

8 CARE AT THE VASCULAR HUB

The 2018 Vascular Society Provision of Vascular Services (POVS) did not include ALI in its time critical conditions or in amputation avoidance.^[2] There are around 5,000 to 6,000 major amputations annually in the UK and the focus has been on chronic limb-threatening ischaemia (CLTI) to reduce amputation rates. Opportunities to reduce amputations and improve overall care for those who develop ALI as a new condition or as consequence of CLTI, have been overlooked until now.

The 2021 POVS included ALI,^[32] and recommends that vascular networks have a written clinical pathway for its management, that ambulances should bypass local emergency departments (spoke hospitals) to avoid delays in presenting to the vascular hub. However, ALI was not included in the time critical conditions in the updated 2024 POVS.^[33]

There were 192/330 (58.2%) patients who presented directly to a vascular hub. The most common route was via presentation to an emergency department (82/192; 42.7%), followed by primary care referrals (30/192; 15.6%) and blue light ambulance (34/192; 17.7%) (T8.1).

Table 8.1 Mode of presentation to the vascular hub	Number of patients	%
Transfer from a spoke hospital	138	41.8
Emergency department (within the vascular hub)	82	24.8
Ambulance attendance, blue light to the emergency department	34	10.3
Referral from a GP/primary care transfer	30	9.1
Referral from another inpatient unit	17	5.2
Other ambulance attendance	10	3.0
Referral from another clinic	9	2.7
Referral from a vascular surgery clinic	8	2.4
Referral from NHS 111	2	<1
Total	330	

Case review data

Time to surgery

Patients diagnosed and transferred from a spoke hospital were referred directly to vascular surgery. This was supported by their median time from arrival at the vascular hub to procedure of 15.4 hours (F8.2). The median time from presentation at the vascular hub to procedure was 28.4 hours. Attendances at the vascular hub were a more varied group of patients, with some attending the emergency department at a vascular hub because it was their local hospital and some who called an ambulance and required triage and assessment before referral to vascular surgery.

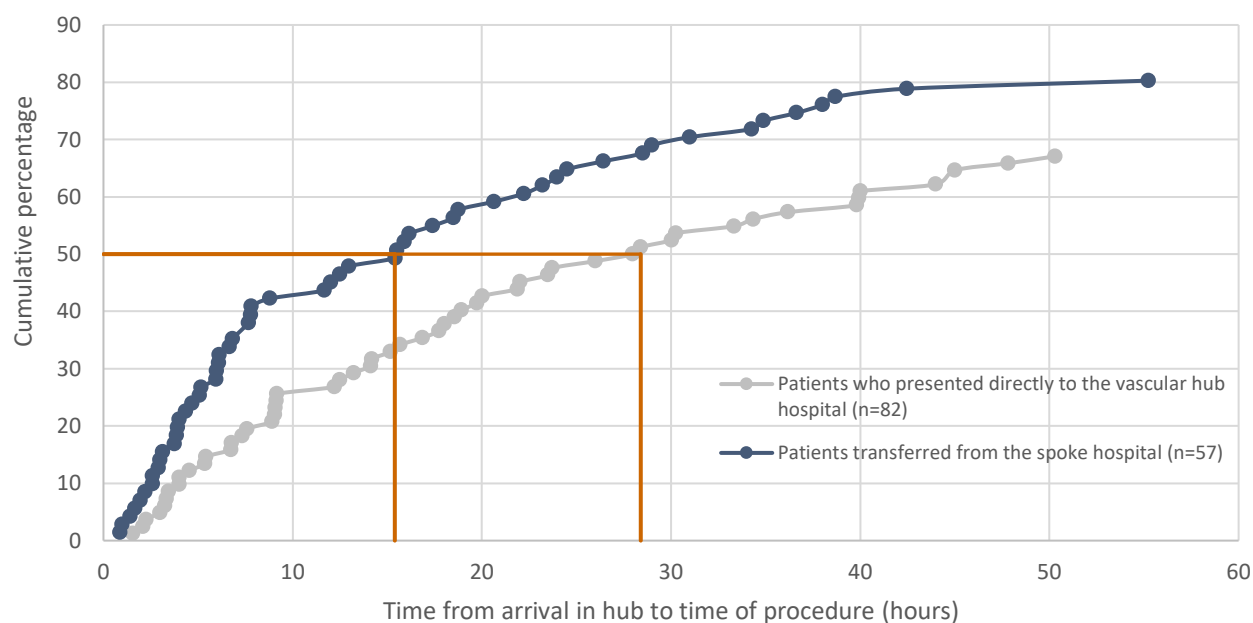


Figure 8.1 Time from arrival in vascular hub to time of procedure - patients admitted directly to vascular hub and those transferred from spoke hospital

Case review data

When ALI is diagnosed in primary care or when the patient is known to be under the care of vascular surgery for chronic ischaemia, there are opportunities to accelerate the care by referring directly to vascular surgery if the network links primary care with the hospitals.

The '6Ps' were inconsistently recorded at the first assessment in the vascular hub (T8.2). Limb pulses (276/293; 94.2%) and pain (253/293; 86.3%) were most recorded. Paraesthesia was recorded in 177/293 (60.4%) patients. Paraesthesia affecting the toes only is categorised as Rutherford IIa ALI, i.e. it is not an indicator of an immediately threatened limb. As noted in the primary care section, it is not uncommon for an ALI limb to be swollen. Limb swelling was present in 27/293 (9.2%) patients. This may cause some diagnostic confusion with deep vein thrombosis and cellulitis if it is not recognised as being present in some patients with ALI.

Table 8.2 Symptoms recorded in the vascular hub	Number of patients	%
Limb pulses	276	94.2
Pain	253	86.3
Cold limb	204	69.6
Paraesthesia	177	60.4
Pallor	146	49.8
Paralysis/weakness	110	37.5
Swollen limb	27	9.2

Answers may be multiple; n=293

Clinician questionnaire data

A Rutherford category was documented in the vascular hub for 69/330 (20.9%) patients (T8.3). When a Rutherford category was not recorded, reviewers estimated the category based on the patient history and examination in the hospital notes.

Table 8.3 Rutherford category	Recorded on admission in the vascular hub notes	Estimated by reviewers	Combination of recorded/estimated
Rutherford I	16 (23.2%)	52 (22.4%)	68 (22.6%)
Rutherford IIa	24 (34.8%)	100 (43.1%)	124 (41.2%)
Rutherford IIb	21 (30.4%)	56 (24.1%)	64 (21.2%)
Rutherford III	8 (11.6%)	24 (10.3%)	32 (10.6%)
Subtotal	69	232	301
Unable to calculate	261	98	29
Total	330	330	330

Case review data

In 81/105 (77.1%) sets of case notes, reviewers stated that there was no change the patient's limb condition between presentation to the spoke hospital and transfer to the vascular hub. Nine patients' limbs improved from Rutherford IIa to I with three on anticoagulation alone. In 15 patients there was a deterioration in their limb with 8/15 deteriorating to a Rutherford category IIb, an immediately threatened limb that required urgent revascularisation for salvage, and 3/15 to an unsalvageable limb requiring amputation (T8.4 and T8.5).

Table 8.4 The Rutherford category changed between the spoke hospital and the vascular hub	Number of patients	%
Stayed the same	81	77.1
Deteriorated	15	14.3
Improved	9	8.6
Subtotal	105	
Unknown	33	
Total	138	

Case review data

Table 8.5 Detail of the deterioration in Rutherford category	Number of patients
Rutherford I to Rutherford IIb	4
Rutherford IIa to Rutherford IIb	8
Rutherford IIb to Rutherford III	3
Total	15

Case review data

Despite the limitations in the documentation of clinical findings, the reviewers considered the initial assessment satisfactory in 290/330 (87.9%) patients and all necessary investigations performed in 307/330 (93.0%).

There was a delay in making the diagnosis of ALI in the vascular hub in 25/297 (8.4%) patients, including 18/25 emergency department attendances (T8.6). This reinforces the need for effective

emergency department initial assessment of acutely painful limbs to correctly diagnose and accelerate the care of those with ALI. The most common reasons for the delay were misdiagnosis in 12 patients, deep vein thrombosis in six and chronic limb-threatening ischaemia in six (T8.7).

Table 8.6 Delay in the diagnosis of ALI in the vascular hub	Number of patients	%
Yes	25	8.4
No	272	91.6
Subtotal	297	
Unknown	9	
N/A - diagnosis already made in spoke hospital	24	
Total	330	

Case review data

Table 8.7 Reasons for the delayed diagnosis in the vascular hub	Number of patients
Misdiagnosed as deep vein thrombosis	6
Misdiagnosed as chronic limb-threatening ischaemia	6
Diagnosis missed	3
Delay in imaging	3
Referred to the stroke team	2
No details provided	5
Total	25

Case review data

Once ALI was diagnosed, or at least considered, a timely review by a vascular surgeon of sufficient seniority to plan their care occurred in 270/330 (81.8%) patients. Using an ALI pathway in the vascular hub appeared to have a positive impact on care: 3/46 (6.5%) patients experienced a delay on an ALI pathway compared to 18/165 (10.9%) not on a pathway.

This view of care was not supported by the emergency and acute care physicians in the clinician survey, who reported that delays were frequently attributed to vascular surgical refusal to see patients before imaging had been performed and a failure to advocate for imaging acceleration.

The clinician survey supported the use of an ALI pathway across spoke hospitals and vascular hubs, which included decision-making tools, reliable lines of communication with vascular surgery and advice on imaging and its urgency. Of the emergency and acute medicine respondents who worked in a vascular hub, 4/11 reported having such a document, which dropped to 3/21 in spoke hospitals.

ALI care pathways should include a preferred imaging modality (CT, MRI or ultrasound, depending on local access/clinical preference) and a process to prioritise an agreed multidisciplinary treatment plan. A delay in treatment planning occurred in 34/330 (10.3%) patients (T8.8). Current NICE guidance states that patients should be assessed for risk factors for iodinated contrast-induced acute kidney injury but that this should not delay emergency CT scans. [\[34\]](#)

Table 8.8 Reasons for delay in treatment planning	Number of patients
Awaiting imaging	11
Awaiting multidisciplinary input	8
Reviewers unable to determine a reason from the records	8
Awaiting senior surgical review	6
Awaiting anticoagulation	1
Total	34

Case review data

Training

This study found delays in the triage, assessment, and diagnosis of patients with ALI in all clinical settings, including vascular hubs. Survey responses indicated that 21/41 vascular hubs provided work-based training in the recognition and management of ALI. In the majority this was focused on vascular surgical residents, with 6/21 extending it to the emergency department and/or foundation/core surgical residents. We did not ask about education on ALI provided in spoke hospitals or primary care. There are opportunities to improve ALI care with better and broader education and improved triage/initial assessment tools.