiding out-of-hours treatment). Inconsistencies within clinical governance. Variation in access to Out of Hours (OOH) / Interventional Radiologists (IR). Potential for over-triaging patients. Challenges in defining long-term patient care teams. Potential to increase impact on Winter bed crisis. 	DISCOUNTED This scenario offers immediate implementation and clear responsibilities but faces significant resource and governance challenges. The group agreed not to procced to feasibility	
Option 3: Transfer Highland patients to Grampian or Tayside	 Closest proximity to NHS Highland. Strong existing working relationships. Good clinical governance. Clear pathways and responsibilities. 	- Existing capacity issues within NHS Grampian and NHS Tayside. - Recruitment and IR issues within NHS Grampian.	DISCOUNTED Leveraging proximity and existing relationships, this scenario faces capacity and recruitment challenges.	
Option 4: Permanent division of Highland case load based on MTCs - Clear lines of responsibility base geography. - Predictable fixed workload. - Clear links for Raigmore. - Good clinical governance.		 Potential boundary issues. Significant travel distance for some patients. Recruitment and capacity issues remain for some centres. 	DISCOUNTED This scenario provides clear geographic responsibilities and predictable workloads but faces boundary and travel challenges.	
Option 5: Recommended by task and finish Group: North of Scotland Network	 Resources from Fife could support Lothian/Tayside. Strong spoke services already in place in Fife Shared workload. Evidence of success from WOS / SW of Scotland network Resources and infrastructure to support Could transition in a phased approach to SOM then TOM to manage change and reduce the impact 	 Significant cooperation and support required from Tayside/Fife & Lothian. Logistics of a network. 	ENDORSED to commence feasibility assessment and conclude recommendations Forming a North of Scotland network with shared resources and workload, this scenario requires significant cooperation and logistical planning.	





Evidence to support the proposed model: Option 5: Creation of a North of Scotland Network

The literature review indicates that the organisation of vascular services has significant implications for rates of amputation, particularly in patients with peripheral arterial disease (PAD) and critical limb ischemia (CLI).

1. Multidisciplinary Teams (MDTs):

The involvement of MDTs, including vascular surgeons, interventional radiologists, podiatrists, and diabetes specialists, has been associated with better outcomes for patients with diabetic foot problems and PAD. MDTs can provide comprehensive care, addressing various aspects of the disease and reducing the risk of amputation. Regular MDT meetings are essential for discussing complex cases and developing comprehensive treatment plans. Effective coordination between MDTs and primary care providers ensures seamless patient transitions and continuity of care.

2. Centralisation of Services:

Centralising vascular services in high-volume centres can lead to better outcomes. High-volume centres tend to have more experienced surgeons and better access to advanced technologies, which can improve the success rates of revascularisation procedures and reduce amputation rates ¹².

Impact of hospital volume on vascular procedure outcomes

A study in Leicester reviewed 3,036 patients who underwent arterial reconstruction, angioplasty, or major amputation for lower limb peripheral vascular disease. The results showed an increase in arterial reconstructions and angioplasties over time, while the total amputation rate slightly decreased. Published evidence indicates a significant association between hospital volume and operative mortality for both open and endovascular repair of abdominal aortic aneurysms (AAA). Higher hospital volumes are associated with lower mortality rates for open surgical repair (OSR) of both intact and ruptured AAAs. A systematic review found that elective open repair of infrarenal AAAs in high-volume centres or by high-volume surgeons is linked to lower perioperative mortality. For endovascular repair, the volume-outcome relationship is less pronounced, but higher hospital volumes may still contribute to better outcomes, especially for complex cases. Adequate institutional experience and meeting specific volume criteria are important factors in reducing in-hospital mortality.⁴

Evidence supports the centralisation of AAA repair procedures in high-volume centres to improve patient outcomes and ensuring surgeries are performed by high-volume surgeons to further reduce operative mortality. These findings should be considered in planning and allocating resources for vascular surgery services.⁴

Similarly, published evidence shows a significant association between hospital volume and outcomes in elective carotid endarterectomy (CEA) surgery. Higher hospital volumes are associated with lower in-hospital mortality rates for CEA. Studies indicate that hospitals performing a higher number of CEA procedures tend to have better outcomes due to greater surgical expertise, better perioperative care, and more robust clinical protocols. This supports the centralisation of CEA procedures in high-volume centres to improve patient outcomes ³.

3. Early Intervention and Preventive Care:

Early diagnosis and intervention for PAD and CLI are crucial in preventing disease progression and reducing the need for amputation. Organised vascular services that emphasise early screening and preventive care can help identify at-risk patients and provide timely treatment ¹.

4. Regional Variations:

There are regional variations in the rates of amputation, which can be influenced by the availability and organisation of vascular services. Regions with well-organised vascular services and higher rates of revascularisation tend to have lower amputation rates ^{1 2}. Establishing regional vascular networks facilitates collaboration between central hubs and local hospitals, ensuring patients have access to specialised care when needed, while routine and less complex care can be provided locally.

5. Integrated Care Pathways:

Developing and implementing standardised care pathways for common vascular conditions, such as peripheral arterial disease (PAD), abdominal aortic aneurysm (AAA), and carotid artery disease, ensures timely diagnosis, treatment, and follow-up care.

6. Scalability & Adaptability:

Designing the service model with modular components allows for flexibility and adaptability based on demand, ensuring the model can scale up or down as the population's needs change.

7. Capacity Building:

Investing in training and development programs builds capacity and ensures a skilled workforce is available to support expansion.

8. Data Analytics:

Leveraging data analytics optimises resource allocation, predicts patient needs, and improves decision-making.

Data source: 1: Association between Hospital Carotid Endarterectomy Procedure Volumes and In-Hospital Mortality in São Paulo State. 2: Association of Very Low-Volume Practice with Vascular Surgery Outcomes. 3: Hospital Volume Association with Carotid Endarterectomy Outcomes. 4. Sayers, R.D., Thompson, M.M., Varty, K., Jagger, C., & Bell, P.R.F. (1993). Effects of the development of modern vascular services on amputation rates in Leicester, U.K.: A preliminary report. Annals of Vascular Surgery, 7(1), 102-105. https://doi.org/10.1007/BF02042667

4A.2 Recommended Model Overview

Phase 1: Sustainable Model

The proposed sustainable operating model is denoted on the map below:



Principles of the SOM:

- o NHS Highland ceases to be an arterial centre with immediate effect
- NHS Grampian, NHS Tayside & NHS Fife form a North of Scotland (NOS) network with two arterial centres. NHS Tayside the lead centre with Grampian undertaking selected arterial cases with a focus on endovascular interventions.
- NHS Fife to confirm capacity they have to free inpatient capacity for Tayside to support the NOS model. The task and finish group recommends that NHS Fife look at options such as provision of minor limb amputations. This will reduce the burden on theatre access and bed space in Tayside and Grampian. An amputation rehab service must be in place to support this.
- **NHS Lothian** to confirm capacity and recommended to look at options such as taking NHS Fife acute unselected take. This would free capacity for NHS Tayside to support the NOS patient demand.
- NHS Highland patients transfer to NHS Tayside as part of the longer-term transition to the demand being met by the NOS network
- Southwest Scotland network remains unchanged
- West of Scotland (WOS) network remains unchanged. OOH IR provision to SW network requires addressed as part of the workforce planning to be taken forward by the Service Oversight Group
- Southeast network remains largely unchanged apart from some additional patients from Fife and continues as the National centre for TAAA and complex aortic conditions.
- NHS Highland to operate as a non-arterial centre and have provided a summary to the T&F group as to what they plan to provide.

Still in draft and will be provided once endorsed-to be taken forward by the service oversight group.

- **NHS Highland** funding for resources to be released to support recruitment to the new model of delivery.
- Service Oversight Group to undertake workforce modelling using the data and recommendations collated in the dashboard to support realignment of funding to support the SOM/TOM implementation and produce a business case to support implementation of the SOM and TOM.

The NOS sustainable model was considered to be the most suitable for the following reasons:

- Moving to a NOS network would align with the network model arrangements already in place across Scotland.
- NHS GGC has already provided support by taking Western Isles patients and is currently supporting OOH support to the SW network as part of a temporary arrangement therefore has no capacity for any additional patients.
- The Southwest Scotland Vascular network is currently under pressure due to capacity issues and regional planning discussions have commenced with WOS to agree a longer-term solution to enable NHS Lanarkshire to meet the requirement of having an OOHs IR service as a vascular hub.

- NHS Fife were keen to remain in a network with NHS Tayside and confirmed during the site visits and at the task and finish group they could provide capacity to support the NOS model.
- It was important not to destabilise well established arterial centres and learn lessons from previous work undertaken both in • Scotland and elsewhere.
- Gateway review points will be established by the Service Oversight Group, along with key performance indicators (KPIs), to determine any additional requirements for transitioning to the target operating model and to monitor implementation to the SOM and the TOM.

The task and finish group recommend that Raigmore hospital in Inverness becomes a "spoke "non-arterial unit with index arterial cases no longer being undertaken. Current VSGBI recommendations are for the following services to be maintained at "spoke hospitals " outpatient clinics, inpatient reviews, renal access work, varicose vein interventions, minor amputations and selective interventional radiological procedures. In order for Highland to maintain these services additional staff will be required including advanced nurse practitioners and visiting vascular surgeons from the NOS network. The service oversight group will assume responsibility for taking this forward as part of implementation using the data and recommendations detailed within this report.

The sustainable operating model is an interim model recommended by the task and finish group merely as a step change to the target operating model acknowledging that it will take time to fully implement the TOM. The task and finish group has indicated that although it is referred to as the sustainable operating model this is an essential step change to move from mutual aid which is unsustainable, acknowledging it will take longer to get appropriate resource, funding and infrastructure in place to fully implement the TOM.

Phase 2: Target Operating Model

The proposed target operating model is denoted on the map below:



NSD608-026.01 V2

Current Operating Model (COM) Current Service Providers (across top) and Referring Board Population (down Side) Health Board South East South West West NHS Grampian NHS Highland NHS Tayside 365228 Ayrshire & Arran Borders 115985 Dumfries & Galloway 146442 Forth Valley 312030 NHS Fife 371824 1192016 NHS GG&C 590374 **NHS** Grampian 320000 **NHS Highland NHS Lanarkshire** 664226 938830 **NHS Lothian** NHS Tayside 416759 Orkney 22341 Shetland 22956 Western Isles 25855 Total 1054815 1175896 1529901 320000 788583 635671

	Propos	ed Target Operati	ng Model (TOM)	
Proposed Regions (acro	oss top) and	Referring B	oard Populati	on (down Side)
Health Board	North	South East	South West	West
Ayrshire & Arran			365228	
Borders		115985		
Dumfries & Galloway			146442	
Forth Valley				312030
NHS Fife		371824		
NHS GG&C				1192016
NHS Grampian	590374			
NHS Highland	320000			
NHS Lanarkshire			664226	
NHS Lothian		938830	k.	
NHS Tayside	416759			
Orkney	22341			
Shetland	22956			
Western Isles				25855
Total	1372430	1426639	1175896	1529901

The target operating model for vascular surgical services complies with current VSGBI recommendations and involves centralising complex and emergency care at arterial centres (hubs) while providing routine non arterial and less complex care at local hospitals (spokes). This model ensures that patients receive the right level of care at the appropriate location, optimising resource use and improving patient outcomes.

Hub (Arterial Centre):

Handles complex elective surgeries, emergency surgeries, advanced diagnostics, post-operative intensive care.

- **Complex Elective Surgeries**: Procedures such as aortic aneurysm repairs, carotid endarterectomy, and complex lower limb revascularisations and amputations.
- **Emergency Surgeries**: Immediate interventions for conditions like ruptured aortic aneurysms and acute limb-threatening ischemia.
- **Advanced Diagnostics**: High-end imaging and diagnostic services, including CT angiography and MR angiography.
- **Multidisciplinary Team (MDT) Meetings**: Regular MDT meetings to discuss complex cases and develop comprehensive treatment plans.

- **Post-Operative Intensive Care**: Specialised post-operative care for patients undergoing major surgeries.
- **Lower Limb Leg Amputations:** The majority of complex lower limb leg amputations will be undertaken in the arterial centres due to the need to improve perioperative mortality rates.
- o Preassessment: Facilitated by vascular anaesthetic team

Spoke (Non-Arterial Centre-Local Hospitals):

Provides outpatient clinics, diagnostic procedures, non-complex elective surgeries, community-based rehabilitation, and telemedicine services.

- Outpatient Clinics: Routine follow-up appointments, initial assessments, and management of stable vascular conditions. Nurse-led claudication clinics and supervised exercise clinics.
- Diagnostic Procedures: Vascular Laboratory services including duplex ultrasound and ankle-brachial index (ABI) measurements, imaging services including CT.
- Non-Complex Elective Surgeries: Day-case procedures including renal access, varicose vein treatments and minor amputations.
- **Community-Based Rehabilitation**: Post-operative rehabilitation and management of chronic conditions.
- **Telemedicine Services**: Remote consultations and follow-up care for patients in remote or rural areas.

The benefits to patients of developing a smaller number of high-volume centres for specialist surgery is now well established. To determine the number of arterial hubs required to meet the population need for vascular services in Scotland, several factors were considered, including population distribution, geographic accessibility, and the volume of vascular procedures undertaken in each arterial centre. In addition, the important role and distribution of spoke centres was considered to ensure equity of access for all vascular patients in Scotland. Consideration of likely changes in disease patterns, consultant staffing levels and the development of non-consultant roles was also reviewed to ensure a safe and sustainable model for future vascular services in Scotland. Finally transport networks and advice from SAS was used to identify the population need.

In determining the appropriate number of hubs and spokes required to meet Scotland's vascular service needs, several key factors were considered, including population distribution, geographic accessibility, and procedural volumes. While population size alone might suggest that three arterial centres would be sufficient, the inclusion of remote and rural geography, along with transport infrastructure challenges, supports the need for five arterial centres to ensure equitable and timely access to care.

Furthermore, based on the data and as recommended by the task and finish group it is proposed that....

- Trainee numbers in vascular surgery should be improved and recruitment and retention of staff addressed.
- VSGBI recommendations are one consultant vascular surgeon per 100,0000 population however the group agreed that an initial working ratio of one per 115,000 was more appropriate to ensure sustainable on call rotas and also ensure adequate case numbers.
- There should be a minimum of 2.0 whole time equivalent (WTE) vascular nurse specialists (VNS) attached to the arterial centre, and 1.0 WTE VNS per network hospital. Recruitment of specialist nursing staff is a specific concern nationally and should be increased.
- The number of Interventional Radiologists should be increased but in the interim distribution of current national resources should be addressed with an increase of interventions undertaken in spoke centres.
- Diagnostic services should be provided at hub and spoke sites as outlined above.
- Primary care communication with local hub and spoke arrangements should be updated and education on the increasing burden of CLTI and Diabetic foot problems should be addressed.
- To facilitate appropriate timely transfer of urgent conditions, including bypass protocols, communication with SAS is
 essential and the development of direct contact process between SAS and an arterial hub senior clinician should be
 considered.

The system oversight group require to take ownership of these as part of implementation.

ADDENDUM: MAY 2025

At the request of the Scottish Government, an additional option—transitioning the SOM (Sustainable Operating Model) into the TOM (Target Operating Model)—was considered by the Task and Finish Group at an extraordinary meeting held on 29th May 2025. The group was also invited to propose any additional suggestions or alternative options for consideration. The outcome of the meeting was as follows:

follows:

- The majority of the group reaffirmed their support for Option 5, recognising it as the most viable target operating model for delivery at a population level, and endorsed the robust process undertaken by the Task and Finish Group.
- While representatives from NHS Fife and NHS Lothian reiterated their reservations regarding the proposed TOM, they
 expressed a commitment to collaborate with NHS Tayside colleagues to determine an appropriate distribution of Fife patients.
 This collaboration will focus on developing an equitable, patient-centred approach.

4A.3 Desired Outcomes & Benefits of the Recommended Model

- Improved Outcomes: Centralising complex procedures in high-volume centres can lead to better patient outcomes. •
- **Equitable Access:** Ensuring that all regions have access to specialised care through a network of hubs and spokes.
- Efficiency: Optimising resource use and reducing duplication of services.
- Sustainability & Resilience: Vascular patients require time-critical intervention and larger arterial hubs will ensure ٠ appropriate on call arrangements for staff and improved safety.
- Ensuring equitable access to vascular treatment and care pathways for all NHS Scotland patients remains a critical priority.
- Vascular patients from throughout Scotland requiring specialist vascular intervention, will be discussed at the Network Multi-Disciplinary Meeting (MDM) to ensure they receive appropriate advice and care.
- Compliance with SHTG recommendations and realistic medicine goals are best served by network MDM process. Decision ٠ making in patients who are often elderly, and frail can be difficult, and a large MDM is key to optimising care and reducing significant variations in practice.
- Key Performance Indicators ensure timely interventions with acceptable morbidity and mortality and are required to comply • with NVR /VSGBI recommendations. It is anticipated that these will improve as a result of the proposed changes.
- Sharing of good practice and equity of access for all patients is enhanced in the hub and spoke model. •

4B. DELIVER - Feasibility Assessment

Treatment: Can the option be feasibly delivered?

4B.1 Principles & Assumptions

It is important to note **NHS Highland** is no longer able to function as an arterial centre and is currently reliant on mutual aid. Option 5 has been developed using a population planning approach using the knowledge and expertise of a multi-disciplinary task and finish group. No other options have been presented for consideration and the proposed option complies with the VSGBI guidelines and is endorsed by the independent vascular consultant.

The task and finish group wish to highlight that the current operating model is no longer sustainable and that whilst consensus has not been reached the majority of the members recommend option 5. The task and finish group have considered all viable options. They recognise that no centre has sufficient capacity, and resources and infrastructure are not ideally positioned to deliver services. Despite interdependent service challenges across the system, the group agrees that change is necessary, and mobilising the SOM is a positive step forward. Additionally, the group has identified that fully implementing the SOM and delivering the TOM will require time and investment.

While high volume arterial centres give better outcomes for most interventions, it is essential that vascular services provided outside of the arterial centre are not neglected. Therefore, the principles of the SOM and TOM development have focussed on ensuring that treatment should be offered locally where possible. Whilst outpatient clinics and vascular diagnostic imaging should be offered locally, inpatient arterial surgery should be undertaken in a specialist 'arterial centre' except when delivered jointly with other services (i.e., trauma, cardiac or cancer).

Principles for Repatriation:

Repatriation should be timely, occurring as soon as it is clinically safe and appropriate, ensuring the patient is medically stable, fit to travel and unlikely to require further vascular intervention. Decisions must prioritise patient-centred care, considering the best interests of the patient and their family. Early coordination and clinician-to-clinician discussions are essential for effective planning. The process involves the lead clinician and MDT deciding to repatriate, communicating with the receiving hospital, organising transport, and transferring all necessary medical records. Follow-up care plans must be clear. Transfers should occur within two days of the decision. Delays can negatively impact patient experience, reduce bed availability, strain resources, and potentially lead to poorer clinical outcomes.

High level repatriation principles agreed by the task and finish group are shown below:

Stage	Clinical Responsibility	Details
Initial Transfer Request	Referring Clinician	Initiates the transfer request and communicates with the receiving board.
Assessment for Transfer	Referring Clinician and Receiving Clinician	Both clinicians assess the patient's condition and suitability for transfer.
Preparation for Transfer	Referring Clinician and Nursing Staff	Ensures all medical records, medications, and necessary equipment are prepared for transfer.
Transfer Coordination	Transfer Coordinator (could be a designated nurse or admin staff)	Coordinates logistics, including transport and communication between boards.
During Transfer	Escorting Medical/Nursing Staff	Provides care during the transfer, ensuring patient safety and comfort.

Stage	Clinical Responsibility	Details
Arrival at Receiving Board	Receiving Clinician and Nursing Staff	Takes over clinical responsibility upon patient's arrival and ensures continuity of care.
Ongoing Care at Receiving Board	Receiving Clinician	Manages the patient's care during their stay at the receiving board.
Preparation for Return Transfer	Receiving Clinician and Nursing Staff	Prepares the patient for transfer back, including updating medical records and medications.
Return Transfer Coordination	Transfer Coordinator	Coordinates the logistics for the return transfer.
During Return Transfer	Escorting Medical/Nursing Staff	Provides care during the return transfer.
Arrival Back at Original Board	Original Referring Clinician and Nursing Staff	Takes back clinical responsibility and ensures continuity of care.
Post-Transfer Follow-Up	Original Referring Clinician	Conducts follow-up assessments and adjusts care plans as needed.

The task and finish group recommend implementing a push model to the referring board to address current pressures and challenges associated with long-distance transport. It is advised that the **System Oversight Group** develop a protocol to cover this as part of the implementation process. The SEAT repatriation protocol, provided **by NHS Lothian**, can serve as a basis for this.

4B.2 Proposed Governance Arrangements

With the establishment of the Planning and Delivery Board, statutory accountability mechanisms have not changed. All NHS Boards are directly accountable to Ministers and Scottish Government and will continue to be. Cabinet Secretary/Director General for Health and Social Care (DGHSC) will continue to set priorities, targets, and outcome measures, which will feed into the mandate for the Planning and Delivery Board to deliver within the wider NHS.

However, the Planning and Delivery Board will draw on existing legislation (National Health Service (Scotland) Act 1978, section 12J) stating that Boards "in the planning and provision of services shall ... co-operate with one another with a view to securing and advancing the health of the people of Scotland".

The NHS Scotland Planning and Delivery Board will consider national decisions which may be required to achieve service sustainability and may avoid future costs, in addition to national decisions identifying which areas may need to pause or stop due to the financial pressures. Taking a strong evidence-based approach, NHSSPDB will make recommendations on NHS Scotland decisions that will be shared with Boards, Board Chief Executives (BCEs), HSCMB and Ministers where necessary.

Governance Structure and Leadership Roles

Governance Structure

- 1. NHS Scotland Board
 - a. Role: Overall strategic oversight and accountability for vascular services.
 - b. **Responsibilities**: Ensuring alignment with national health policies, approving budgets, and monitoring performance.
- 2. Vascular Services task and finish Group
 - a. Role: Providing recommendations for the Target Operating Model (TOM).
 - b. Responsibilities: Developing the TOM and recommendations to inform the implementation plan.
- 3. Clinical Governance Committee
 - a. Role: Ensuring the quality and safety of vascular services.
 - b. **Responsibilities**: Reviewing clinical outcomes, patient safety incidents, and adherence to clinical guidelines.

4. Regional Vascular Networks

- a. Role: Coordination of vascular services across different regions.
- b. **Responsibilities**: Facilitating collaboration between hospitals, managing resource allocation, and ensuring equitable access to care.
- 5. Multidisciplinary Teams (MDTs)
 - a. Role: Providing comprehensive and coordinated patient care.
 - b. **Responsibilities**: Developing individualised treatment plans, conducting regular case reviews, and ensuring seamless care transitions.

6. Service Oversight Group

- a. Role: Implementing the SOM & TOM
- b. **Responsibilities**: Taking ownership of the recommendations from the task and finish group and implementation. Development of care pathways, timelines, processes and protocols, development of business cases where applicable and updating on implementation progress.

4B.3 Operational feasibility

• Workforce, Facilities & Equipment

The following diagram details the workforce across the system, current assessment against the VSGBI guidelines to inform implementation. Implementation will be taken forward by the **service oversight group** following endorsement of the recommendations by the PDB and NHSEG.



Vascular Specialist	POVS 2021 guidelines	Current in post	Current funded
Vascular Consultant	Approx 55 WTE for Scotland	40.1 WTE	48.6 WTE
Interventional Radiologists	Between 27 to 55 WTE	33.7 WTE	35.1 WTE
Vascular Scientists	3 WTEs at each arterial unit	15.8 WTE	17.1 WTE (Sufficient to support 5 arterial centres)
Vascular Nurse Specialists	Approx. 55 WTE for Scotland	15.2 WTE	20.2 WTE

• Demand

Whilst population level planning has informed the SOM and TOM, as requested by the task and finish group members to support capacity planning to mobilise the SOM the average NHS Highland demand has been extracted and is denoted below. There is an average of 25 blue light emergencies per annum (approx. 1 every 2 weeks) and a typical week consists of an MDT list of 36 patients. On average over the last 5 years the procedure numbers have been:

Procedure	Average annual number of procedures
Open Aortic Aneurysm	13
EVAR	10
Carotid Endarterectomy	18
Bypass	33
Other endartectomy	23
Leg amputation	24
Other (non-leg) amputation	59

• Pathways of care

When reconfiguring services, the whole patient pathway, from diagnosis to rehabilitation, should be both defined and written down. For 'time critical' vascular treatment pathways should include time-frame standards, and how these will be recorded and monitored. The **service oversight group** will assume responsibility for development of care pathways and timelines as part of implementation.

• Workflow & Service Integration

Responsibilities at Each Stage of the Pathway

To support implementation the task and finish group has provided high level recommendations as follows:

- 1. Initial Assessment
 - a. **Responsibility**: Non-Arterial Local hospitals (Spoke) and GPs.
 - b. Role: Conducting initial assessments, history taking, and physical examinations.
- 2. Diagnostic Imaging
 - a. Responsibility: Referring/local hospital
 - b. Role: Performing imaging such as CT angiography and MR angiography.
- 3. Risk Factor Modification
 - a. **Responsibility**: Non-Arterial -Local Hospitals (Spoke) and GPs.
 - b. Role: Providing lifestyle advice, smoking cessation programs, and managing comorbidities.
- 4. Medical Management
 - a. Responsibility: Non-Arterial -Local hospitals (Spoke) and GPs also support.
 - b. Role: Prescribing and monitoring medications.
- 5. Supervised Exercise Therapy
 - a. **Responsibility**: Non-Arterial -Local hospitals (Spoke) and community-based programs.
 - b. Role: Providing supervised exercise programs.
- 6. Revascularisation / Surgical Interventions
 - a. Responsibility: Arterial centres (Hub).
 - b. Role: Performing surgical and endovascular procedures.
- 7. Follow-Up
 - a. Responsibility: Non-Arterial -Local hospitals (Spoke) and GPs also support.
 - b. Role: Conducting regular follow-up appointments and monitoring progress.

It is recommended that the Service oversight group develop these further as part of implementation.

• Technology Integration

Technology Integration Requirements for Transition to Sustainable and Target Operating Models

Technology integration requirements for transitioning to sustainable and target operating models include non-invasive assessment of vascular disease using computed tomography, magnetic resonance angiography, or ultrasound, which is crucial for both diagnosis and planning of vascular interventions. Ensuring equitable access to these techniques and aligning them with local outpatient clinics is necessary for rapid assessment. Patient management increasingly requires a combination of open surgical and/or endovascular techniques, necessitating that vascular units operate with effective multidisciplinary teams and have access to both vascular surgical and interventional radiology techniques.

Investment in advanced diagnostic and treatment technologies, including telehealth services, is essential to reach underserved areas. Implementing telemedicine services can provide remote consultations, follow-up appointments, and monitoring for patients in remote or rural areas through virtual consultations and remote monitoring devices. Utilising digital health tools such as mobile apps and wearable devices can help monitor patients' health status and provide real-time feedback to healthcare providers. Advancements in diagnostic tools and techniques, such as Doppler ultrasound and CT angiography, have improved the ability to diagnose vascular conditions accurately, contributing to an increase in outpatient visits for diagnostic evaluations and monitoring. Implementing integrated electronic health records (EHRs) ensures seamless information exchange and coordination, reducing duplication of tests and procedures, ensuring all providers have up-to-date information, and facilitating better communication and continuity of care.

It is recommended that the Service oversight group develop a technology integration plan as part of implementation.

• Transport Integration

SAS have provided a summary of requirements to deliver- refer to section 2B.3. If the Planning and Delivery Board endorse the proposed operating model, a full risk assessment will be required and would be the responsibility of the Scottish Ambulance Service to deliver. SAS colleagues are aware of this, and it is recommended that the Service Oversight Group take ownership to ensure delivery.

To support implementation SAS has undertaken the following modelling based on the SOM and TOM. Costings are outstanding and will require to be taken forward by the **service oversight group**.

		Fife in North of Scotland Model (SOM)	Fife in Southeast Scotland Model (TOM)
	Population	1.7 million	1.4 million
	Covered	Currently Funded and in Place	Would Require New Funding
Transport to Arterial Centre	Paramedics	1.5 WTE	Additional 2 Paramedics to go to 3.5 WTE
	Ambulance Care Assistants	3 WTE	Additional 1 WTE to increase operational hours of resource
	Accident and Emergency Ambulance	1	Current Resource would be utilised
Repatriation	Ambulance Care Assistants	3 WTE	WTE of 3 new ACAs for Edinburgh
	Patient Transport Ambulance	1	1 new Patient Transport Ambulance Required for Edinburgh

4B.4 Economic Evaluation

Cost-Benefit Analysis

Aspect	Details
Current Model (Individual Sites)	- Each site operates independently, managing both arterial and non-arterial cases.
	- Higher operational costs due to duplication of services and resources.
	- Potential variability in quality of care and outcomes.
Network Model (Arterial and Non-Arterial Centres)	- Centralised arterial care at designated hubs, with non-arterial care at spoke sites.
	- Improved resource utilisation and specialisation.
	- Potential for better patient outcomes and standardised care.
Average Cost per Patient	- Current model: Higher due to duplication and inefficiencies, use of locums and enactment of mutual aid leading to inefficient patient transfer requirements to support demand
	- Network model: Potentially lower due to centralised services and economies of scale.
	- Initial setup costs relating to human resource, hybrid theatre and transport. Transport costs will also require factored in as ongoing cost implication. Other costs include requirement of appropriate IT systems to share patient data effectively, provision of additional capacity (beds, staff, theatre lists) in hub centres, transport needs
Overall Cost Impact	- Long-term savings from reduced duplication and improved efficiency.
	- Potential reduction in emergency and complex case costs due to better management.
Opportunity Cost	- Current model: Opportunity cost of not centralising services includes continued inefficiencies and variable outcomes. Current service model is unsustainable and unaffordable, ongoing costs related to locum and mutual aid
	- Network model: Opportunity cost requires to factor in potential initial disruption during transition and investment in infrastructure.

Key Considerations:

- Initial Setup Costs: Mobilising the SOM will require realignment of current funding and full implementation will require investment in infrastructure, staff training, transport and coordination mechanisms. Implementing the TOM will require investment in infrastructure, staff training, transport and coordination mechanisms.
- Long-term Savings: Centralising complex and emergency vascular care can lead to significant long-term savings by reducing duplication of services and improving resource utilisation.
- Quality of Care: A network model can standardise care, potentially leading to better patient outcomes and reduced variability in treatment.
- Operational Efficiency: Improved coordination and specialisation can enhance operational efficiency, leading to cost savings and better patient management.
- Opportunity Costs: Transitioning to a network model may involve initial disruptions and investments, but the long-term benefits of improved efficiency and patient outcomes can outweigh these costs.
- Current model is unsustainable and unaffordable.

It is recommended that the Service Oversight Group take forward the cost/benefit analysis once the pathway and workforce modelling is concluded as part of the implementation plan.

4B.5 Risk Assessment & Mitigation Strategies

Centralising vascular services and moving to a hub and spoke model can present several risks, but these can be mitigated with careful planning and strategic measures.

Risk	Description	Mitigation Strategy	Residual Risks
Reduced Access to Specialist Care	Patients may have reduced access to specialised vascular care if local hospitals lack the necessary expertise and resources.	Establish strong referral pathways to ensure that patients who need specialised care are promptly referred to high-volume centres (hubs). Implement telemedicine services to provide remote consultations with specialists.	Potential delays in referral process; reliance on telemedicine infrastructure.
Variation in Quality of Care	There may be variations in the quality of care provided at different local hospitals, leading to inconsistent patient outcomes.	Standardise care pathways and clinical guidelines across all hospitals. Conduct regular training and audits to ensure adherence to best practices.	Ongoing need for training; potential resistance to standardised guidelines.
Resource Constraints	Local hospitals may face resource constraints, including limited access to advanced technologies and specialised staff.	Allocate resources strategically, ensuring that local hospitals have the necessary equipment and trained personnel. Training, recruitment and retention strategy required as part of implementation plan.	Limited funding for resource allocation; dependency on cross border working arrangements
Coordination Challenges	Effective coordination between local hospitals and central hubs can be challenging, potentially leading to delays in care and fragmented services.	Implement robust communication systems and integrated electronic health records (EHRs) to facilitate seamless information exchange. Establish multidisciplinary teams (MDTs) to coordinate patient care.	Technical issues with communication systems; need for continuous monitoring.
Patient Travel Burden	Patients in remote or rural areas may face difficulties traveling to central hubs for specialised care.	Expand community-based services to provide preventive care and follow-up locally. Use telemedicine to reduce the need for travel.	Limited availability of community- based services; reliance on telemedicine infrastructure.
Impact on Emergency Services	Centralising vascular services may lead to increased pressure on emergency services at central hubs, potentially causing delays in care for other emergencies.	Implement robust triage systems and ensure adequate staffing and resources at central hubs to manage increased demand. Enhance coordination between emergency services and vascular teams to streamline patient flow.	Potential bottlenecks in triage process; need for continuous staffing adjustments.
Strain on Critical Care Units	Centralising complex vascular procedures can strain critical care units, affecting the availability of beds and resources for other critical patients.	Expand critical care capacity at central hubs and optimise bed management practices. Develop protocols for timely transfer and repatriation of stable patients to local hospitals. Push repatriation model.	Limited critical care capacity; need for continuous optimisation of bed management practices.
Disruption to Diagnostic Services	Increased demand for advanced diagnostic services (e.g., CT angiography, MR angiography) at central hubs may lead to longer wait times for other patients.	Invest in additional diagnostic equipment and staff at central hubs. Implement scheduling systems to prioritise urgent cases and ensure efficient use of diagnostic resources.	Limited availability of diagnostic equipment; need for continuous scheduling adjustments.

Impact on Surgical Services	Centralising vascular surgeries may reduce the availability of operating rooms and surgical teams for other elective and emergency surgeries.	Optimise operating room schedules and increase surgical capacity at central hubs. Ensure that local hospitals continue to perform non-complex elective surgeries to balance the workload. Invest in hybrid theatres.	Limited surgical capacity; need for continuous optimisation of operating room schedules.
	Effective coordination between central hubs and local hospitals can be challenging, potentially leading to	Establish integrated electronic health records (EHRs) and robust communication systems to facilitate seamless information exchange. Conduct regular	Technical issues with EHRs; need
Coordination Challenges	fragmented care and communication breakdowns.	multidisciplinary team (MDT) meetings to ensure coordinated care.	for continuous monitoring and coordination.

Overcoming the Risks

1. Strengthen Regional Networks:

a. Strengthen regional vascular network model to facilitate collaboration between local hospitals and arterial centres. Ensure that all hospitals within the network adhere to standardised care pathways and clinical guidelines.

2. Invest in Training and Development:

a. Provide continuous training and development programs for healthcare professionals to ensure they are equipped with the latest skills and knowledge. This will help maintain high standards of care across all hospitals.

3. Leverage Technology:

a. Utilise telemedicine and digital health tools to enhance service delivery and improve access to specialist care. Implement integrated EHRs to ensure seamless information exchange and coordination.

4. Monitor and Evaluate:

a. Establish key performance indicators (KPIs) to monitor the quality of care and patient outcomes. Conduct regular audits and evaluations to identify areas for improvement and ensure adherence to best practices.

5. Engage Stakeholders:

a. Involve patients, healthcare providers, and other stakeholders in the planning and implementation process. Gather feedback and make necessary adjustments to ensure the model meets the needs of the population.

The task and finish group recommend that the **service oversight group** ensures that mitigation strategies are implemented, regularly review risks to identify any new or changing risks and confirm that the mitigation measures are appropriate and effectively address the identified risks as part of implementation.

Vascular disease management requires input from multiple medical specialties and allied health professionals; the specialist vascular multi-disciplinary team (MDT) is key to the provision of good care. POVS 2021 places the person at the centre of their care, with vascular services providing them with the support and information they require to self-manage and make choices about their treatment. The hub and spoke arrangement proposed by the T&F group will ensure that vascular patients from throughout Scotland will have access to a specialist MDT ensuring equity of care provision. The vast majority of patients with a vascular emergency can be safely managed within the network ensuring they arrive at an appropriate hub in a timely manner for optimal care.

Consequences of Highland not being an arterial centre

Inpatient arterial surgery will no longer be undertaken at Raigmore hospital, which will become a spoke centre with the potential to deliver services as outlined in the Workflow and Service Integration section. Spoke services will be delivered by Consultant Surgeons, Podiatrists, and Vascular Nurse Specialists. The current consultant in Raigmore supported by consultant surgeons travelling from the NOS network can continue to undertake OP clinics and day case surgery procedures.

4B.6 Requirements to deliver the SOM / TOM

Before transitioning to the SOM and TOM, it's crucial to ensure compliance with national healthcare regulations and maintain high standards of clinical governance and patient safety. This will involve obtaining necessary regulatory approvals, adhering to data protection laws, and implementing robust quality assurance processes. Staff will require to receive comprehensive training on new protocols, and patient consent and communication should be prioritised. Coordination between healthcare organisations will be essential, along with addressing legal and ethical considerations. Financial practices will require to comply with NHS policies and will require formal sign off through the Directors of Finance, and technology and infrastructure will require to meet regulatory standards to support the new model effectively.

Board / Provider	Requirements to deliver the SOM	SOM Implications	Requirements to deliver the TOM	TOM Implications
NHS Highland	 NOS network to mobilise Pathways Repatriation principles Mobilise as a non- arterial site 	Cease to be an arterial centre	 NHS Highland transitioned to a non- arterial site Clinical pathways, transport, repatriation & funding arrangements in place 	
NHS Grampian	 Form NOS network with NHS Tayside. Fife supporting as non-arterial support 	Theatre access	•	 Selected arterial cases- novel approach under re view at T&F which would make on call over 2 sites achievable (WIP as part of implementation)
NHS Fife	 Support NOS network Confirm capacity to free inpatient capacity for Tayside to support the demand 	 Support NOS network Inpatient beds 	 NHS Fife to align with the South-East of Scotland Network 	 To support the network model, additional staff will require recruited as NHS Fife will remain a non-arterial centre. This will help retain the services delivered at NHS Fife. A review with NHS Fife will require undertaken to ensure that the impact on staff is minimised and that this transition takes account of measures to reduce the impact.
NHS Tayside	 Form NOS network with NHS Grampian. Fife supporting as non- arterial support 	Hybrid theatre accessInpatient beds	 NHS Fife transition to SE network post gateway review and if still indicated 	 Additional bed/ward capacity
NHS Lothian	 Identify capacity to support NHS Tayside and NHS Grampian to free up capacity to take NHS Highland patients 	 Support the NOS model by taking some of NHS Fife patients whil e developing readiness for TOM. 	 NHS Fife to align with the South-East of Scotland network IR space / Hybrid theatre access / finance to support Dedicated wound clinic 	 Recruitment to posts to the network in conjunction with NHS Fife to support the transition to the TOM
SAS	 Funding & recruitment for addition al double crewed A&E ambulanc e 24/7 located in/around Inverness area 	 Adapt resourcing & delivery models Defined clinical & geographic bypa ss criteria for certain patients with une quivocal vascular emergencies 	 WIP-to be modelled via AmbSIM 	WIP-to be modelled via AmbSIM
				currently providing OOH

		to SW of Scotland
		requires addressed
		alongside impact of
		taking the western isles

Service oversight group: To be reviewed and updated as part of implementation. Gateway review stage to be undertaken to monitor implementation of the SOM and the TOM



5. DELIVER - Implementation Plan

Treatment: How will it be implemented?

5.1 Roadmap to implementation

Key milestones and timelines:

Phase	Milestone	Timeline	Responsibilities	Status
Planning and Preparation	Establish Governance Structure & agree Governance & Accountability	0-1 month	NHS Scotland Planning and Delivery Board	Complete
	Conduct Baseline Assessment	1-3 months	Vascular Task & Finish Group, Service providers	Complete
	Identify SOM / TOM recommendations / undertake feasibility assessment	3-6 months	Vascular Services Steering Group	SOM recommendations identified and high level feasibility assessment concluded
	Seek endorsement	1 – 3 months	NHS Scotland Planning and Delivery Board	In progress
SOM Implementation	Standardise Care Pathways	6-12 months	Service oversight group	
	Enhance Multidisciplinary Teams (MDTs)	6-12 months	Service oversight group	
	Implement Regional NOS Vascular Network and take forward all actions/recommendations identified in the planning stage and summarised in this report	12-18 months	Service oversight group	If endorsed Service
	Stakeholder communication	12-18 months	Service oversight group	oversight group to be mobilised to progress
TOM Implementation	Community-Based Services	18-24 months	Service oversight group	
	Telemedicine and Digital Health Tools	18-24 months	Service oversight group	-
	Business cases endorsed and being implemented to support delivery of TOM	24-30 months	Service oversight group	
	Enhance MDT Collaboration with AI and Data Analytics	24-30 months	Service oversight group	
Full Implementation and Optimisation	Infrastructure, resourcing and training funding identified and in place	36-48 months	Service oversight group	
	Continuous Quality Improvement	48-60 months	Service oversight group	
	Evaluate and adjust	48-60 months	Service oversight group	

The task and finish group has provided a high level timeline to support implementation. It is recommended that that Service oversight group expand the implementation plan to aid delivery of the recommendations identified by the task and finish group.

5.2 Stakeholder Engagement

The fourteenth Citizens' Panel survey was published at the time of writing this case for change and citizens were specifically asked questions around NHS reform which was helpful given the specialist nature of some vascular procedures and helped inform the task and finish group approach.

Key Findings from Citizens' Panel Survey:

- Travel for Specialist Services: 84% of respondents are willing to travel further for specialist services if it results in better outcomes.
- **Travel Preferences**: Respondents are willing to travel regionally for routine inpatient care (55%) and outpatient services (62%). For specialised services, 43% would travel regionally, 33% nationally, and 24% locally.
- Workforce Shortages: 90% of respondents prioritise expanding the range of NHS health and care professionals, ensuring they have appropriate training and support. This is followed by providing services in the same locations but for reduced hours (60%) and reducing the number of service locations.

Service oversight group: – Undertake phase 2 of patient/public engagement taking forward the steps provided in Appendix 8.2 following feedback from colleagues in HIS.

5.3 Training and Support

Plans for training healthcare professionals and providing ongoing support.

At the time of writing there are 18 registrar training jobs in Scotland. They are split between the West and East of Scotland. The West rotate through QEUH/ UHH. The East rotate through RIE/ Ninewells/ ARI. Currently, one trainee is due to finish in August 2025, x2 in August 2026 and then x6 in August 2027.

Service oversight group: Develop full workforce strategy for training, recruitment and retention using the recommendations detailed within this report for workforce requirements

6. DELIVER - Monitoring and Evaluation

6.1 Performance Metrics

Key Performance Indicators (KPIs) for the Target Operating Model (TOM) are essential for monitoring performance, ensuring quality, and driving continuous improvement.

1. Clinical Outcomes

- KPIs time to intervention AAA, CLTI, Carotids
- Mortality Rates: Track changes in mortality rates associated with vascular conditions.
- **Complication Rates**: Monitor the rates of complications following vascular procedures.

2. Service Efficiency

- Waiting Times: Measure the average waiting times for vascular consultations, diagnostics, and treatments.
- Length of Stay: Track the average length of hospital stays for vascular patients.
- Readmission Rates: Monitor the rates of readmission within 30 days of discharge for vascular conditions.

3. Patient Experience

- Patient Satisfaction: Use surveys to gauge patient satisfaction with vascular services.
- Quality of Life: Assess improvements in patients' quality of life post-treatment using standardised tools.
- 4. Access to Care
 - Equity of Access: Measure access to vascular services across different demographic and geographic groups to ensure equity.
 - Utilisation Rates: Track the utilisation rates of vascular services to identify any barriers to access.

5. Preventive Measures

- Screening Uptake: Monitor the uptake rates of vascular screening programs.
- Lifestyle Modification Programs: Measure participation and success rates in programs aimed at reducing risk factors (e.g., smoking cessation, hypertension management).

6. Resource Utilisation

- Staffing Levels: Ensure appropriate staffing levels and monitor staff-to-patient ratios.
- Facility Utilisation: Track the utilisation rates of facilities providing vascular services to optimise resource allocation.

7. Financial Performance

- Cost per Patient: Measure the average cost of providing vascular care per patient.
- Budget Adherence: Monitor adherence to budget allocations for vascular services.

8. Innovation and Improvement

- Implementation of Best Practices: Track the adoption of clinical guidelines and best practices in vascular care.
- **Research and Development**: Measure the involvement in and outcomes of research and development activities related to vascular health.

9. Health Outcomes

- **Reduction in Risk Factors**: Measure changes in the prevalence of risk factors such as smoking, hypertension, and diabetes in the population.
- Long-term Outcomes: Track long-term health outcomes for patients who have received vascular treatments.

Furthermore, it is recommended that the following five key performance indicators (KPIs) are collected alongside compliance with entry to the vascular registry.

1	Inpatients at arterial centre and at network hospitals seen within 72 hours of referral.
2	Re-vascularisation for CLTI within 5 days for admitted patients and 14 days for non- admitted patients.
3	Carotid endarterectomy within 14 days of TIA or minor stroke.
4	People with a lower limb wound assessed within 2 weeks of primary care referral.
5	Intact AAA repair performed within 8 weeks of reaching threshold for intervention.

Service oversight group: Develop criteria to evaluate implementation of the SOM and TOM

7. Conclusion and Recommendations

7.1 Conclusion

Vascular services in the UK have been transformed since the creation of a separate vascular surgery speciality in 2013 through the introduction of the following:

- Vascular networks
- Arterial centres
- Shared pathways of care
- Multidisciplinary team working.

Whilst progress in Scotland has seen significant changes for the good further work is required to implement a target operating model that resolves the identified challenges around service sustainability, lack of resource and inequitable access.

Volume and outcome relationships

Whilst it is recognised that reconfiguring to the SOM and TOM will be challenging with remote and rural impacted the most, the sustainability issues across vascular services alongside the evidence indicates only in the most geographically remote regions do the risks outweigh the benefits centralisation brings to patients.

The case for networks

Centralising resources and expertise at the arterial centres offer several benefits, including increased surgeon availability, and enabling seven-day vascular surgery. Pooled budgets can be used to invest in facilities like CT scanners, hybrid theatres, and better-equipped vascular wards, allowing both endovascular and open surgery to be performed without delays. This setup provides patients and clinicians with more choices regarding procedures.

Arterial centres with higher patient volumes facilitate greater collaboration with other medical disciplines, such as cardiology, radiology, and elderly care, promoting a multidisciplinary approach with standard protocols for referral and post-operative care. This ensures that relevant support from other departments is available when surgery is provided seven days a week.

The hub and spoke network model, proposed by the Vascular Society over ten years ago and reflected in the NHS national service specification, has shown significant positive impacts where well-implemented. However, variations in implementation have led to differences in throughput, wait times, and outcomes between hubs and spokes. Despite excellent work by consultants and teams in non-network providers, advanced hub and spoke models with well-established referral processes demonstrate better outcomes.

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7.2 Recommendations

The core recommendation is to accelerate the implementation of the proposed NOS network model. Although there are workforce, financial, and logistical barriers, the task and finish group majority have confirmed the network model remains the most practical and achievable way to deliver a vascular surgery service with the capacity and flexibility to provide urgent care for all patients.

Recommendation	Associated Actions		
Ensure all units operate within the network model (arterial centres (HUB); non-arterial (Spoke)	Hubs must perform a minimum of 40 carotid endarterectomy and 60 AAA procedures per year, staffed by at least six vascular surgeons and six vascular interventional radiologists. Aim for higher volumes where possible.		
Pool budgets for investment in facilities	Invest in CT scanners, hybrid theatres, and better-equipped vascular wards.		
Adopt a multidisciplinary approach	Facilitate overlap with other medical disciplines, promoting standard protocols and processes for referral and post-operative care.		
Accelerate implementation of the NOS network model	Emulate well-developed hub and spoke networks to treat all patients equitably		
Address cultural, financial, and logistical barriers	Overcome barriers within established networks to ensure effective implementation.		
Monitor outcomes and referral processes	Ensure TOM implementation with well-established referral processes to achieve significant positive impacts on patient outcomes.		
Promote the National AAA Screening Programme (NAAASP)	Continue efforts to ensure early identification and treatment before emergencies occur.		
Increase early availability of revascularisation surgery	Enhance access to revascularisation surgery to reduce amputation rates.		
Identify funding to meet workforce and infrastructure needs for vascular surgery and interventional radiology	Evaluate and increase workforce to support sustainable delivery of TOM.		
Improve prehabilitation for AAA, PVD, and CEA	Enhance perioperative medical input for better prehabilitation.		
Ensure case ascertainment to the National Vascular Registry >85%	Achieve and maintain high case ascertainment rates.		
Improve quality of routine data entry and collection	Enhance data entry and collection processes.		
Improve coding for complex aneurysms and emergency vascular surgical activity	Enhance coding accuracy for complex cases.		
Improve insight into patient experience	Gather and utilise patient experience data to support clinical improvements.		
Improve procurement of devices and consumables	Enhance procurement through transparency, aggregation, consolidation, and best practice sharing.		

Addressing data quality issues

There are several underlying issues:

- Not all NHS Boards in Scotland use the same coding to record Surgical Procedures.
- Differences in the Pathways used depending on procedure performed (outpatient appointments used/not used recorded/not recorded as Vascular)
- PHS round the C12 Vascular Surgery Code to C1 General Surgery for reporting

A conformed coding set would help address this going forward.

Alongside these core recommendations to improve care, development of the SOM and TOM has also highlighted the need to improve data collection related to vascular surgery. Development of real-time 'dashboards' to monitor activity, with vascular services developing action plans for improvement when standards are not being met alongside a mandatory requirement to report to the vascular registry is recommended. Investment in data analysts to support is recommended. One particular gap in the data around vascular surgery relates to patient experience. Ultimately a cultural shift is needed; one that places increased value on the importance of record keeping. It is recommended that responsibilities around data collection to make the NVR and HES more valuable resources for commissioners and clinicians are clarified.

Workforce planning

Setting standard parameters for consultants' workload helps with workforce planning at Board level. However, Boards can only recruit from the available vascular surgery workforce and concerns about whether or not this is sufficient have been long documented. Demand is rising and it is known that many vascular surgeons are expected to retire in the next decade. There is therefore a need to plan ahead and develop a workforce strategy – not just for surgeons but for all members of the vascular team. In particular, to ensure the workforce is sustainable, the numbers of vascular specialists in training will need to increase.

Retain vascular nurse specialist posts, losing any of these vital members of the vascular team will have a detrimental effect on the network. A specialist nurse presence in the non-arterial vascular hospitals is the glue that holds the network together. Amongst other things, they ensure timely review of internal requests for vascular opinions, that relevant investigations are performed and available and the smooth transfer of patients to and from the arterial centre. Interventional radiologist numbers also require increased across NHS Scotland.

Referral Protocols

Standardise referral protocols into the arterial centre, together with the investigations and the capacity of the non-invasive imaging that is available in the non-arterial network hospitals. Inevitably there will be differences, but as far as possible try to get consistency for the sake of smooth, rapid transfer of patients.

Repatriation protocols

Agree repatriation 'rules' this can make or break the capacity of an arterial centre to deliver good, timely care and so again, needs early agreement. This needs to be at executive level because of the implications it has on the wider functioning of all hospitals concerned, A push model is recommended by the task and finish group.

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8. Appendices

8.1 Literature Review-Lessons Learned

Lessons learned from two previous service reconfigurations were considered by the task and finish Group and are outlined below.

The first involved the reconfiguration of vascular services in Northern Ireland, presented by Paul Blair and the second concerned the formation of the South West Scotland Vascular network, presented by Tam Siddiqui.

Paul Blair was appointed External Clinical Advisor for Scottish vascular service reconfiguration, he is a past President and chair of Professional Standards for VSGBI. He was closely involved in the reconfiguration of Northern Ireland vascular services and for 9 years was Clinical Director of the regional unit in Belfast, one of the largest vascular centres in the UK. He has personal experience of overseeing several UK regional vascular service reconfigurations.

Tam Siddiqui is a Consultant Vascular and Endovascular Surgeon at University Hospital Hairmyres. He was Clinical Lead during centralisation and played a pivotal leadership role in the formation of the South West Scotland Vascular Network. He has a number of management and training roles including Deputy Clinical Director for Surgery and Associated Specialties, Training Programme Director for Vascular Surgery in Scotland and Vascular Specialty Advisor to the Chief Medical Officer.

Northern Ireland Network

In 1995 Northern Ireland had eight hospitals performing vascular surgery, by 2015 reconfiguration had resulted in one singular vascular centre in Belfast serving a population of 1.9 million.

Barriers to change that were encountered are listed below

- Geographical concerns with additional travel times for patients
- Clinicians apprehensive about change
- Split site working logistics
- Loss of local vascular services for interdependent specialties
- Perception of winners and losers
- Team and hospital loyalty of clinicians, MDs and CEOs
- Perception of large complacent arterial "hub" v hard working and enthusiastic "spoke"
- Capacity issues at arterial hub, delayed repatriation to "spoke"

Lessons learned:

- · Patient safety and best outcome must be the priority
- Elective and urgent index arterial cases were relatively low volume and easy to manage
- Patients with Critical Limb Ischaemia and Diabetic foot problems more difficult to manage as high volume
- Diabetic foot service now improved enhanced podiatry team
- Vast majority of vascular emergencies will tolerate and benefit from transfer to hub
- Despite significant concerns, Vascular emergencies occurring in spoke hospitals were extremely rare and could be managed locally with subsequent transfer of patient.
- · Vascular presence at spoke hospitals required hub surgeons to travel and was dependent on vascular consultant numbers
- Support for vascular interdependent specialties at spoke centres important
- Avoid prolonged transition arrangements if possible
- Identification of strong clinical and managerial leaders essential
- Resources must follow patients
- Communication with staff and patients important

The service reconfiguration in Northern Ireland was an evolving model with a gradual reduction in the number of arterial centres. Some of the changes occurred without adequate time for planning. It was under resourced and as a result several Key Performance Indicators slipped, particularly assessment and intervention for patients with critical limb ischaemia. Diabetic foot services have improved due to additional funding for a regional Podiatry led initiative but maintaining some services at spoke hospitals has proved difficult as consultant vascular surgeon numbers have reduced due to retirement and staff relocation. Delayed discharge and repatriation combined with a lack of adequate inpatient beds at the arterial hub remains an ongoing problem.

South West Scotland Vascular Network

In August 2022 the vascular services of NHS Lanarkshire, NHS Ayrshire and Arran and NHS Dumfries & Galloway formally centralised, with the formation of the South West Scotland Vascular network with the hub based at University Hospital Hairmyres. This was the cumulation of an extremely complex, sensitive but necessary process involving a huge variety of stake holders, both clinical and

managerial. Nonetheless, this was planned and delivered in a structured and efficient manner with "buy in" from all involved parties including executive and board level at all 3 health boards.

Some key points

- The planning and implementation were delivered via regular high level Programme Board meeting, chaired by the Director of Acute Services with senior representatives from all sites including clinical services, chief of nursing, director of finance, director of modernisation and planning and service managers from all involved specialties and disciplines.
- Attendance was compulsory with specific workstreams (capital & procurement, clinical pathways, medical staffing, AHP workforce, Repatriation, A&C staffing, finance, nursing and radiology)
- Nominated leads with described and mandated outcomes and outputs
- Deliverables included within next reporting period, progress against key deliverables and a risk register.
- The net result was an extremely well organised, efficient and productive process befitting a complex service reconfiguration across a wide geographical area and population of 1.2 million.
- There was significant capital investment from all 3 Health Boards with the construction of a highly sophisticated hybrid operating theatre, refurbished interventional radiology suite, vascular laboratory and funding of additional staff including vascular nurse specialists, vascular scientists and additional middle grade vascular surgeons.

Challenges and Lessons Learned

- Consultant staffing has become challenging as the previously fully staffed hub at University Hospital Hairmyres has inherited the consultant staffing vacancies of the other sites.
- Communication and outreach between the hub, spoke sites and with other specialties is of paramount importance.
- The formation of formal clinical pathways to support the "hub and spoke" model was very helpful
- Recruitment of the non-medical workforce is of pivotal importance with vascular nurse specialists and podiatrists of huge value.
- The patient volume was under predicted, with a knock on effect of a shortage of inpatient and critical care beds.
- Rehabilitation and repatriation pathways are complex across a wide geographical area with ongoing refinement and optimisation to improve patient flow.
- There was no significant reluctance or resistance from consultant colleagues to change their working pattern and location of clinical activity, as the benefits to patients and the service clearly outweighed any perceived inconvenience.

The formation of the South West Scotland Vascular network was a success four years in the making. The enthusiasm, passion and diligence demonstrated by the entire multidisciplinary team across the full spectrum of specialties and disciplines, both clinical and managerial led by senior figures within the organisation allowed the process to reach its goal, while accepting the lessons learned for the future.

The experience from these two service reconfigurations were helpful when considering the proposed model. In order to agree an appropriate target operating model the following were also considered by the task and finish Group:

- Report of Scottish Vascular Steering Group 2011
- Stonebridge Report November 2023
- SAS Preliminary modelling of transfer of Highland patients April 2024
- Arterial site visits NSS + ECA (June/July 2024)
- T&F group meetings (number 11)
- Data submissions from each arterial centre outlining capacity issues and current kep performance indicators
- Further NSS engagement at individual sites
- ECA discussions with individual lead clinicians
- ECA meeting with Trainees
- Impact of change on local vascular codependent specialties

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8.2 Supporting Data

Additional data and analysis that support the findings and recommendations.

Planning with people

Planning with People Steps (actions required)		Actions taken to date	Further actions required	
1. National Engagement Stage	Develop a communication & engagement plan to underpin the service change / development. This will include planning a co-ordinated and coherent approach across all affected board areas.	Site visits have taken place to all arterial centres and communicated with throughout the process at a service, Board Chief Executive and Medical Director level.	A formal communication plan to be developed through a coordinated approach involving SG Communications and NHS Board communications. Boards to advise on the best methodologies and platforms for informing people living in their areas.	
	Inform affected people and communities about the planned service change / development by making information widely available at an early stage.	As above	As above	
	Recruit extensive community representation to the project group, including people with lived experience of the services proposed, and from the geographical communities affected.	Due to the politically sensitive nature of this work and the move to the SOM and TOM, the timing of communication to affected people has been carefully considered. A Task and Finish Group developed the SOM and TOM recommendations based on capacity and demand.		
		There was input from staff representatives from all Boards (for example vascular consultants, Board Chief Executives and Medical Directors). It would not have been appropriate to involve the public at this stage due to the political sensitivities around sustainability in NHS Highland.		
	Complete and publish an options appraisal involving people, communities and clinicians. If there is only one viable option available, clearly provide the reasons for this.	An options appraisal was not conducted for this piece of work due to the urgency of the commission from Scottish Government and the sustainability issues experienced.		
		The SOM and TOM were developed as a population health planning approach based on current capacity (SOM) and predicted demand (TOM).		
		An Equality Impact Assessment has been completed and is being updated over the lifespan of the workstream.		
	Update the communication & engagement plan based on the findings of the early engagement and impact assessments, identifying any specific additional engagement required.	Communication & engagement has been an ongoing process through the vascular Task and Finish Group, via NSD engaging with Board Medical Directors/BCEs and the clinical lead providing support and guidance directly to boards.	The legislation states that this will be done by SG following the development of the engagement plan.	
	Complete a 3-month public consultation with communities affected by the proposed change providing full information on the viable option(s).		If this is considered major service change is determined P&DB will inform next steps	
	Submit new service description and details of all engagement activities to Scottish Ministers for consideration, assurance and approval.		The legislation states that this will be done by SG following the development of the engagement plan.	
2. Handover Point	Provide written notice to all affected NHS Boards and IJBs explaining what the national service change is, why the decision is being made on a	All affected NHS boards are already engaged in the process and aware of the outline proposals.	The legislation states that this will be done by SG following the development of the engagement plan	

	national basis and how it has been informed by meaningful engagement activity.		
	Develop a local communication and engagement plan. This will differ from case to case and from area to area depending on the provision of relevant services in each area, so requirements should be discussed and agreed with HIS.	NSD have communicated with affected boards throughout, and HIS are represented on the group. NHS Boards are responsible for developing local communication and engagement plans.	A formal communication plan to be developed through a coordinated approach involving SG Communications and NHS Board communications. Boards to advise on the best methodologies and platforms for informing people living in their areas.
3. Local engagement stage	Inform affected people and communities about the service change (communication). This is required for all nationally determined service changes.	All key stakeholders have been involved in discussions throughout the process.	NHS Boards will be involved to inform best practices for communicating with their communities.
	Undertake specific local engagement to consider any local mitigations required to the nationally determined service change.	Affected NHS Boards have been involved throughout the process.	NHS Boards will be involved to inform best practices for communicating with their communities.

Main findings from previous patient surveys

Patient Satisfaction

- 1. **Overall Satisfaction**: The Health and Care Experience Survey indicates that a majority of patients report positive experiences with vascular surgical services. High satisfaction levels are noted in areas such as the professionalism of staff and the quality of care received ¹.
- 2. **Communication**: Patients appreciate clear and effective communication from healthcare providers, which is crucial for understanding treatment options and managing expectations2.
- 3. **Waiting Times**: While many patients are satisfied with the care they receive, some express concerns about waiting times for appointments and procedures².

Quality of Life

- 1. **Post-Treatment Improvement**: Many patients report significant improvements in their quality of life following vascular treatments. This includes reduced pain, increased mobility, and better overall health³.
- 2. **Ongoing Support**: Patient's value ongoing support and follow-up care, which helps them manage their conditions more effectively and maintain a higher quality of life³.

Health and Care Experience Survey - gov.scot

Other supporting data available on request:

- Project initiation document
- Vascular dashboard <u>Vascular Report</u> including data on referrals, workforce, demand, population stats, mapping of proposed models and access to board supplied data
- Site visit summaries
- Independent consultant advice and recommendations
- T&F group meeting presentations and minutes

8.3 Task and Finish Group Membership

It should be noted that membership has been added to throughout the lifecycle of the programme and this has been recorded in the Terms of Reference – noted below are the original nominated individuals from relevant boards/specialties that were endorsed by the Planning and Delivery Board:

NAME	ROLE	BOARD
Paul Blair	Independent Vascular Consultant	BELFAST TRUST
Karen Murphy	NHS Fife Consultant Vascular Surgeon and Clinical Lead	NHS FIFE
Mirriam Watts	NHS Fife, General Manager Emergency Care	NHS FIFE
Sally McCormack	NHS Fife, Associate Medical Director	NHS FIFE
Andrew Murray	CHAIR , Medical Director, NHS Forth Valley with previous experience of	NHS FORTH VALLEY

	vascular reconfiguration as one of the affected Boards	
Benjamin Cooper	Vascular Nurse Consultant	NHS GRAMPIAN
Bryce Renwick	NHS Grampian, Consultant Vascular & Endovascular Surgeon and Clinical Lead	NHS GRAMPIAN
Karin Macleod	NHS Grampian, Unit Operational Manager	NHS GRAMPIAN
Paul Bachoo	Acute Portfolio Lead, Acute Medical Director	NHS GRAMPIAN
Sotiris Makris	NHS Grampian, Consultant Vascular Surgeon	NHS GRAMPIAN
Claire MacArthur	Director of Planning, NHS GGC/NHS Forth Valley	NHS GGC / FORTH VALLEY
Keith Hussey	Consultant General and Vascular Surgeon, NHS GGC/NHS Forth Valley	NHS GGC / FORTH VALLEY
Samuel de Bono	Senior Trainee Vascular Surgeon	NHS GGC
Scott Davidson	Medical Director	NHS GGC
Wesley Stuart	NHS GGC, Consultant Vascular Surgeon	NHS GGC
William Edwards	NHS GGC, Chief Officer Acute	NHS GGC
Elaine Henry	NHS Highland, Operational Medical Director	NHS HIGHLAND
Katherine Sutton	NHS Highland, Chief Officer Acute	NHS HIGHLAND
Lorraine Cowie	Professional Lead Health Planning & Sustainability	SCOTTISH GOVERNMENT
John Keaney	NHS Lanarkshire, Acute Medical Director	NHS LANARKSHIRE
Kenneth Dagg	Consultant Physician	NHS LANARKSHIRE
Margaret Meek	NHS Lanarkshire, Director of Hospital Services University Hospital Hairmyres	NHS LANARKSHIRE
Tamim Siddiqui	NHS Lanarkshire, Deputy Clinical Director	NHS LANARKSHIRE
Andrew Tambyraja	NHS Lothian, Clinical Director for Vascular surgery	NHS LOTHIAN
Aris Tyrothoulakis	NHS Lothian, Site Director	NHS LOTHIAN
Caroline Whitworth	NHS Lothian, Acute Medical Director	NHS LOTHIAN
Kirstie Tinkler	NHS Lothian Clinical Service Manager for Vascular and General Surgery	NHS LOTHIAN
Michelle Carr	Chief Officer Acute Services	NHS LOTHIAN
Donna McLean	NHS NSD, Programme Support Officer	NHS NSD
Jenny Morgan	NHS NSD, Programme Manager	NHS NSD
Mark Allardice	Senior Programme Manager	NHS NSD
Moira Straiton	NHS NSD, Associate Director	NHS NSD
Gavin Halford	Data Analyst	NHS NSS
Ewan Murray	Strategic Planning Manager, Scottish Ambulance Service	SCOTTISH AMBULANCE SERVICE

Christina Beecroft	Consultant Anaesthetist	NHS TAYSIDE
Christina Navin	NHS Tayside, Clinical Care Group Manager	NHS TAYSIDE
Fiona Kerra	Senior Trainee Vascular Surgeon	NHS TAYSIDE / NHS LOTHIAN
Graeme Guthrie	NHS Tayside, Consultant Vascular Surgeon	NHS TAYSIDE
James Cotton	Medical Director	NHS TAYSIDE
Julie Christie	Associate Medical Director for Surgery	NHS TAYSIDE
Julie Greenlees	NHS Tayside, Associate Director for Vascular Services	NHS TAYSIDE
Sanjay Pillai	NHS Tayside, Consultant Interventional Radiologist	NHS TAYSIDE
Stuart Suttie	NHS Tayside, Consultant Vascular Surgeon	NHS TAYSIDE

Attendance at each of the meetings was recorded and deputies were also sent by individuals.

Meetings also took place with Medical Directors and Board Chief Executives during the course of the process and updates were taken to Directors of planning, NSSC and BCE meetings throughout the process.

8.4 EQIA

2024-06-10 EQIA for Vas Wstream.pdf Updated post final T&F group 19/03/25

8.5 References

List of references and sources used in the report.

1	Diabetes NHS Research Scotland NHS Research Scotland
2	Scotland's Population 2023 - The Registrar General's Annual Review
	of Demographic Trends - National Records of Scotland (NRS)
3	Vascular Services Quality Improvement Programme (VSQIP) 2024
	State of the Nation Report
4	Population projections – ScotPHO
5	Scottish Burden of Disease Forecasting Briefing
6	Scottish Burden of Disease Study - Public Health Scotland
7	2024 NVR State of the Nation Report - HTML - VSQIP - Vascular
	Services
8	Scotland's Census 2022 - Rounded population estimates
9	Public Health Scotland Surgical Procedures Dashboard

Other refs and data sources have been highlighted at point of use in the report

8.6 Procedure type, demand and IR requirements

Procedure Type	Demand	Importance	Interventional Radiologist Support
Lower Limb Revascularisation	High	Critical for restoring blood flow in patients with Peripheral Artery Disease (PAD); prevents limb loss. These are critical for patients with chronic limb-threatening ischemia (CLTI). The demand for these procedures has increased, with a focus on ensuring timely care to prevent major amputations	Yes
Renal Access Procedures	High	Essential for patients requiring haemodialysis; ensures effective dialysis treatment.	Yes
Endovenous Laser Treatment (EVLT)	High	Minimally invasive treatment for varicose veins; improves patient outcomes and recovery time.	Yes
Carotid Endarterectomy	Moderate	Prevents strokes by removing plaque from carotid arteries. This procedure is crucial for preventing strokes in patients with significant carotid artery stenosis.	No
Abdominal Aortic Aneurysm (AAA)	Moderate	Prevents life-threatening aortic ruptures; includes both open surgical and endovascular repairs.	Yes
Major Lower Limb Amputation	Moderate	Performed in severe cases of PAD or diabetic complications; prevents further health deterioration There has been a notable rise in the number of major lower limb amputations, particularly among patients with peripheral arterial disease (PAD). This increase highlights the need for early intervention and effective management of vascular conditions	No

Elective Endovascular AAA Repair (EVAR)	Moderate	Minimally invasive repair of abdominal aortic aneurysms; reduces recovery time and complications.	Yes
Complex AAA Elective Procedures	Moderate	Includes various elective procedures for AAA; important for preventing aneurysm rupture.	Yes
Elective Open Surgical AAA Repair	Moderate	Traditional surgical repair of abdominal aortic aneurysms; used when endovascular repair is not suitable.	Yes
Emergency Open Surgical AAA Repair	Low	Performed in emergency situations to repair ruptured aneurysms; life-saving procedure.	Yes
Emergency Endovascular AAA Repair (EVAR)	Low	Minimally invasive emergency repair of ruptured aneurysms	Yes
Thoracic Endovascular Aortic Repair (TEVAR)	Low	Minimally invasive repair of thoracic aortic aneurysms; prevents life-threatening complications.	Yes
Thoraco-abdominal Aortic Aneurysm (TAAA)	Low	Complex repair of aneurysms involving both thoracic and abdominal aorta; critical for preventing rupture.	Yes

8.7 Role, responsibilities and location

Role	Responsibilities	Location
Vascular Nursing	Combines aspects of general surgical nursing, critical care, limb and wound assessment, tissue viability, wound care, end of life care, and rehabilitation.	Arterial Centre
Vascular Nurse Specialist (VNS)	Provides specialist vascular opinion to establish a diagnosis and formulate a treatment plan. Involves inpatient reviews, outpatient clinics, and performing interventions.	Arterial Centre and Non-Arterial Centre
Advanced Nurse Practitioner (ANP)	Supports the safe care of ward patients as a supplement to the Foundation doctor role.	Arterial Centre
Theatre Nurses	Requires knowledge and skills for both vascular and endovascular procedures at the arterial centre.	Arterial Centre
Interventional Radiology Nurses	Requires knowledge and skills appropriate to endovascular procedures at both the arterial centre and network hospitals.	Arterial Centre and Non-Arterial Centre
Ward Nurses	Should have specific knowledge and skills to care for patients with complex vascular conditions. A core of nurses should complete a designated vascular course.	Arterial Centre
Tissue Viability Nurse (TVN)	Complements the VNS service by providing complex wound advice and management.	Arterial Centre and Non-Arterial Centre
Outpatient Clinic Nurses	Needs knowledge and skills in wound care, especially in compression therapy and wound care, when TVNs are not available.	Arterial Centre and Non-Arterial Centre
Advanced Clinical Practitioner (ACP)	Comes from nursing or allied healthcare professional backgrounds and completes a master's level degree. May work at the equivalent of a middle-grade doctor's role.	Arterial Centre
Physician Associate (PA)	Has a life science or allied health degree and a postgraduate diploma. Trained to perform roles normally performed by doctors.	Arterial Centre
Radiographer	Needed for interventional radiology rooms and the hybrid operating theatre. May take on extended roles like ultrasound or line insertion.	Arterial Centre
Pharmacist	Provides high-level input for vascular patients who are often elderly, frail, and on multiple medications.	Arterial Centre and Non-Arterial Centre
Podiatrist	Leads community diabetic foot protection teams and works in hospitals alongside vascular teams. Provides community-based PAD triage and diagnosis.	Community, Arterial and non-arterial centre
Physiotherapist	Provides experienced vascular physiotherapy input to aid recovery after surgery. Amputee care should be from a specialist physiotherapy team.	Arterial Centre and Non-Arterial Centre
Occupational Therapist	Provides home assessment visits and coordinates safe discharge back into the community.	Community
Discharge Coordinator	Allocated to people with complex discharge social or rehabilitation needs.	Arterial Centre and Non-Arterial Centre
Social Worker	Provides input for the successful recovery of frail and disabled patients after treatment.	Community and Hospitals
Network Clinical Lead	Overall responsibility for the performance of the vascular network. Chairs regular network management meetings and recruits' network medical staff.	Arterial Centre
Network Governance Lead	Responds to serious adverse events across the network. Chairs the network morbidity and mortality meeting and acts on concerns raised.	Arterial Centre

Role	Responsibilities	Location
Lead Vascular Nurse Specialist	Allocates the vascular specialist nursing team and manages nursing staff.	Arterial Centre
Lead Interventional Radiologist	Supports the interventional radiologist's role within the vascular MDT.	Arterial Centre
Lead Vascular Anaesthetist	Delivers and develops a specialist vascular anaesthetics service at the arterial centre.	Arterial Centre
Lead Clinical Vascular Scientist	Represents vascular scientists across network sites and is responsible for the governance of non-invasive imaging surveillance.	Arterial Centre and Non-Arterial Centre
Network Manager	Manages network staff, monitors the effectiveness, quality, safety, and accessibility of the service, and ensures network protocols are up to date.	Arterial Centre
MDM Coordinator	Single point of contact for referrals to the vascular MDM. Supports the smooth running of the MDT and records discussions and outcomes.	Arterial Centre
Data Manager	Ensures the completeness of NVR and HES data, supports NHS clinical coders, and provides data for governance and quality improvement.	Arterial Centre
Medical Secretaries	Important point of contact for patients to ask for advice and raise queries. Roles vary across the network.	Arterial Centre and Non-Arterial Centre

8.8 Feedback from stakeholders (You said, we did)

Comments	Actions
Current reliance on mutual aid poses a major patient safety concern. This highlights the importance of moving to the SOM and TOM at pace. Although the mutual aid work is not excessive, this remains a temporary solution and does not address the full needs of the Highland population. This cannot be seen as a sustainable model as already there is a blur between mutual aid and patients for whom there is no clear route.	ACTION REQUIRED Service oversight group if recommendations endorsed by the PDB – Agreed hence the need to agree the direction of travel so that implementation can commence to resolve.
Trainee post should be spread across Scotland proportionate to populating size.	ACTION TAKEN - Trainee numbers have been specifically mapped in the report.
 IR capacity is a concern in Scotland. Additional IR theatres required (Tayside) Additional Specialist Nursing Radiographers and Interventional Radiologists staff required. 	ACTION TAKEN - The capacity constraints have been acknowledged in the report as an interdependent service. As a recommendation the report highlights the need to evaluate and increase workforce to support the sustainable delivery of TOM. ACTION REQUIRED Service oversight group if recommendations endorsed by the PDB- workforce realignment and business case to support increase in resources
 The 2-centre NoS model requires clearly defined pathways and division of workload to operate successfully. This new model is very different to other similar network reorganisations because the NoS network has 2 Arterial Hubs and 1 Spoke Hub that is not like other spoke hospitals in terms of its geographical location and immediate in- house workforce. It is vital to have clearly defined pathway referral / repatriation pathway destinations in this two-hub model 	ACTION REQUIRED NHS Grampian/Tayside supported by Service oversight group if endorsed by PDB to implement - Discussions are ongoing between Grampian and Tayside around pathways and division of workload.
There is a need for clearly defined implementation phases from the interim SOM model to the TOM as a 'once for Scotland' approach.	ACTION REQUIRED - Service oversight group if recommendations endorsed by the PDB
Lothian highlighted concerns surrounding the TOM that the physical capacity of their system and infrastructure is at its limit and without additional critical care, IR, ward and theatre capacity.	ACTION REQUIRED - Service oversight group to take forward business cases to support investment. The report acknowledges there will be a requirement for additional resource, infrastructure and equipment
A commitment to mandatory input to the vascular registry is essential going forward. Disparity in completion was evident particularly in outcomes. The ability to assess effectiveness of the new model and for future resource planning, this is essential. It is therefore recommended that all centres monitor reporting compliance with the Vascular Registry to allow reporting of improvement and sustainability of this model of care.	ACTION TAKEN - One of the recommendations in the report is: To ensure case ascertainment to the National Vascular Registry >85%. Development of real-time 'dashboards' to monitor activity, with vascular services developing action plans for improvement when standards are not being met alongside a mandatory requirement to report to

The report has been updated with the following caveat for clarity: Unfortunately, it is currently difficult to obtain accurate data on numbers of index procedures performed and subsequent clinical outcomes due to poor compliance with the National Vascular Registry in Scotland. This has been highlighted regularly at the annual meeting of Scottish Vascular surgeons where lack of audit support has been identified as a significant problem.	the vascular registry is recommended. Investment in data analysts to support is recommended.
Well done the NSS team on this large piece of work.	
Can it be made clear at the next T&F meeting that Highland vascular has completely collapsed and that a very chaotic emergency aid 1:4 cover situation has been imposed on the vascular units of Glasgow, Edinburgh, Dundee and Aberdeen. This presents a major patient safety concern and should push the T&F group to the 'Finish' stage.	ACTIONED
Consultant recruitment in Grampian has been specifically mentioned in the attached document and is a well-founded concern. However as of August 2025 there will be 4 senior trainees (ST7+) in each of Edinburgh and Glasgow while the Grampian unit have been given an exceptionally junior and variable LAT3 post. I think the training programme team should specifically comment on this. It will be impossible to recruit young consultants to Grampian as long as they spend their final years of training in the central belt. I have personally raised these concerns with the Scottish TPD and have not had a satisfactory response.	Added to the report
As clinical lead for interventional radiology for NHS Tayside and NHS Fife I wish to raise the following serious concerns.	IR constraints documented in the report
We are supposed to be a 1 in 7 IR group unfortunately due to vacancies and sick leave we are a 1 in 4.5. This unfortunately equates to a 1 in 3 for daytime work across both sites. 40 % of our workload is vascular and we currently do not meet the QPI for CLTI or AAA.	
In addition, we have had the work of mechanical thrombectomy for stroke that we were promised a 3rd IR room for that has not materialised. We also do not have the full complement of nursing or radiographer staffing that was promised for MT. 150 cases were cancelled last year as a result of this.	
From an IR service and staffing perspective, it is not possible to absorb the workload from another health board until we are fully staffed, and we have a separate IR theatre to accommodate this.	
Only modification I would suggest is slide 4 in the last column " TOM implications " for Grampian I would replace " less complex " with " selected " arterial cases.	Actioned
Regarding the document referenced above (appreciate it is V2 & out with CEO for commentary and feedback on the template provided), thank you for all the work around this, it really is helpful and in hindsight a shame it has taken until now and the significant challenges to organise the service @population level despite prior attempts. Can I ask if we can consider slightly more focus on how we reference the need to:	Report updated to reflect requirements and will form part of implementation requirements
Bring 2 Hubs in the NoS network model with Highland-Orkney-Shetland- Tayside-Grampian to work as one (real or virtual) - appreciate there is reference to"a high degree of trust—" because there is as I have read the document reference to Tayside as the point of reference to the NoS network. This I do not believe has been discussed or agreed and may detract attention going forward. I agree the preferred option requires exchange of Fife for Highland. Defining the hub will also help us to define both "hot" & "cold" pathway referral / repatriation pathway destinations.	
My concern is that if this is not addressed, we may end up replacing Fife with Highland in Tayside, solving NHSH issue, not transform the model for the North into an integrated model but simply change the referring health boards and introduce a new imbalance between the Northern Hubs.	
1 Our understanding of the Task and Finish Group for Vascular Services was to set out a new model for the delivery of vascular services in Scotland. Over time this appears to have been reduced to a model to support delivery of services for the Highland population and references to what have been previously stated as necessary changes for sustainability for the SW services based with a hub in Lanarkshire have been lost. If the proposal as it stands is an interim one, and the feasibility phase comes next, it might be useful to reference subsequent phases.	The majority consensus at the T&F group is that a new model of delivery is required and that the model has taken a population level approach

2 The main problem is in the North, although not clearly defined, would appear to be one of the availabilities of consultant workforce, both in IR and vascular surgery. It would be helpful to understand how the proposed reconfiguration will address this, as the paper does not address this. Even if the groups implicit assumption is that posts will be more attractive if part of a wider network with greater opportunity for professional support, it would be helpful for that to be stated, otherwise the prospect is one of change with no impact on the underlying problem.	Actioned
3 Lothian have repeatedly explained that the physical capacity of our system is at its limit and without additional critical care, IR, ward and theatre capacity, we do not have a mechanism to take on the Fife population's arterial work. This is separate to the workforce capacity required and is the reason why the data on which the proposals have been modelled need to be accurate, based on the work for the secondary care referral population, separating the TAAA national service aspects.	Actioned and acknowledged in the report. This is not just specific to Lothian
I realise that MDs supporting mutual aid in this area are writing to you separately, urging a resolution to the work of the T and F group, principally as a way to demonstrate to surgeons within the boards supporting mutual aid that it is not the end solution. I recognise that you have taken on a difficult role in chairing this group, but I think overall the proposal from the T and F group need to be realistic, deliverable and address the problem it was established to look at without reducing the quality of care in all areas.	Noted
Just to confirm that in South-West Scotland Vascular Network we are now up to 7 consultants in the Southwest Scotland Vascular network, and we have x4 VNS and x1 ANP across the network. We have x6 vascular scientists across the network.	Actioned – note added to report
Pages 22-24: graphics are difficult to read but get the gist	Actioned
Pages 29-30: it might be good to make it obvious in the table these are approx. numbers, otherwise the look too neat	IMS have now validated and updated
Pages 38-40: funnel charts may need some narrative against each to make it clear what we are looking at?	Actioned
Page 41: there is a typo in the first paragraph	Actioned
Page 55: para 2 refers to PLICS but no explanation I can find of what this means?	Actioned
Page 65: "NHS fife patients transfer to Lothian" – would it be worth mentioning this is necessary to mitigate the movement of NHS Highland patients?	Actioned
Page 67: in the charts what do the different colours indicate?	Actioned
Pages 83-85: table needs formatted	Actioned
Page 89: "progress in Scotland has been paid " – not sure what this means?	Corrected
Accelerate the implementation of the proposed North of Scotland network model, to align with the model in rest of Scotland. This will result in the first step to a sustainable operating model of four networks and enable closer delivery of best practice model of care. <i>The implication on Boards is set out in the detailed</i> <i>report and summarised on p8.</i> The move to this networked model of care across Scotland will result in changes that will initiate nationally instigated service change.	All points Noted and report updated to reflect service oversight group to take forward as part of implementation
Planning and Delivery Board are asked to note that work to standardise referral	Noted and would be agreed through NHSEG

agreement. This requires to be agreed at executive level due to the implications it has on the wider functioning of all hospitals concerned.

To enable robust data on quality, a commitment to mandatory input to the vascular registry is essential going forward. Disparity in completion was evident particularly in outcomes. The ability to assess effectiveness of the new model and for future resource planning, this is essential. It is therefore recommended that all centres monitor reporting compliance with the Vascular Registry to allow reporting of improvement and sustainability of this model of care.

Recommendation 1 Comments:

Reference to Tayside being the place to accommodate demand from Highland – do not recall that being so explicit. Understanding was by moving demand from fife to out with the NoS network the released capacity would be backfilled in the new model. What makes the new model very different to other similar network reorganisations is that in the development of the NoS network is that it has 2 Arterial Hubs and a spoke that is not similar to other spoke hospitals in terms of its geographical location and immediate in house workforce.	Clarified through later T&F groups
In the immediate future we will need to bring 2 Hubs (Ninewells & ARI) in the NoS network model to work as one (real or virtual) - appreciate there is a short reference in the 96 page document to"a high degree of trust—". As I have read the document makes reference to Tayside as the point of reference to receiving referrals in the NoS network. This I do not believe has been discussed to the detail that it is understood or agreed and may detract attention going forward. Defining the hub will also help us to define both "hot" & "cold" pathway referral / repatriation pathway destinations. This working together is not 2 separate services with very good relationships (as at present) working collaboratively but as sites that share common systems-processes – governance etc. Considering cancer, NOSCAN whilst we have a regional component, responsibility & accountability is within each board.	Clarified through later T&F groups
Concern is that if this is not addressed, we may end up replacing Fife with Highland in Tayside, solving NHSH issue, but not transforming the model for the North into an integrated model but simply change the referring health boards (which would be Orkney-Shetland-Highland) and introduce a new imbalance between the Northern Hubs.	Noted and report updated to reflect
Recommendation 2 – No specific comment as it is still quite sparse, however, the intent is agreed.	Further detail now added post further T&F group meetings, this point was from an early draft
Recommendation 3 – Supported. The National Vascular Registry (NVR) must be the framework we use to collect and share outcome data, but we should also consider bringing the National screening programmes into the framework as the operational delivery arm - the AAA screening programme is a long way from desired performance.	
Sensible references to the prerequisite of funding and resource allocation are noted and at this stage I don't think require comment other than noted and sensible.	Noted
As Medical Directors of the boards providing mutual aid for out-of-hours (OOH) and emergency vascular surgical care for NHS Highland, we write to provide an update and hope this may inform the work of the Task and Finish (T&F) group. Since January 2025 NHS Greater Glasgow & Clyde, Lothian, Tayside, and Grampian have been providing rotational cover for OOH and urgent patients. The current situation in Highland remains very fragile, even for the triage and outpatient services. Under the mutual aid arrangement with Highland, the urgent and emergency workload has not been significant, with approximately one call a day. However, it was clear that these were not being filtered as well as they could have been. There are patients that fall outside the scope of mutual aid, and NHS Highland is working through these to find bespoke solutions for those likely to become urgent in the very near future on a case-by-case basis. These patients have been seen and added to a waiting list from autumn onwards. This reflects that the provision of Highland vascular services has really stalled over the last 12 months. The decision-making in Highland is not contemporary, confirming the findings in the Stonebridge report dated November 2023. This reflects a considerable period of isolated practice and lack of an adequate multidisciplinary team (MDT). Some of the other patients on the list are a cause for concern, including those with AAA of a size that would normally proceed to operation, who are described as on hold. Inevitably, individuals with chronic limb-threatening ischaemia will progress without further intervention to limb loss. They are not currently in the defined mutual aid arrangement, though. In summary, although the mutual aid work is not excessive, this remains a temporary solution and does not address the needs of the population of Highland in full. This cannot be seen as a sustainable model. Already there is a blur between mutual aid and patients for whom there is no clear route. We support the T&F group in the work tha	Agreed hence the need to move to the SOM at pace
I am writing on behalf of NHS Greater Glasgow and Clyde to provide formal feedback, as requested, on the draft Target Operating Model for Vascular Services shared with the Task and Finish Group in February of this year. As you will no doubt be aware, the vascular service in NHSGGC, as with other	

boards, is under pressure, which is compounded by increasing demand and challenges to capacity. Demand projections for the next five years, based on experience of the previous five years, suggests an additional 2-3 admissions per week each year in each of the next five years, from an average of ~40 admissions per week in 2024 reaching ~50 by 2029. Along with the projected increase in admissions, there is also the increasingly complex profile of patients with greater co- morbidity, frailty and later patient presentation, all contributing to increased duration of stay and subsequent pressure on inpatient beds. You will also be	
aid model) agreed through the Task and Finish Group, GGC vascular service currently provides 1 week in 4 covers for NHS Highland urgent & emergency cases, and that we have also provided a full service to NHS Western Isles since mid-2024 given the fragility of the Highland service.	The SOM is not mutual aid hence the need to get agreement to the SOM as mutual aid position currently in is not sustainable
I am aware Medical Directors from the four boards supporting Highland have written to you separately to update on that arrangement, outline issues with that model and express support for the work of the Task and Finish Group, along with a desire to see speedy progress towards a long term solution.	Mutual aid is not the SOM-agreement on the
particular challenges, risks and concerns within the Sustainable Operating Model (or mutual aid model) (SOM) and in particular, NHSGGC would wish to draw attention to the following:	approach will allow the service oversight group to mobilise to take this forward
• The SOM (or mutual aid model) covers only urgent and emergency patients – there is lack of clarity as to the pathway for patients who have been assessed and placed on a nonurgent waiting list. Left unresolved, this will impact clinical outcomes for NHS Highland patients.	Agreed hence the need to move to SOM at pace
 There is a risk of lack of knowledge among referring clinicians in NHS Highland in terms of understanding pathways and knowing which board is providing cover. We are concerned that this may lead to referrals being delayed, again potentially impacting on patient outcomes There remains little clarity around what elements of a vascular service NHS Highland will continue to provide locally, and what resource can be released to NHSGCC and other boards providing cover to the service on a rota basis. There are further challenges in repatriating patients to NHS Highland, where it is unclear what elements of post-operative follow up can be delivered locally. Given the challenges within the current mutual aid (or SOM) model, NHSGGC are keen to support agreement and implementation of the TOM as soon as possible. Draft Target Operating Model We have reviewed the draft TOM and identified a number of areas which present specific issues to GGC, areas that require to be further developed or clarified, and some inaccuracies to be corrected. I have attached our detailed feedback separately. The key points outlined in our feedback are as follows: 	Report updated to reflect, and NHS Highland has produced a paper on this
• Timeline – the potential 36-48 month timescale for implementation of the TOM is too long and presents significant risk. We believe this should be significantly accelerated and are happy to support work to achieve this.	The TOM will require significant investment to deliver hence the need to phase and move to the Som initially and out of mutual aid
• Repatriation – As a large board taking patients from all over Scotland, repatriation of patients presents a frequent challenge to GGC. We are keen that clarity be given around processes for repatriation, and that these are agreed nationally	See updated section on repatriation
• Interventional Radiology – the POVS 2021 guidelines state that a vascular hub should have 24/7 Interventional radiology service. Within the TOM NHS Lanarkshire will be a hub, they however currently rely on a temporary arrangement with OOHs IR being provided by NHS GGC.	Report updated to reflect
Discussions are underway to agree a longer-term solution to enable NHS	

Lanarkshire to meet the requirement of having an OOHs IR service as a	Report updated to reflect
Vascular Hub. This is not clear in the TOM and may as a result present a	
misleading representation of the readiness of the SW Scotland network centred	
in Lanarkshire to implement the TOM. This needs to be clarified within the TOM	

Comments from NHS Lothian and response from independent vascular consultant in red/action taken

Page	Comments/Response
P7	The case for change is using the problem in Highland to extrapolate that there is a much wider problem of
	sustainability effecting vascular surgery in Scotland - there isn't.
	Recruitment in Grampian
	IR issues nationally
	Workforce concerns with age profile of Cons
	KPIs, NVR uptake poor, variation in practice all need addressed
P8	It continues to focus on Highland but overlooks the chronic recruitment crisis in Grampian over last 7 years
	See above workforce requirements have been detailed in the report alongside the overall issues across Scotland
P13, Section 2A.3	'Out of scope' is implementation' and 'resourcing to deliver' plans, 'this will remain responsibility of provider boards'. Is this realistic? What about a need for redistribution of resources to meet redistribution of work?
	to be responsible for implementation including redistribution
	Later in paper (p55) there is a suggestion that funding of activity previously delivered in NHS Highland would be
	on a cost per case basis by provider boards though implementation of an SLA. SLAs may not permit additional
	Substantive funding/started beds/theatre sessions etc to meet needs of redistributed work.
	updated to include this. Direction of travel requires endorsed to allow these to be developed
P23	NHS Lothian/SES Network DOES have a vascular ward
	Noted as 36 in table as per NHS Lothian return
P24	'By forming a NOS network Grampian, Highland and Tayside can enhance access to staffing and infra-structure, 'ensuring better alignment with the guidelines'. It might help meet guidelines, but it won't necessarily help staffing of two rotas given two hubs.
	NHS Grampian and Tayside have commenced discussions as to how this would work and have not raised
p25	Patient pathways and systems mapping - probably needs to be done from a patient (resident in a region)
	perspective rather than from an individual hospital perspective? Agreed this forms part of the planning with
	patients approach currently in development with Derek Blues and phase 2 will be actioned by the service
P30	oversight group. Phase 1 has been detailed in this report.
F 30	have sorted data was noted as under review in draft
P31	Dialysis access procedures - interventional radiology support should be a YES rather than a NO Amended
P33	not clear what is meant by 'Vascular access surgery' as opposed to 'Dialysis access procedures. Think we should
D24	probably be consistent and agree a single term perhaps "Renal access surgery "-Actioned
F34	varicose vein numbers look verv wrong. The forecast of increasing demand for AAA defies current national
	projections. The same is true for forecasts (P60-61) Agree re forecasts incorrect as already mentioned AAA and
	Carotid interventions declining. Data team have since verified and updated. These issues have occurred due to
D20	the inconsistent coding in SMR01, and the various other issues highlighted-Actioned
F 3 9	sources we have, and its weaknesses are already stated
P46	SES Vascular Network makes no mention of Scottish national TAAA service with reference to referring boards
	Actioned
P47	The vascular and IR consultants' data is very hard to interpret. Is this based on 10PA WTE for all submitting centres, which is how data was submitted from NHS Lothian? Clarified in report
P48/49	Not sure of the relevance of stating 10.5 radiologists/100.000 pop against a recommended 0.5-1 interventional
	radiologists/100,000 to cover vascular services specifically. However, section also states that there should be
	between 27-55 interventional radiologists for Scotland, and we currently have 28.7 in post, 29.1 funded and a
	"24% shortfall". Not clear what the 24% shortfall is based on? Perhaps remove the statement about 10.5
	updated info provided from services
P49	Vascular Nursing Specialists - do we know what this group includes? For examples does it include Vasc access
	nurse specialists in all areas? Discussed and clarified at later task and finish groups
P54	The financial data also looks very odd with wide variance between health boards suggesting a data problem (This is from the cost book but will be explored further by the convice everying a data problem. This has
	subsequently been validated.
P59 and 61	Projections for increased EVAR and TEVAR are not evidence based Happy to address this and reword in main
	document -actioned
P63-64 4A.1	Assertions that options are discounted or endorsed is not reasonable given current data quality; but note also that it is 'endorsed to move to feasibility assessment'
	This is not the view of the wider T&F group members, and no further options were presented for consideration.
	The option itself has been modified to include additional information as it has become available – the task and
	tinish group were aware of the data limitations but were also aware of the various routes explored to make the data as robust as possible all of which are datailed in the report. Lack of compliance with input to the vacaular
	registry and SMR01 coding errors led to a buge volume of work for the data team to validate. Limitations are
	noted in the report and population data used to support planning
	Makes case that new networks would require 'significant cooperation and support/logistical planning' but no
	detail. This really up to the individual units and their needs / variations in job plans /subspecialisation /number of
	spokes etc, the service oversignt group would be responsible for the detail Resources from Fife could support Lothian/Tayside' – but P66 infers Fife workload would move to Lothian without
	transfer of consultant resource. Incorrect.

	Updated to be clearer Case made that organisation of vascular services has significant implications for rates of amputation; early diagnosis and intervention being crucial PAD and importance of collaboration/MDT approaches. There is no discussion here as to how a network might negatively impact on early recognition and referrals - specifically on how potential barriers to referral or early patient review may result in a non-arterial /spoke hospital and how this should be mitigated but appears on P80 as a risk with suggested mitigation strategy – 'strong' referral pathways and telemedicine services. Potential delay for CLTI has been identified by VSGBI and is being addressed with current QIP initiative in England.
P64	This suggests that the data about hospital volumes and outcomes seem to be specific to AAA and CEA procedures but not so for CLI/PAD? the data we received on visits did show a variation in amputation rates. [P7 and 8 allude to differences in outcomes but don't specify any differences for NHS Scotland units. Updated to be clearer Funnel plots (accepting earlier concerns about quality of data input) on P38-40 don't suggest any significant differences in outcomes for specified procedures including lower limb vascularisation and mortality for amputation in Scotland units. Sections 3A1 and 3A2 (p28) present epidemiological data but don't define differences in outcomes for NHS Scotland units. P78 alludes only to 'potential variability' in outcomes which is perhaps most appropriate.] Updated to be clearer
p65-66 Section 4A2	Not clear why NHS Fife needs to transfer to Lothian/SE Network. Statement that NHS Lothian 'considered to have more capacity compared to other centres' does not have any evidence behind it, 0.89 WTE pretty good if Fife Con support for Lothian-this has been discussed extensively at T&F group. NOS nw would be supporting 1,7m population vs just over 1M in SE NW. and does not seem to be supported by Fig W (p47) - consultants per 100K pop, or by data in figure on p74 where the current Vasc cons WTE/100K pop for SE Scotland is the same as WOS but lower than all other networks. Updated post further data validation If the proposed move of workload from Fife to Lothian occurred, WTE/100K would drop to 0.57 WTE/100K (compared to 0.78 WTE/100K for WOS, and for NOS 1.1 WTE/100k pop without Fife or 0.89 WTE/100K with Fife) SOM does not propose this, Fife would remain in NOS model-T&F group have recommended that Lothian look at capacity to support some demand, implementation of TOM flags additional resource is required. These figures do not take into account the workload of the national TAAA service within Lothian. It also assumes that the proposed option of Fife patients moving to Lothian is not matched by Fife consultants moving to SE network. Not correct assumption. If that were not to happen, how would the Fife spoke/non arterial centre retain vascular activity expected of such a centre?
P76-77	Responsibilities – initial assessment by non-arterial-local hospital and GPs. What does this mean? A hospital cannot assess a patient. Who in the hospital should do it? There needs to be a definition of who with what level of vascular expertise is required as a minimum to perform initial assessment of referred patients and follow up. This is covered elsewhere. It states that Diagnostic imaging is the responsibility of arterial centres/hubs. We would have thought that imaging should and can be done locally. Already confirmed in recent edits. Statement that GPs would be jointly responsible for assessment, medical management and follow up of patients based in spoke hospitals is likely to be challenged by local GP groups. A non-arterial or arterial site does not need to prescribe medication once a treatment plan in place-report updated to say supported by GPs
P78-80	Transport costs will not sit in 'initial set up costs' but will be a long term increased cost in a network model, resulting from both increased movement of patients and clinical staff. Agreed but there are initial set up costs to allow the model to move forward as defined by SAS. There will be lost Consultant time from travelling time between hub and spoke centres. Initial set up costs may need to include appropriate IT systems to share patient data effectively, provision of additional capacity (beds, staff, theatre lists) in hub centres. Actioned There is no evidence to support assertion that there will be long term cost savings from reduced duplication and improved efficiency. I think there is a reasonable assumption that only resourcing a smaller number of hubs will save money also wiser use of new technologies controlled but could say "more cost effective rather than "save" money Actioned P80 details the potential extensive investments required to manage proposals: examples for EHRs, critical care beds, diagnostic equipment, MDTs, additional staff in hubs etc
P80-82	'Consequences of not being an arterial centre' - this needs careful consideration as it will inevitably affect provision of access to and timely support of nurse specialists/allied health professionals/other teams, as well as future recruitment to those specialties, and sustainability of interdependent services. Updated further

Specific feedback from GGC and comments/actions in red:

Page / Section	Comments
P7,8	Challenges faced by vascular services do not mention the impact of deprivation and increasing multi-morbidities – this is particularly important within NHS GGC, where 34% percent of our population reside in the lowest 25% SIMD catchment areas with a 4-5 times higher rate of cardiac mortality Co-morbidities are covered-population
	level not region specific
Section 2A.3	(from P13) This section notes that 'implementation' and 'resourcing to deliver' plans is out of scope and will remain responsibility of provider boards. However, the proposal later recognises that moving to the TOM will require investment in resource and infrastructure, and that 'all boards will be appropriately funded for the activity they are undertaking on behalf of another board'. In addition, POVS 2021 workforce guidelines are referenced along with the suggestion that we should "Allocate resources to healthcare facilities based on geographic distribution and capacity needs". We suggest that there needs to be a discussion about the current Highland vascular resources, their future model and what resources can be released and reallocated to meet the POVS 2021 workforce guidelines to ensure parity and enable the hubs to meet the guidelines. Agreed report updated to reflect and now confirmed service oversight group would be mobilised to implement
P15, 22, 46, 66	NHS Greater Glasgow and Clyde are noted as providing Out of Hours Interventional Radiology for Lanarkshire. This is a temporary arrangement currently provided for all West of Scotland boards out of hours, including those in the Southwest Scotland network. NHS Lanarkshire, who are a hub service do not have an OOH IR service. Regional Planning discussions have commenced with WoS to agree a longer term solution to enable NHS Lanarkshire to meet the requirement of having an OOHs IR service as a Vascular Hub. The inference created later in the document that the South West Scotland network, with the arterial centre in Lanarkshire, is able to provide IR 24/7 is not strictly true – the document should be amended to note that "in the absence of a Lanarkshire service, access to OOH IR for all boards in the SW Scotland network is to Glasgow via a temporary

	arrangement, pending agreement with regards a permanent OOHs IR solution within NHS Lanarkshire". P65-66
P65-66	TOM diagram refers to 'NHS Argyll and Bute' as a referring board to the West of Scotland Vascular Network. This should be amended to Argyll and Bute HSCP. Amended Narrative on page 65 says that NHS Highland will transfer into the North of Scotland network and makes no mention of a different arrangement for the A&B portion of this board area. Updated Suggest this is clarified within the TOM. Orkney and Shetland are both noted as referring to both the North of Scotland and Southeast Scotland hubs instead of NoS. Amended
P27	Section 2B.5 – 'Policies and Regulations' only specifically mentions the Heart Disease Action Plan and notes no regulations. We are unsure of the value of this section and believe it could be removed. Updated
P28, 29	Epidemiological Data (section 3A.1), does not factor in the impact of deprivation e.g. on multi-morbidity, complexity of cases, late presentations – see our earlier comment, this is particularly relevant for the NHS GGC population. The NHS GGC context on page 29 does note 'socioeconomic factors' as driving the rate of hospital admissions, but this should be expanded based on the above. We would be happy to provide further text in support of developing this section further Updated data does reflect this
P65,66	There needs to be clarity on current NSH Highland vascular resources, what elements of a vascular service NHS Highland will continue to provide, what resources will be needed to be retained and what can be released to support the delivery of the POVS 2021 workforce guidelines. Report updated and NHS Highland have developed a paper to support implementation
3C.1 (from page 46)	Suggest this section is renamed 'Workforce' rather than Human Resources Table on page 49 suggests GGC are under-resourced in terms of Vascular Nurse Specialists. Narrative states that 'investment in this area will be required' Links to finance point raised above and need to release Highland resource to support hubs to meet POVS 2021 workforce guidelines. GGC staffing for Vascular Scientists has changed slightly since data was submitted earlier in this process (correct figure is now 1.6 WTE). Based on the recommendation that there should be 3 WTE at each arterial centre, GGC is under-resourced while other centres are over-resourced - please see our earlier comments release of NHS Highland resource to hubs as per previous comments
P54	GGC has 2 IR angio suites, not 0 as stated in the document Amended
4A.2 (from page 65)	IR is not mentioned in the TOM specification, although noted earlier in the document as essential for an arterial centre. This should be included, factoring in the temporary OOH in WoS arrangement as noted above – this should also be for inclusion in risks / mitigations section on page 80-81. Amended
P71	Principles for repatriation are helpful, but the processes and pathways for this need to be clearly documented in an SOP. This section may benefit from a diagram or flowchart to outline the process. There should also be more clarity given on the options open to boards seeking to repatriate patients from an arterial centre where the patient's home board are unable or unwilling to support this. Updated - service oversight group responsibility to progress further
P68, 70	The objectives of the TOM (page 68) and desired outcomes (page 70) are essentially the same and so one of these should be removed to avoid confusion. Amended
4B.2 (from page 72)	Overall governance may benefit from a diagram or structure chart to visualise this. Governance structure still being finalised by SG
4B.3 (from page	This section should address the issue with IR, and the question of what elements of service in Highland will be retained and what resources can be released. Report updated
P83 / 84	This table needs to include impacts to GGC, in particular the OOH IR issue noted above, and that we continue to support Western Isles. Report updated
Section 5 (from page 85)	There needs to be a clear, accelerated timeline for moving towards the TOM, particularly given challenges in continuing to provide mutual aid support to Highland. The 36-48 month timeline alluded to in the document is far too long and risks negating any benefits of moving to the TOM and patients suffering harm in this interim period. We understand a feasibility study is underway – it would be helpful for this to be undertaken rapidly and for its remit to be fully understood by the task and finish group. The feasibility study for Fife / Lothian should not be allowed to delay the wider timeline. Along with the accelerated timeline, we suggest a simple Readiness Assessment checklist be developed to allow boards to provide internal and external assurance that they are ready to move to the TOM. As per previous comments on phased approach to Som then TOM
P87	A significant range of performance metrics are listed, we would suggest that this list be streamlined with a focus on those which are realistic and achievable. For example, the first metric (Reduction in Disease Incidence') is unrealistic, as the actions outlined in the TOM do not tend towards prevention and having a realistic impact on this measure. Amended In fact, given demographics noted elsewhere in the TOM the opposite is more likely. Some metrics refer to measuring wait times, length of stay, readmission rates etc. but do not say what the preferred direction of travel (or target) for these should be. Still to be defined and will be taken forward by the service oversight group these were provided by the task and finish group to support the next phase It is presumed that success in each of these areas would be a reduction, but this is not made clear in the TOM. Reporting on these metrics will also likely require additional staffing in boards to gather, analyse and present data. It is not clear how this will be resourced. Still to be defined and will be taken forward by the service oversight group
various – reference to National Vascular Registry	Ine proposal recognises that there are challenges with data entry to the National Vascular Registry. It is important to note that within GGC there is no dedicated administrative resource to support completion - and our completion rate is around 33% therefore conclusions drawn from data in the registry must be heavily caveated. Acknowledged in the report hence other data and returns from services themselves has been used We believe there are significantly varied levels of completion between Boards. There is a recommendation (page 91) that case ascertainment to the National Vascular Registry should exceed >85%, we would note that achieving this level in GGC would require additional administrative resource. Consistent across all services and acknowledged in the report. There is potential that administrative resource released from the NHS Highland service may support Boards in achieving this, At page 91, where the document states that in regards to data collection that 'ultimately a cultural shift is needed; one that places increased value on the importance of record keeping' we would disagree with that statement, and assert that the main challenge is provision of administrative resource to support data collection / entry while continuing to deliver a service under significant pressure. It is both
General Comments	I he document is lengthy and at times drifts from the main focus of establishing the TOM. It could be substantially shortened by moving some of the context and data to an appendix or separate strategic needs analysis
	document. Some of the tables / diagrams are difficult to read and accessibility of these needs to be improved

significantly. This is the first time we have undertaken a population level planning approach in this way and the detail and length of report has been driven by feedback and requirements from various stakeholders to get this over the line, it is hoped we can streamline going forward however the detail include has borne out of the numerous requests for additional detail to support decision making.

Additional comments received from NHS Lothian via email, 7th-14th May 2025 (and responses):

Summary of Key points/Concerns/Recommendations	Response
NHS Lothian now responsible for all screen-detected AAA patients from NHS Highland (effective 25 April).	Has this arrangement been formally endorsed and what Governance route did this go through? This will allow this information to feed into the work of the task and finish group and the actions that require taken forward by the service implementation group. Given the relatively low patient numbers, I presume this can be accommodated within existing resource and infrastructure arrangements—can you confirm whether that is the case? Additionally, has NHS Lothian been able to identify any further capacity to provide additional support.
	While this development is welcomed, patient numbers remain small (fewer than one per month). During discussions at the task and finish group, NHS Lothian representatives were asked to assess their capacity to support a phased implementation of a sustainable and target operating model. Has any additional capacity been identified to further support this approach?
	Response from Clinical Advisor: While we appreciate the willingness to support by taking on a limited number of index cases, this approach may not align equitably with the contributions being made by other centres. The primary challenge, as highlighted by both the data and insights gathered during site visits and the task and finish group, lies in managing the high volume of CLI cases. Addressing this collectively will be key to ensuring a balanced and effective response across all sites.
2023–24: NHS Highland had 9 threshold AAA cases, 8 eligible for surgery; 2 referrals received.	All centres are currently facing significant pressures. The challenges associated with CLI are not isolated but represent a broader, national issue across the UK. This has been formally acknowledged by the VSGBI, which has called for coordinated action to address the situation effectively.
Public Health teams in NHS Lothian and Borders unaware of new arrangement.	Please refer to the attached timeline, which details Public Health Scotland's representation across multiple groups and highlights various opportunities for inclusion in the task and finish group. The roles and responsibilities of members within these groups are clearly defined, with the expectation that representatives provide feedback, engage with their peers and the process to ensure a well-informed process.
	Response from clinical advisor: The development of the SOM, and the associated work of the Task and Finish (T&F) group, has required significant effort, including multiple cross-disciplinary meetings and site visits. From the outset, it was clearly communicated that T&F representatives were responsible for engaging with their colleagues throughout the process.
Additional workload risks deterioration in performance (Only 28% of eligible patients met KPI 3.2 - surgery within 8 weeks).	A national, whole-Scotland approach is essential to ensure equitable access to treatment across NHS Scotland. While performance is assessed through specific KPIs for screened patients, it is equally important to consider the broader patient population. Currently, NHS Scotland patients are experiencing adverse effects across the system, highlighting the need for timely intervention. Prioritising a comprehensive strategy that encompasses all patients will support a more sustainable and effective healthcare model.
Reconsider Sustainable Operating Model until fully resourced plan is in place.	The Sustainable Operating Model is designed to support a phased transition that moves NHS Scotland toward a more stable position before advancing to a fully resourced and financially sustainable Target Operating Model. Maintaining the current mutual aid arrangement indefinitely is not a viable solution.
	A fully resourced plan will take time to implement, and immediate financial investment alone will not resolve the issue. Despite existing funding allocated for positions, roles remain unfilled.
	One of the immediate priorities should be the enactment of a training, recruitment, and retention strategy, building upon the successful initiatives in the West that have increased vascular consultant numbers. While it is acknowledged that addressing these challenges will take time, delaying all action until a fully resourced plan is in place risks patient safety and may contribute to geographical disparities in access to treatment across NHS Scotland
	Response from clinical advisor: The development of the SOM, and the associated work of the Task and Finish (T&F) group, has required significant effort, including multiple cross-disciplinary meetings and site visits. From the outset, it was clearly communicated that T&F representatives were responsible for engaging with their colleagues throughout the process.
	While the desire for additional resources is understandable, delaying acceptance of the SOM until such resources are secured risks exacerbating existing delays in care for vascular patients across Scotland. A phased implementation of the SOM, in parallel with ongoing efforts to build capacity, represents a more pragmatic and patient-focused approach.
	Although the SOM is not a perfect or fully resourced solution, it reflects the best achievable outcome under current constraints. Further delays—particularly those that disregard the collaborative work of the T&F group or that hinge solely on future resource commitments—would not be in the best interest of patients or the wider system.
Prefer receiving elective AAA cases from NHS Fife rather than emergency admissions.	How does this preference align with national colleagues and the broader interests of NHS Scotland patients?
	NHS Greater Glasgow & Clyde has assumed full responsibility for Western Isles patients.
	NHS Tayside is currently managing urgent and complex NHS Highland cases.
	Could NHS Lothian accommodate more than elective AAA cases?

Summary of Key points/Concerns/Recommendations	Response
Highlight need for additional resources (assessment and theatre capacity).	The need for additional resources has been consistently highlighted during site visits, task and finish group discussions, and governance meetings and is articulated in the report. In order to progress business cases effectively, a clear agreement is required on the strategic direction. For example
	 If NHS Fife is unable to transition into the Southeast network, investing in NHS Lothian's infrastructure and resources is unlikely to be the best course of action.
	 In such a scenario, NHS Tayside/Grampian or Fife may need to be considered and progressed to support the substantially larger population.
	The strategic direction provides essential guidance for the oversight group as they determine the next steps in the development of business cases, patient pathways, and related initiatives. Ensuring clarity in this direction will facilitate effective planning and resource allocation
	Response from clinical advisor: Disregarding the substantial work undertaken and diverging from the recommendations of the Task and Finish Group could risk undermining clinicians' confidence in what has been a fair, transparent, and robust process. This, in turn, may impact the collective ability to implement the agreed solutions effectively and in a timely manner.
IR services in Highland collapsed; Grampian under pressure.	Yes, the task and finish group are fully sighted on this. They are not the only speciality in this situation, and this has been acknowledged in the report. NHS Highland and NHS Grampian were well represented through the task ad finish groups, site visits and various governance groups. Information relating to IR was provided via site visits, position statements from the IR teams at multiple sites, and discussions within the task and finish group.
	Members of the Vascular Task and Finish Group have also raised this issue, and the population-level workforce assessment further highlights these concerns. The report clearly outlines the need for workforce investment, evidencing the under-establishment in WTE numbers. Additionally, the independent consultant has addressed these findings through discussions within the task and finish groups and site visits.
IR underrepresented in Task & Finish Group discussions/ IR supports multiple specialties, not just vascular surgery.	Please refer to the attached timeline for details on stakeholder engagement. Shilpi Pal met with NSD colleagues and was invited to both the site visit and the Task and Finish (T&F) group but did not attend. Sanjay Pillai was also a member of the T&F group, and there have been multiple opportunities to include interventional radiology (IR) colleagues throughout the process.
	IR colleagues were engaged through several site visits, and their position was reflected in the presentations provided by various centres, as well as in the data, which clearly demonstrates the current landscape. All representatives serve as delegates of their respective peer groups, and it is their responsibility to ensure appropriate engagement. Additionally, any absence of stakeholder representation should be actively flagged for further review.
	Response from clinical advisor:
	Failure to attend these meetings by key individuals or a deputy is regrettable but is the responsibility of the individual centres.
Lothian IR under-resourced and failing KPIs (e.g., critical ischaemia).	Could you clarify how this issue has been escalated within NHS Lothian? Additionally, what actions are currently in progress to address it, and are there any lessons that could be incorporated into the national approach? Understanding the steps NHS Lothian has taken to address this challenge would be helpful in shaping broader strategies.
	Tam Sidiqui has shared insights into training and recruitment efforts that have been successful for vascular consultants, and these will be built upon for other specialities as part of the work of the service implementation group which will be mobilised once the strategic direction is agreed.
	This issue reflects a national trend, which remains the focus of ongoing efforts. Addressing it will require a comprehensive approach, including recruitment, retention, training, funding, and new ways of working to mitigate the resource deficit. As a healthcare system, we must establish clear and equitable provisions for all NHS Scotland patients while progressing toward a position where workforce and infrastructure are appropriately aligned to meet population needs, key performance indicators and also areas of concern that are not currently monitored via KPIs.
Share T and F groups' concern that Northern region too big a population when Fife included. From blank sheet of paper point of view, makes sense for Fife pts to come to Edinburgh.	This aligns with the majority view shared by the task and finish group members who support the target operating model recommendation, however, is not the position that NHS Lothian have taken as a Board. Full implementation of this model would require significant investment in workforce, infrastructure, and equipment, necessitating a phased approach to allow sufficient time for transition.
	Given that NHS Lothian and NHS Fife have indicated they do not support this approach, it is crucial to either establish a national position or identify an alternative solution. At present, no alternative options have been proposed that have not already been discounted. Investment decisions must align with the agreed direction of travel to ensure a strategic and sustainable allocation of resources. Until consensus is reached, the current mutual aid arrangement remains an unsustainable position.
Adding Fife patients would overwhelm current IR capacity.	The phased approach is designed to assess both the immediate impact and the longer-term resources required to support the Target Operating Model (TOM). The Task and Finish (T&F) group has repeatedly requested alternative options for consideration and explored what support could be managed in a phased manner.
	Currently, NHS Greater Glasgow & Clyde (GGC) has taken full responsibility for Western Isles patients, while NHS Tayside is managing emergency and complex cases. NHS Highland's interventional radiology (IR) services are no longer operational, leaving the Highland population reliant on mutual aid.
	While the intention is to avoid creating additional strain elsewhere, it remains essential to find a practical means of distributing the workload as effectively as possible.

Summary of Key points/Concerns/Recommendations	Response
No changes should proceed without adequate resources.	Given that interventional radiology (IR) services in NHS Highland have collapsed, leaving patients without local access to care and placing additional strain on NHS Grampian, NHS Tayside and NHS GGC, is the expectation that we 'do nothing' until resources become available?
	Can the system continue to sustain mutual aid without further exacerbating the situation, potentially leading to a loss of specialist expertise? If a simple solution existed, Boards would likely have acted already. There are funded posts in the system that remain unfilled the fundamental issue remains there is a shortage of IR specialists, necessitating investment in training, recruitment, and retention strategies which is not an immediate fix.
	To ensure a safe and equitable approach, we must also focus on infrastructure and optimise existing resources and funding across the system. This will allow for a balanced distribution of support, ensuring that solutions do not disproportionately impact one or two Boards at the expense of the wider healthcare system.
IR must be better represented in future planning.	All relevant groups will be represented on the implementation stakeholder list. It is essential that individuals who commit to a representative role actively participate by attending meetings or ensuring a deputy is present in their absence. Representatives must fulfil the responsibilities associated with their role, as agreed upon when they became members or were nominated by their Board or peer group.
	For collaboration to be effective and successful, engagement must be reciprocal, ensuring that all stakeholders contribute meaningfully to the process. Please also refer to earlier comments relating to representation.
Proposal lacks clarity on logistics (e.g., which patients move, IR sessions in Fife?).	Without clarity and agreement on the direction of travel there is a risk of investing significant time, expertise, and resources into an approach that may not be widely supported.
	To facilitate this process and provide the detail you refer to, a service implementation group would be mobilised to oversee a phased transition, incorporating key checkpoints to confirm readiness at each stage. This is not an immediate shift, but rather a structured, incremental approach to delivering vascular services, ensuring that the evolving model effectively meets the needs of the population.
NHS Lothian plays central role in national TAAA service (60+ patients treated, 630+ complex aortic cases via MDT).	NHS Lothian receives ring-fenced funding from the 14 territorial Health Boards to provide this service for all NHS Scotland patients. Given this dedicated funding, further clarity on its allocation and use would be beneficial.
	Response from clinical advisor: The TAAA service is well-resourced and safeguarded, with a relatively low volume of operative cases when compared to the substantial and growing backlog of CLI cases. Aligning a population of 1.7 million to a network that covers the NOS (some of the most remote & rural areas) particularly when contrasted with the needs of the Lothian catchment—raises concerns around equity and prioritisation. It is important that resource distribution reflects the scale and urgency of clinical demand to ensure fairness and uphold ethical standards in patient care for all NHS Scotland patients.
Proposal to shift NHS Fife's acute take to NHS Lothian risks destabilising national TAAA service.	The National Service was initially excluded from the scope following early scoping discussions and subsequent agreement by the PDB. However, in light of ongoing concerns, should this exclusion now be reconsidered?
	It is acknowledged that any transition would require a phased approach, along with investment and resource realignment to ensure successful delivery.
NHS Lothian already under pressure and expanding responsibilities.	This trend is consistent across other Health Boards as well, further reinforcing the need for a coordinated and strategic approach to address these challenges.
A more sustainable option would be for NHS Lothian to take on planned vascular activity (e.g., AAA repair, carotid surgery).	Is this a position endorsed by NHS Lothian senior management and the Medical Director? If NHS Lothian is willing to take on carotid work, this option has not yet been formally presented. Given the repeated requests for viable alternatives, it is important to clarify whether this is being considered. The 'do nothing' approach is no longer feasible, as NHS Highland's service has now completely collapsed. Understanding whether this option is viable would help inform the next steps.
The proposal overlooks the scale and significance of NHS Lothian's current workload.	This statement is inaccurate. The data used to reflect demand is based on figures provided by NHS Lothian, as has been the approach across all centres.
Avoid disrupting emergency care pathways in Fife and Tayside.	The NOS emergency workload cannot be safely managed for a population of 1.7 million solely by NHS Tayside, NHS Grampian, and NHS Fife without additional support and a phased approach to implementation which includes resource and infrastructure investment.
Sustainable Operating Model (SOM) lacks clarity (roles of NHS Fife and Lothian). Proposal includes diverting work from Tayside to Fife and transferring Fife's acute	The roles of arterial and non-arterial centres are clearly outlined in the Vascular Society of Great Britain and Ireland (VSGBI) guidelines and have been referenced in the report. The clinical advisor has also addressed this within the Task and Finish (T&F) group discussions.

Summary of Key points/Concerns/Recommendations	Response
unselected take to Lothian. SOM vague and potentially unfeasible.	Pathways, clinical governance, and related aspects will be defined by the service implementation group, which would be mobilised and responsible for overseeing the implementation process. Response from clinical advisor : Lothian, Fife, and Tayside have previously been asked to explore opportunities for a phased transition from the SOM to the TOM through a shared workload model. It is important to note that the proposal is that patient triage would remain under the clinical oversight of Fife Consultants, meaning that many cases may not require immediate transfer. Additionally, the option of a geographical split within NHS Fife was considered but ultimately dismissed early in the discussions, based on clinical and operational considerations.
Doubts on accuracy of demand data used in proposal.	NHS Lothian supplied the data and has been given multiple opportunities to review and correct any inaccuracies. If errors remain, they originate from the service itself. Each centre has also been asked to review and confirm their own data on multiple occasions to address your concerns in addition to the other validation work that has taken place, and there is also acknowledgement of the limitations of the data.
	Please refer to the attached timeline, which details the ongoing exchanges with the NHS Lothian team regarding data validation.
	IMS has thoroughly assessed the data against clinical systems, collaborated with Public Health Scotland (PHS) to evaluate population-level effects on the patient cohort over time, and integrated vascular registry data while accounting for service compliance with data entry requirements.
	As experts in this field, IMS has applied the standard data validation processes used across all datasets while acknowledging the existing error margins in vascular data, which must improve going forward. Strengthening data accuracy has been identified as a mandatory requirement moving forward. Among the validation reviews, IMS have confirmed NHS Lanarkshire and NHS Greater Glasgow & Clyde (GGC) demonstrated the highest robustness in data accuracy and verification.
Fails to acknowledge NHS Lothian's growing national workload.	As both you and Mr. Falah have raised this as a concern, we can escalate it as a risk and propose through NSSC that the National Service be reviewed, including workload and future service delivery models. While initially out of scope—per PDB agreement following early scoping discussions—the evolving position suggests reconsideration may now be necessary.
	Given that this concern is now shared, it would be helpful to confirm whether this represents a formal Board position. If so, we will proceed to request a review through NSSC to assess the designation and future delivery model for the National Service.
	As part of the standard review process, options to address increasing demand will be explored, including distributing workload across multiple centres while considering the infrastructure challenges NHS Lothian has identified, which may limit expansion to support additional demand.
NHS Lothian should take on scheduled vascular activity (AAA, carotid surgery) from Fife and Tayside.	If there are concerns regarding the growing workload, has a formal assessment been conducted to evaluate the impact and resource implications? Response from clinical advisor: The inclusion of AAA screening cases was never formally put forward as an option for discussion at the T&F group, and current assessments suggest that their impact on overall capacity is likely to be minimal. As such, expectations around capacity gains from this area should be managed accordingly.
Maintain emergency care arrangements.	As above current emergency arrangements are unsustainable.
Consider Highland-Grampian network as alternative.	This issue has been carefully considered through the site visits, subgroup work and via the Task and Finish (T&F) group and has been deemed unsustainable. NHS Highland currently operates on a 1-in-1 rota using a locum and remains reliant on mutual aid, while NHS Grampian is also facing a precarious situation.
	Given these challenges, there is a clear need to align with NHS Tayside to ensure the necessary resource and infrastructure are in place, particularly considering the population size and the increasing demand for services.
Reassess SOM based on verified and transparent data.	The data provided by each service provider has undergone rigorous verification through IMS, the NSS data team responsible for national validation and data presentation across multiple networks. As experts in this field, IMS has also assessed population-level data, highlighting relevant caveats.
	The data remains fully transparent via the dashboard and final report, with extensive engagement from services to ensure the required level of data accuracy, most of which have provided comprehensive submissions.
	Given that this assessment is population-based, demand data represents only one component in

determining the overall delivery model. For instance, based solely on population size, NHS Scotland
would require three arterial centres. However, when factoring in remote and rural geography, existing
infrastructure, SAS data, and other key considerations, the assessment indicates a need for four lead
arterial centres, with NHS Grampian functioning as part of a network alongside NHS Tayside.