North West NHS Podiatry Services
Peripheral Arterial Disease Clinical Effectiveness Group

Guidelines for the Assessment, Diagnosis and Management of Peripheral Arterial Disease

Thanks to CLCH Academy for graphic design support.

Version 4 (updated and amended)

Date of issue: **2022**

Date of review: **2025**

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Original contributors and 2017 and 2021 Review Group

NW CEG Review Group 2021

Susan Matthews, Manchester University NHS Foundation Trust (Chair & editor)

Michelle Cullen, University of Salford

Martin Fox, Manchester University NHS Foundation Trust

Lindsay Jones, Northern Care Alliance NHS Foundation Trust

Michelle Miskell, Stockport NHS Foundation Trust

Pamela Smith, Northern Care Alliance NHS Foundation Trust

Kathryn Taylor, Manchester University NHS Foundation Trust

Michelle Thurman, Tameside Hospital NHS Foundation Trust

External reviewers 2021

Naseer Ahmad, Consultant Vascular Surgeon, Manchester University NHS FT

Sam Haycocks, Consultant Podiatrist, Northern Care Alliance NHS Foundation Trust

Deborah Ruff, Lead Nurse Vascular, Northern Care Alliance NHS Foundation Trust

NW CEG Review Group 2017

Martin Fox, Pennine Acute Hospitals Trust (Group chair & editor)

Susan Matthews, Pennine Acute Hospitals Trust

Michelle Miskell, Stockport NHS Foundation Trust

Pamela Smith, Salford Royal Foundation Trust

Michelle Thurman, Tameside Hospital NHS Foundation Trust

External reviewers 2017

Naseer Ahmad, Consultant Vascular Surgeon Manchester Royal Infirmary CMFT

Linda Gregory, Specialist Podiatrist, South West Yorkshire Partnerships NHS FT

Reference Group 2011

Chairs & Editors

Louise McDaid, Trafford Provider Services

Martin Fox, Pennine Acute Hospitals Trust (Final revisions) martin.fox@nhs.net

Contributors

Sally Andrew, Stockport PCT

Sheila Cheetham, Central and Eastern Cheshire PCT

Clare Collier, Trafford Provider Services

Joan Griffiths, Manchester PCT

Sue Hall, Royal Bolton Hospital NHS Foundation Trust

Samantha Hatton, Warrington PCT

Emma Howard, Knowsley PCT

Sue Kail, Oldham PCT

Tracey Loder, North Lancs PCT

Faith Murray, Central Cheshire PCT

Louise McDaid, Trafford Provider Services

Wendy Mayo, East Lancashire PCT

Susan Popadiuk, Central Lancashire PCT

Gaynor Richardson, North Lancs PCT

Carolyn Ryder, Heywood, Middleton and Rochdale PCT

Nicola Skitt, Ashton, Wigan and Leigh PCT

Pam Smith, Salford PCT

Matthew Wright, Tameside and Glossop PCT

External reviewers 2011

Mr M Baguneid, Consultant Vascular Surgeon

University Hospital South Manchester NHS Foundation Trust

Mr G Ferguson, Consultant Vascular Surgeon

Royal Bolton Hospital NHS Foundation Trust

Ms A Graham, Senior Lecturer (Podiatry) Salford University

Ms Lisa Smith, Vascular Nurse Specialist, Pennine Acute Hospitals Trust

Introduction

This The Clinical Effectiveness Group for Peripheral Arterial Disease (PAD) consists of NHS clinical specialist podiatrists who share a particular interest in this field, and was initiated by the regional podiatry service leads to provide a forum for implementing best and evidence based practice, improving service delivery and continuing professional development.

The group was tasked with creating a guidance document to standardise the level of minimum and full recommended peripheral arterial assessment across the region provided

within a Podiatry setting, to assist in the early detection of PAD, and aid in the prevention of outcomes such as cardiovascular events, ischaemic ulceration, gangrene and amputation. Although the document covers commonly presenting lower limb disease, including arterial, venous and lymphatic conditions presenting to Podiatrists, the focus is primarily on PAD, because of the prevalence (20% of the over 60s) and the significant associated limb, morbidity and mortality risks.

The purpose of the guidance document is to encourage clinicians and managers to review and redesign the peripheral vascular aspects of their clinical services, to ensure equality, based on best evidence, best practice service models and multidisciplinary collaborations. This version has been updated to include aspects of international vascular guidelines, in particular those by Conté et al (2019) and the IWGDF (2019).

This guidance can be used:

- To facilitate a 'definitive' early clinical diagnosis and guide appropriate urgent or non-urgent referrals, in order to improve the patients' prognosis for life and limb.
- To help prevent misdiagnosis by considering differential diagnostic criteria.
- To help provide appropriate key members of the healthcare team with relevant evidence-based information, in order to maximise clinically effective and cost effective treatment and ongoing management, via the GP and vascular team.
- To promote clinical audit / research with reference to evidence-based practice.

Baseline peripheral arterial assessment does not require specialist equipment or skills and should therefore be carried out by all podiatrists. It has been recognised regionally as a minimum clinical standard, to aid in the risk assessment of adult podiatry patients prior to podiatry treatment and at least annually thereafter.

If there are any significant clinical signs or symptoms of PAD at initial assessment, the patient should be referred for a **diagnostic peripheral arterial assessment, performed** by a vascular assessment skilled clinician and interpreted by an experienced / specialist clinician. This section of the document applies to those clinicians capable (or developing the capabilities) to perform the key non-invasive diagnostic tests. This can be a clinician within the podiatry team, or if not available, another healthcare professional with relevant vascular assessment knowledge and skills.

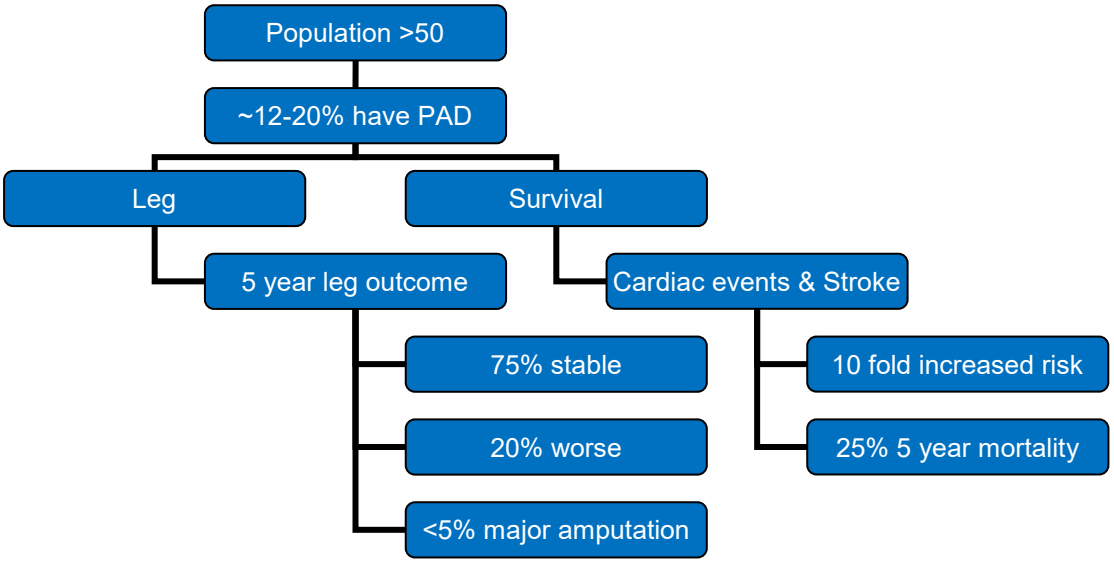
This is an evolving guidance document that has been subject to three / four regional reviews and endorsement nationally by the Society of Chiropodists and Podiatrists, now The Royal College of Podiatry, and Foot in Diabetes UK (FDUK). The latest review has aimed to simplify the guidance and link it primarily to the relevant NICE guidelines, technical appraisals, quality standards and the most recent international consensus guidelines, as a source of best clinical evidence. In 2019 a national on-line survey of the arterial assessments carried out in the United Kingdom by registered podiatrists was conducted, with the aim of describing the current practices in performing lower-limb arterial vascular assessments. It indicated that the majority of vascular assessments carried out in the UK by podiatrists are inconsistent with national and international guidelines. There is an over-reliance on subjective assessments such as pulse palpation and Doppler waveform analysis, along with a lack of routine use of brachial, ankle and toe pressures to obtain ABPI and TBPI. The survey also revealed that many of the participants felt they needed more education and training, to feel confident in assisting people with PAD to manage their limb and cardiovascular risks (Tehan et al 2019). It is essential that all podiatrists, service leads & managers now review and update their own practice and service pathways, to ensure a safe, proactive & unified approach to early PAD detection and best treatment. Ultimately this will help to save more lives and limbs.

An overview of peripheral arterial disease

It is estimated that PAD affects around 20% of the UK population over the age of 60 (NICE, 2012). It is suggested to be under-diagnosed and undermanaged in many people, leading to potentially avoidable heart attacks, strokes and associated early deaths (Belch et al, 2007). In people with severe or critical arterial disease, amputation becomes another significant and modifiable risk. It may be asymptomatic or symptomatic - both associated with similar high mortality and cardiovascular event risks. (Diehm et al, 2009).

The ratio of symptomatic to asymptomatic disease is up to one in three with as many as 50% never consulting a doctor (Norgren et al, 2007). Those with PAD have a three-fold increase in risk of mortality from major cardiovascular events (heart attack and stroke) compared to those without PAD (Pande et al, 2011; Fowkes et al, 2008).

The natural history for people with PAD in a given population can be summarised as below:



(From: Timaran & Timaran, 2014)

Effective treatment strategies involve cardiovascular risk management including medicines, exercise, smoking cessation and in more severe cases revascularization - endovascular or open (Conte et al, 2015).

The NICE Guideline (CG 147) published in 2012 has provided a template for what individual clinicians and healthcare organisations should now provide for people with suspected PAD. The subsequent Quality Standard (QS52) published in 2014 has clarified what the key clinical implementation priorities are, to help identify and tackle this relatively common and devastating vascular disease. In 2014 The Society for vascular surgery developed a classification system to recognise limb risk based on wound, ischaemia and foot infection (WIfI) (Mills et al 2014)

Since NICE published this guideline, recognition and agreement has been reached between The Royal College of Podiatry and the Vascular Society of Great Britain & Ireland, on a common approach to tackling PAD and that Podiatrists in particular are able to play a key role in both the early detection and best clinical management of PAD, working closely with colleagues, GPs and Vascular Teams (Fox et al, 2015). Podiatrists are also able to support patients to optimize their modifiable cardiovascular risks by joint working with cardiovascular rehabilitation teams to support people with peripheral arterial disease to exercise safely (Matthews et al 2016) and support Public Health England's 10 year cardiovascular priorities (**Appendix 14**)

NICE Quality Standard 52

The NICE Quality Standard for PAD (QS52) was published in 2014. The 5 Quality Statements in this publication summarise the priorities from CG147 to be implemented, to ensure people with PAD get best diagnosis and treatment. The following NICE Quality Statements are considered to be the key priorities for clinicians to offer people with suspected and confirmed PAD.

Statement 1	People who have symptoms of, or who are at risk of developing, peripheral arterial disease (PAD) are offered a clinical assessment and ankle brachial pressure index (ABPI) measurement.
Statement 2	People with PAD are offered an assessment for cardiovascular comorbidities and modifiable risk factors.
Statement 3	People with intermittent claudication are offered a supervised exercise programme.
Statement 4	People with PAD being considered for revascularisation who need further imaging after a duplex ultrasound are offered magnetic resonance angiography (MRA).
Statement 5	People with intermittent claudication are offered angioplasty only when imaging has confirmed it is appropriate, after advice on the benefits of modifying risk factors has been given and after a supervised exercise programme has not improved symptoms.

These NICE PAD Quality Statements are relevant to all Health Professionals who assess and review people over the age of 40, presenting with lower limb problems. The NICE PAD QS audit tool in **Appendix 9** may be a good place to start, by 'bench-marking' what individual Podiatry Clinics or Services can demonstrate currently, in relation to people attending with suspected or confirmed PAD. Podiatrists working to the minimum or recommended PAD assessments outlined in this guideline will be able to demonstrate to a lesser or greater degree that they are aware of NICE and have reviewed their practice to help meet some of these standards, protecting patients and protecting themselves.

Section A - Baseline Peripheral Arterial Assessment

Prior to the treatment of any foot problems in adults, a minimum lower limb vascular assessment is essential to help identify any underlying peripheral vascular disease and identify those at need of a full non-invasive diagnostic vascular assessment, as recommended by NICE (NICE, 2012). A minimum vascular assessment should include:

1. **History of modifiable and non-modifiable risk factors**
2. **Palpation of foot pulses**
3. **Skin, temperature and other visible clinical features**
4. **Intermittent claudication and ischaemic rest pain identification**
5. **Differential diagnosis of common leg symptoms**
6. **Identification of arterial ulceration and severity**
7. **Identification of venous disease, oedema and lymphedema**

Top tip

Integrated Care Pathways for Peripheral Arterial Disease have been developed and implemented by Podiatry Services, working in partnership with Vascular Services, using the principles from these guidelines. They can be found in **Appendix 8**. They have been published and endorsed by NICE and could be implemented by all Podiatry and Vascular Services.

A1. History of modifiable and non-modifiable risk factors

A detailed history needs to be elicited, with emphasis on modifiable and non-modifiable risk factors for PAD, which can indicate an increased risk of developing PAD or progression of the disease. Fowkes et al (2013) reviewed 14 risk factors for PAD and created a meta-odds ratio based on effect size for risk factors that were investigated by at least three studies using multi-variate analysis. The odds ratios, based on sample sizes varying from 25 000 to 60 000 in Europe, that significantly increased the risk of PAD are detailed in the table below. History of cardiovascular disease (regarded as a evidence of co-existing atherosclerotic disease and not a causal factor for PAD) was 2.55.

Risk Factors for PAD based on Meta-odds ratio (adapted from Fowkes et al, 2013)

	Risk Factor	Odds ratio	Significant
Non Modifiable	Age (per 10 year increase)	1.75	P<0.05
	Male sex	1.43	P<0.05
Modifiable	Hypertension	1.55	P<0.05
	Diabetes	1.88	P<0.05
	Current smoker	2.72	P<0.05
	Former smoker	2.03	P<0.05
	Hypercholesterolaemia	1.19	P<0.05
	Hypertriglyceridaemia	1.26	P<0.05
	C-reactive protein	1.82	P<0.05
	BMI (>25mg/m2)	0.96	Not significant
	Elevated LDL	1.03	Not significant
	Low HDL	0.90	Not significant
	Fibrinogen	1.07	Not significant

Race: Black ethnicity increases the risk of PAD by over two-fold in the US population. In the UK a study has shown prevalence of PAD to be similar with Black and South Asian people at around 12% (Bennett et al, 2009)

Other vascular history associated with PAD: Previous vascular surgery, erectile dysfunction, abdominal aortic aneurysm, reno-vascular connective tissue disorders, rheumatoid arthritis, vasospastic disorders and venous insufficiency can all be markers of risk factors for the development of PAD.

(Norgren et al, 2007)

Note: The group would recommend additional reading be advised on all the above factors to build further knowledge if required.

Take a history of any significant risk factors as part of baseline peripheral arterial assessment

A2. **Palpation of foot pulses**

Palpation of foot pulses is subject to significant observer error and should be only used in combination with other objective measures as a guide to disease presence / absence and clinical management (Brearley et al, 1992). The dorsalis pedis / anterior tibial and posterior tibial pulses should be palpated. Both pulses should be felt, however it is important to remember that the dorsalis pedis pulse may be congenitally absent in around 10-15% of people (Orchard & Strandness, 1993). Absent posterior tibial pulses are clinically significant, however clinical findings of absent peripheral pulses are more meaningful of occlusive disease in the context of clinical symptoms such as intermittent claudication (Palumbo & Melton, 1995). Peroneal pulses are usually easier to detect with Doppler than by palpation. They are usually located on the lateral lower leg, just above the lateral malleolus. It has been recommended they are routinely checked as part of a lower limb vascular assessment (NICE, 2012). A recent large population study has shown that if all 4 foot pulses are easily palpable, it is unlikely there is any significant peripheral arterial disease (Londero et al 2016)

Palpation can be affected by room temperature (Mayfield et al, 1998). Anatomical variance is rare (Brearley et al, 1992). Some pulses may be non-palpable due to oedema. A referral for a recommended peripheral arterial assessment as described in Section B would be necessary in the above presentations. In the event of suspected critical limb ischaemia the assessing clinician should instigate urgent referral to a Vascular Team. Early intervention by a Vascular MDT can help reduce lower limb amputation rates.

See **Appendix 7 & 8** for PAD / CLI & CLTI assessment forms and referral pathways that start with foot pulse palpation and include other key indicators.

On palpation always classify the foot or leg pulse as palpable or non-palpable. If in doubt, classify as non-palpable and along with other clinical findings, consider the need for the next layer of vascular assessment.

Top tip

Asking the patient to relax their foot and leg muscles fully and then the examiner dorsiflexing the foot prior to palpating for dorsalis pedis and inverting the foot slightly prior to palpating for post tibial pulses can relax the soft tissues and help identify a palpable pulse. It is important to classify the pulse as non-palpable if the pulse is not easily felt and put this result in the context of other history and clinical findings.

See **Figure A** for depiction of the common foot and ankle pulse points.

- Foot pulse palpation should be performed and results documented with all adults, prior to any podiatry intervention
- Where one or more pulses in a foot are not easily palpable, further assessment is required e.g. Doppler insonation +/- ABPI / toe pressures, to inform significant arterial disease presence or absence and clinical management

Figure A

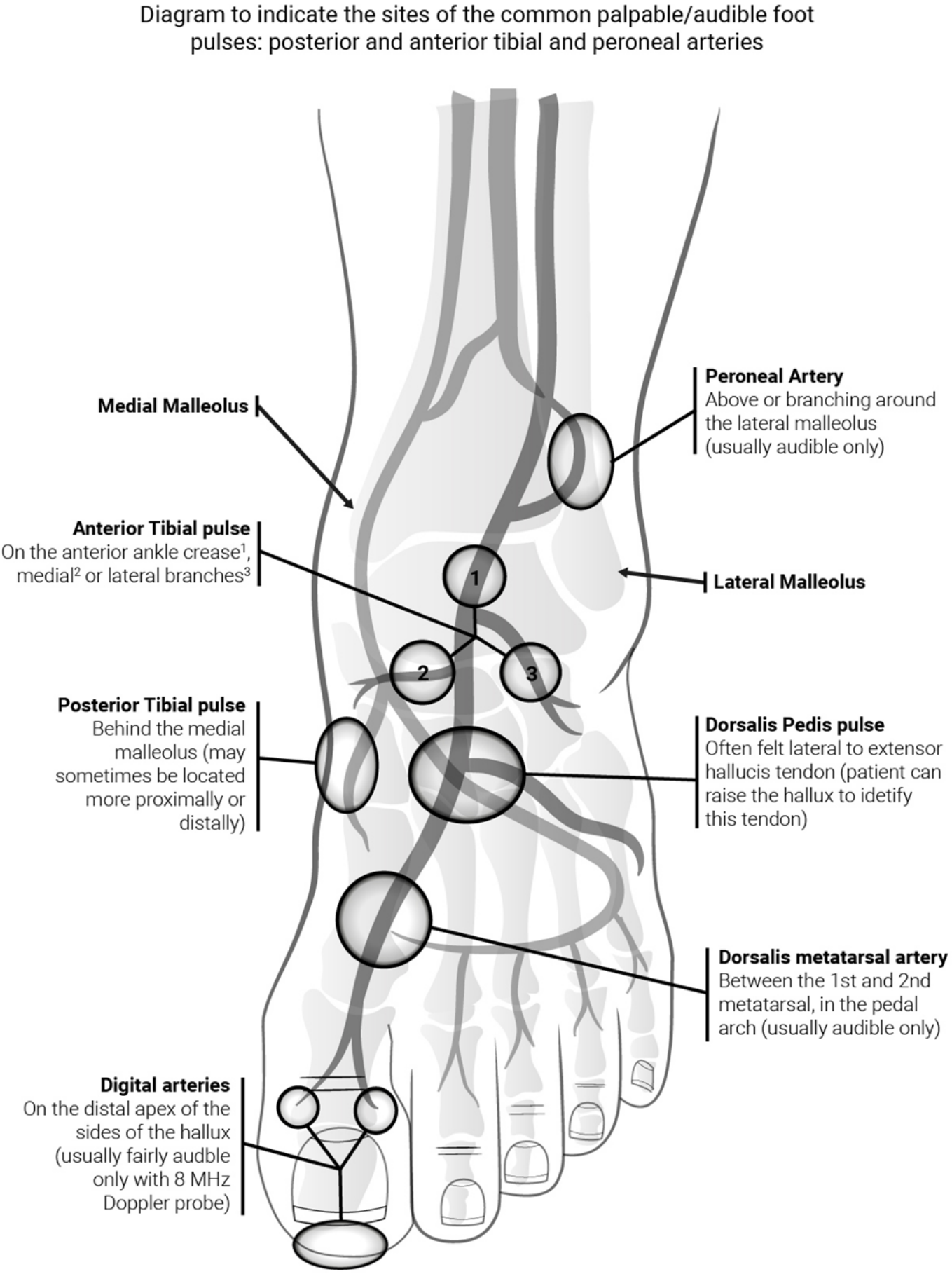


Image courtesy of Tim Carter Wale @ Systemfx

A3. **Skin, temperature and other visible clinical features**

Careful inspection of the limb and comparing features between the 2 limbs can provide useful information about the circulation. People may have scars from previous vascular surgical procedures; their veins may have previously been used for cardiac or lower limb bypass or stripped as part of varicose vein surgery. Comparing the temperature of both limbs may give further clues to a person's vascular status. A unilateral lower temperature may be an indication of PVD (Stoffers et al, 1997)

The temperature gradient of the skin is checked using the back of the hands and gently moving them from the pre-tibial region of the leg distally over the dorsum of the foot to the toes while keeping in contact with the person's skin. An asymmetric gradient may indicate either unilateral ischaemia on the colder side or unilateral inflammatory response such as Charcot osteoarthropathy or infection on the warmer side (Edmonds et al, 2004). A skin temperature probe if available would give a more objective result on skin temperature variations.

Top tip

Beware of people with diabetes presenting with a warm reddened foot with no palpable foot pulses. They may have significant arterial insufficiency masked by the reactive vasodilatation of severe diabetic foot infection. Pain may be masked by neuropathy and ABPI can be misleading due to calcification often present in their calf vessels. Please refer to **Appendix 3** for further information on the use of Doppler.

It is important to take into consideration the ambient temperature outdoors and of the room in which the assessment is being performed, and to keep the legs and feet covered for as long as possible before assessing foot temperature and pulses or this may result in misleading clinical signs.

Trophic changes can occur secondary to tissue malnutrition from arterial compromise and include:

- hair loss
- thin, smooth, shiny skin
- thick brittle nails
- tapering of toes ***(Fahey, 1999)***

Characteristics of the above, plus fissuring (especially of heels) and oedema could be indicative of ischaemia (Edmonds et al, 2004) and should be used as part of a full vascular assessment.

To determine capillary refill time the examiner applies firm pressure to the plantar aspect of the great toe for 5 seconds. If after releasing the toe it takes longer than 5 seconds for normal skin colour to return this is considered abnormal (Khan et al, 2006) but is of little diagnostic value. Capillary refill time although commonly used in clinical examination has not been shown to be reliable or valid (Nerida et al, 2007). A lack of clinical features must not preclude PAD especially in its early stages.

Assessment of skin colour and temperature should be taken into account as part of a full vascular assessment, but not solely relied upon for clinical diagnosis.

Colour may range from pallor/white appearance (which may be associated with acute ischaemia, severe anaemia, a vasospastic response or cold ambient temperature), to erythema (which may be associated with chronic ischaemia – dependent rubor, infection or a warm ambient temperature), or cyanosis (which may be associated with chronic ischaemia, coronary/pulmonary disease, microcirculatory disturbances or cold ambient temperature).

Other vascular markers to be aware of include the vasospastic response found in primary Raynaud's Disease and secondary Raynaud's Syndrome, vasculitis or infarctions caused by rheumatoid arthritis, and varicose veins (Al'Khaffaf & Dorgon, 2005)

The NICE Guidelines on PAD (2012) recommend that people with a history or signs / symptoms suggestive of PAD should proceed to objective testing to confirm / exclude significant disease, including foot and leg pulse palpation and Doppler insonation of all lower limb pulses and an Ankle Brachial Pressure Index (ABPI).

A4. Intermittent claudication and ischaemic rest pain

Intermittent claudication (IC) is defined as cramping muscle pain, commonly occurring in the calf, thigh, or buttocks, brought on by walking a predictable distance and relieved by rest. Relief should occur within 10 minutes and more commonly within 5 minutes (Norgren et al, 2007).

It is derived from the Latin 'to limp' (claudicare) and the pain may vary from a slight ache to severe cramp-like pain. Claudication, similar to angina, indicates inadequate arterial blood supply to contracting muscles.

IC is often the first and main symptom of peripheral arterial disease and an indicator of systemic atherosclerosis, however it does not always predict the presence or absence of PAD. In cases where neuropathy is present then symptoms of IC may be masked. In people with limited mobility from other problems such as arthritis or COPD, or those who are sedentary, symptoms of IC may not be initiated as another condition may be masking them, even in cases of severe PAD (Norgren et al, 2007).

A diagnosis of IC can be made on the basis of the person's history and the Edinburgh Claudication Questionnaire. The questionnaire is highly specific (91%) and sensitive (99%) for the condition (Leng & Fowkes, 1992). A copy of the Edinburgh Claudication Questionnaire is included in **Appendix 1 & 7**.

The distance walked by the person before leg symptoms occur is termed the 'distance to onset'. This should be assessed and noted at each clinical review. People often walk for some distance further with their leg discomfort until either their claudication pain limits them or other limiting symptoms occur such as breathlessness, angina or back pain. This is termed the 'maximum walking distance'. The time taken for symptoms to resolve is termed 'resting time'. A prolonged resting time usually indicates a poorly developed collateral circulation whilst a rapid resting time suggests that well developed collaterals exist.

It is important to recognise whether the person's claudication limits their ability to work, significantly impairs lifestyle or is deteriorating / stable.

Pain in the legs brought on by exercise is a common complaint and not always due to arterial occlusive disease. There are other medical conditions that can mimic claudication (See **section A5 – Differential Diagnosis**). ABPI and further investigative tests should be used to confirm a clinical diagnosis of PAD.

Key Recommendation

All people presenting with symptoms of intermittent claudication should receive further non-invasive vascular assessment with Doppler insonation, ABPI, +/- toe pressures, to confirm PAD

Initial management of PAD if there are no wounds or ischaemic rest pain should be initiated and reviewed in partnership with GPs. Interventions would usually be; optimised cardiovascular medicines, exercise therapy and smoking cessation if relevant

Ischaemic rest pain occurs with advanced arterial occlusive disease, when resting blood flow is insufficient to meet the maintenance metabolic requirements for non-exercising tissue (Dormandy et al, 1999). The pain typically occurs at night and interferes with a person's sleep, but in severe cases can be continuous. It is described as unremitting pain typically in the distal part of the foot or in the vicinity of an ischaemic ulcer or gangrenous toe that is aggravated by elevation and diminished by hanging the foot in a dependent position. It has usually been present for > 2 weeks, with no relief from usual analgesia Norgren et al, 2007). It can indicate critical limb ischaemia (CLI).

Key Recommendation

All people presenting with CLI and ischaemic rest pain or PAD with a wound should be referred urgently to the Vascular Team

Top tip

Nocturnal calf cramps is quite common and is not ischaemic rest pain. If you suspect ischaemic rest pain in the foot or toes, check foot pulses again. They are usually all non-palpable in that foot and leg, pulses signals are monophasic or not audible with Doppler and ankle systolic pressures if checked will usually be low (< 50mmHg or < 70mmHg with ulcer present). **Appendix 7** for example of referral pathway & brief CLI assessment & referral form.

A5. Differential diagnosis of common leg symptoms

It is important to consider a differential diagnosis for any person presenting with pain in the legs, in order to appropriately identify people who are displaying symptoms of IC. There are a number of other conditions that can imitate claudication, including nerve root compression, spinal stenosis, hip arthritis or chronic compartment syndrome. It is not uncommon for people to present with symptoms of PAD as well as nerve root compression or arthritis. Establishing which underlying condition is the most limiting factor for the person can be quite complex and may require specialist vascular input. Surgery on the knee joint, for example, is extremely hazardous in patients with significant arterial disease in the affected leg.

- **A table is included in Appendix 2 to aid differential diagnosis.**
- **The Edinburgh Claudication Questionnaire is a useful tool to help identify intermittent claudication. See Appendix 1.**

A6. Identifying arterial ulceration and severity

Arterial or ischaemic ulceration typically occurs over the toes, heels and bony prominences of the foot, often originating from minor trauma, for example ill-fitting footwear. Gangrene may occur, particularly of the digits, and if not complicated by infection can eventually mummify and auto-amputate (Norgren et al, 2007).

An ischaemic or gangrenous toe may be present in a small number of patients despite strong foot pulses. These people may have an aortic or popliteal aneurysm that results in thrombus formation locally and the first sign can be an embolus that breaks away and lodges in a distal digital or forefoot artery. Gangrenous or blue ischaemic toes may not be painful in people with diabetes with significant peripheral neuropathy. Lack of protective sensation in the foot is usually ascertained initially by testing with 10g monofilament (NICE, 2015).

People with arterial ulcers will typically display absent pulses, a cold and often hairless foot, which is pale or cyanotic, with associated pain from the ulcer (Edmonds et al, 2004).

- All people with a lower limb ulcer deteriorating or static at 2 weeks require a diagnostic assessment, to exclude or confirm significant PAD and determine the need to refer to the Vascular Team or other specialist services
- All people with diabetes and foot ulceration should be referred to the Diabetes MDT as per NICE NG19

A7. History of venous disease

It is good practice to ascertain if the person has a history of varicose veins, deep vein thrombosis (DVT) or varicose vein surgery, to add to the clinical picture. A common cause of leg ulceration is venous disease, for example in the post-thombotic limb. Please see Section E for further information on the venous system. People with symptomatic venous disease should be considered for referral to a Vascular Team for Duplex assessment and further vascular opinion, following consideration from their GP and in line with local commissioning (NICE CG168).

Section B – Diagnostic Peripheral Arterial Assessment

Following the baseline assessment as detailed in Section A, further diagnostic peripheral arterial assessment will be necessary prior to any lower limb or Podiatry treatment, if peripheral arterial disease is suspected (NICE, 2012) to reduce the risk of non-healing wounds, avoidable amputation and early death.

Ensure recommended peripheral arterial assessment if:

- Foot pulses are not easily palpable on one or both feet
- Foot pulse signals are monophasic or 'whooshy' with handheld Doppler
- There are symptoms of intermittent claudication or ischaemic rest pain
- There is a presentation of deteriorating or static foot ulceration (at 2 weeks)

The recommended PAD assessment should be carried out by an clinician with capabilities in lower limb vascular assessment. Ideally they will work closely with or have direct referral links to the local Vascular Team, have demonstrated and documented capabilities in lower limb vascular assessment and have evidence of continued professional development specific to this area. The results of a full non-invasive vascular assessment will determine the future clinical diagnosis and management plan including liaising with the patients' GP or a Vascular Consultant.

The diagnostic PAD assessment tests focused on in this document are:

1. **Handheld Doppler assessment**
2. **Ankle brachial pressure index (ABPI) and ankle systolic pressure**
3. **Toe brachial pressure index (TBPI) and toe systolic pressure**
4. **Assessment of popliteal and femoral pulses**
5. **Other clinical tests (e.g. Buergers & Pole Test)**

B1. Handheld Doppler assessment

The hand-held Doppler probe is now widely used as a screening tool to assess peripheral arterial circulation (Tehan & Chutner, 2015). It can also be used to pick up arrhythmias and in the opportunistic detection of atrial fibrillation which can prevent avoidable strokes (Hicks et al, 2019; Royal College of Podiatry Position Statement).

Evaluation of the persons arterial blood flow should be made using the hand held Doppler by a clinician who has the competency to locate the foot and leg pulses and interpret the results.

- Refer to **Appendix 3** for Doppler technique and clinical explanation and evaluation of Doppler sounds and waveforms.
- Refer to **Appendix 3B** for Atrial fibrillation early detection pathway using Doppler or pulse palpation findings.

B2. Ankle brachial pressure index (ABPI) and ankle systolic pressure

The measuring of the pressure in the ankle arteries has become a standard part of evaluation of people with suspected PAD, recommended by NICE (2012) and major international vascular guidelines (Norgren et al, 2007) The comparison of the systolic pressure measured at the ankle with that of the brachial artery is a good indicator of the presence and severity of the disease, when used with other clinical factors at assessment.

A reduced ABPI is also a predictor of the risk of future cardiovascular events, the lower the ABPI predicting the higher the risk, independent of other risk factors. There is no strict definition of what constitutes a normal ABPI, however the consensus is in practice an ABPI <0.90 is considered abnormal which would be the typical cut-off point for diagnosing PAD (Norgren et al, 2007) A meta-analysis of 15 population studies showed that ABPI < 0.90 was strongly correlated with all-cause mortality (Fowkes et al, 2005) The procedure for performing an ABPI is detailed in **Appendix 4**.

All people with suspected PAD should be assessed with foot pulse palpation, Doppler insonation and ABPI initially

B2.1. Cautions with ABPI

It is important not to rely on the ABPI in isolation, significant difference in dorsalis pedis and post tibial artery systolic pressures in the same limb may indicate early diagnosis of PAD in a single artery (Shröder et al, 2006). In the presence of non-healing foot wounds, the angiosome concept may be considered, in relation to the need of targeted revascularisation and healing potential in areas of the foot (Conte et al, 2019). An ABPI for example, based on a patent anterior tibial artery, may mask a severely diseased post tibial artery, which can clinically present as a necrotic heel ulcer – Orphan Heel Syndrome (Taylor, 2013)

The measurement of ABPIs is non-invasive, safe and well tolerated in most circumstances. It should however be discontinued if it becomes painful during inflation of cuffs and avoided over recently placed distal bypass grafts due to the potential risk of causing graft thrombosis. If used in the presence of ulcers, the ulcer should be covered first and infection control procedures flowed to minimize cross infection (Aboyans et al, 2012). Other situations where cuff inflation is not appropriate in one or more limbs are:

- Recent history of deep vein thrombosis - past 3 months
- Severe cellulitis / ulceration that would make application of the cuff inappropriate
- Active vasculitis i.e. in patients with rheumatic disease or connective tissue disorders
- Patient intolerance as a result of severe calf pain
- History of breast cancer with lymph node involvement (arm)
- Over an AV fistula or midline PICC line (arm)

B2.2. Calculations

A separate result is achieved for each leg using the following division:

$$\frac{\textbf{A}}{\textbf{B}}$$ i.e. Highest **A**nkle systolic pressure (per leg) / Highest **B**rachial systolic pressure from arms

e.g. $\frac{90}{150}$ = ABPI 0.6 $\frac{145}{135}$ = ABPI 1.07

B2.3. Interpretations

Ankle Brachial Pressure Index	Ankle systolic pressures	Indication
0.90 –1.30	> 100	Normal
<0.90	< 100	Abnormal (with or without symptoms)
<0.40	< 50	Severe / Critical Limb Ischaemia
>1.30 or non-compressible	> 200	Vascular calcification

The above interpretations are recommendations of the North West Podiatry Services Clinical Effectiveness Group, and are based on evidence based clinical consensus guidelines and local expert opinions (NICE, 2012; Norgren et al, 2007)

People with symptoms of IC typically have an ABPI of 0.5 – 0.9, and ischaemic rest pain most commonly occurs below ABPI 0.4 or ankle systolic pressure < 50 mmHg (unless calcification of leg arteries artificially raises the result).

Interpretations may vary slightly between health organisations based on the protocols, guidelines and referral criteria of the vascular surgeons in your area.

ABPI must be carried out by clinicians who have been trained and who perform this test regularly. This will help ensure accurate results and interpretation.

Integrated Care Pathways for peripheral arterial disease and critical limb ischaemia, which have been developed and implemented by multi-disciplinary clinicians and managers using the principles in these guidelines, can be found in **Appendix 8**.

B2.4. Calcification of leg or foot arteries

Calcified arteries in ischaemic feet may give false readings within the normal ranges. It is therefore important that signs and symptoms are taken into consideration at assessment.

In some people with diabetes, renal insufficiency or other diseases that cause vascular calcification the tibial vessels at the ankle become non-compressible, leading to false elevation of the ankle pressures. These people typically have an ABPI >1.3 or > 1.4 (Aboyans et al, 2012) or may have a normal or lower results that does not fit the clinical picture. For example, a person presenting with an ABPI of 0.8 who has rest pain or a deteriorating ulcer may actually have severe arterial disease, masked by calcification. If the ankle arteries are non-compressible due to calcification then Doppler waveform signals, toe pressures and / or vascular ultrasound imaging should be considered as part of further vascular assessment (Brownrigg et al, 2015).

Duplex ultrasound uses high frequency ultrasound to create a colour map of the arteries (or veins) in the leg. It is useful when surgical intervention is being considered in cases of severe PAD with a wound, critical limb ischemia or signs of calcification – elevated ABPI or incompressible arteries, and to exclude DVT. It provides detailed information on location, extent and severity of disease. An example of referral pathway for duplex is includes in **Appendix 3C**.

Calcification of leg arteries is important to identify, as it links to increased cardiovascular risks and if in conjunction with occlusive arterial disease, limb risk (Aboyens et al, 2012). Performing an ABPI can help identify people with calcification of leg arteries and along with other clinical assessment, can help guide cardiovascular and limb risk management.

B2.5. Ankle systolic pressures

Performing an ankle systolic pressure can be useful when guiding clinical decisions, particularly in people with suspected severe or critical limb ischaemia. Similar to ABPI, it is a relatively safe, non-invasive assessment and as it may only involve taking a systolic pressure from the limb of concern, can be done much quicker than an ABPI. The identification of an ankle systolic pressure < 50 mmHg, indicates a likely critical limb ischaemia and is associated with a higher risk of limb amputation (Aboyans et al, 2012). An ankle systolic pressure < 70mmHg in a the presence of a wound indicates urgent secondary care vascular services review in required.

B2.6. Post-exercise ankle systolic pressures

Further exploration using post-exercise testing is useful in identifying those people with normal ABPI and PAD as they have increased CV mortality risk (Marius et al, 2014). A stenosis which is not sufficient to cause a pressure drop at rest (i.e. patients with degrees of diameter reduction of less than 50%) may cause a pressure drop during exercise (Carter, 1972). Therefore people with exertional non joint related leg symptoms and normal or borderline resting ABPI (>0.9 and ≤ 1.4) should undergo exercise treadmill ABPI testing to evaluate for PAD (Gerhard-Herman et al, 2016)

Exercise treadmill ABPI testing can also be useful to objectively assess functional status in people with PAD and abnormal resting ≤ ABPI (Gerhard-Herman et al, 2016)

The post exercise ankle systolic pressure can be useful to differentiate between ischaemia and other causes of lower limb pain. In the presence of spinal stenosis and absence of peripheral arterial disease there would be no significant pressure drop after exercise (Grasty, 1999). Although most research and recommendations are based on the use of a treadmill as a means of exercise, these are not readily available in most out-patient clinics and alternative simple methods can be as effective.

An example of this is the weight bearing heel raise method (Aboyans et al 2012). Blood pressure cuffs should remain on the affected ankle(s) after resting ABPI is completed and the person is asked to stand up straight facing a wall or next to a supportive structure. When the person is ready and their hand(s) supported by a wall or chair they are instructed to raise their heels then lower them back to the ground and then repeat this without stopping for a maximum of 2 minutes. The person should be asked to report when they start to develop symptoms of claudication and report when they have reached maximal discomfort if this is occurs before the 2 minute maximum. They should then be put into a supine position once again and the systolic ankle pressure be taken quickly of the most symptomatic limb.

A decrease in the post-exercise ABPI of 20% or more compared to the resting ABPI is indicative of clinically significant PAD (Tehan et al., 2018)

However exercise testing may not be an option for people with poor mobility due to comorbidities such as cardiac disease, respiratory disease or disability (Stein et al, 2006)

B2.7. Common errors during ABPI assessment

Errors may arise if:

- The clinician 'slips off' the Doppler waveform signal with the probe during sphyg cuff inflation, which can produce a false low systolic ankle pressure result.
- The pulse is irregular or the cuff is deflated too rapidly, missing the true systolic ankle pressure.
- The clinician has not completely occluded the artery with inflation. Need to inflate to 20 mmHg above last audible signal (NB do not inflate > 250 mmHg, or less if intolerable to the patient)
- The vessels are calcified and this is not taken into account with other indicators such as clinical signs / symptoms or monophasic Doppler signals
- The legs are large or oedematous
- The cuff size is inappropriate e.g. small cuff used on a large limb
- The legs are raised too high or too low, or the patient is not lying flat for 10 minutes before readings are taken

B3. Toe brachial pressure index (TBPI) and toe systolic pressures

TBPI or toe pressures are now recommended in first-line non-invasive vascular assessment by key international guidelines (Conté et al, 2019; IWGDF, 2019). As toe arteries are less likely to be calcified, taking toe systolic pressures may be helpful for people with a falsely elevated ABPI measurement, if the clinician has the skills, experience and the equipment to do it (Norgren et al, 2007). However, digital calcification should not be ruled out, particularly if seen on previous X rays or if the toe systolic pressure is suspiciously high (Brooks et al, 2001).

Toe systolic pressures have been shown to be directly related to the outcome of foot ulceration healing (Brownrigg et al, 2015). Toe systolic pressure is normally approximately 30mmHg less than the ankle systolic pressure, and an abnormal toe brachial pressure index is < 0.70. Toe systolic toe pressures and toe brachial pressure index (TBPI) are useful in clinical decision-making.

Toe Brachial Pressure Index	Toe systolic pressures	Indication
>0.7	>95	Normal
<0.7	<95	Abnormal (with or without symptoms)
<0.3	< 30	Severe / Critical Limb Ischaemia
If > 1.1		Suspect vascular calcification

A toe systolic pressure < 60 mmHg would suggest an ischaemic component to any foot ulcer. If toes systolic pressures are < 30mmHg, this would suggest critical limb ischaemia (Norgren et al, 2007). The WIFI classification system (Mills et al 2014) is a useful tool for the assessment of limbs at risk of amputation that uses toe and / or ankle pressures and the presence of infection and a wound to determine best management (**Appendix 12**) Toe pressures are a useful assessment tool when considering undertaking any nail or foot surgery in an "at risk" patient (**Appendix 10**)

Once again, it is recommended a clinician who has competence in performing and interpreting the results of the test undertake this investigation.

- In people with known or suspected leg artery calcification, consider assessing further using toe systolic pressures, to help with clinical decision making
- In people presenting with foot ulceration, consider taking toe systolic pressures as part of further assessment, to help identify the severity of ischaemia, amputation risks and potential for ulcer healing in the foot, with or without revascularisation

B4. Assessment of popliteal & femoral pulses

Non-invasive lower limb vascular assessment also includes assessment of popliteal and femoral pulses (NICE, 2012). This can be done by palpation and use of 5 or 8 mhz Doppler probe, to identify whether each pulse is palpable and what the Doppler waveform signal is at each pulse location. This can help provide guidance on presence, severity and anatomical location of any PAD in each limb, which in turn can help guide the clinician on whether to proceed with a best medical therapy & exercise or surgical opinion approach (Fox el at, 2012). For example, a person with a non-palpable / monophasic popliteal pulse and a palpable triphasic femoral pulse may have femoral-popliteal disease and be suitable for best medical therapy + exercise, under ongoing GP cardiovascular management. A person with non-palpable / monophasic popliteal AND femoral pulses may have aorto-iliac

disease. More proximal arterial disease can be more suitable for vascular surgical intervention and require onward referral for opinion on surgical intervention.

B5. Opportunistic checks for undiagnosed abdominal aortic aneurysms

In addition, opportunistically checking the abdominal aorta for any excessive and expansile pulsation is performed as standard in most vascular out-patient clinics and can help identify undiagnosed large abdominal aortic aneurysms. With local Consultant Vascular Surgeon support, Vascular Specialist Podiatrists / Nurses & Advanced Practitioners can be taught how to do this quick clinical check as part of the full PAD assessment. Onward referral for arterial duplex scanning to confirm or exclude an aortic aneurysm is essential, if suspected. This has been shown to identify people with undiagnosed larger abdominal aortic aneurysms, which if remain undetected and rupture result in very high mortality rates (Fox et al, 2014). As more people with suspected PAD are assessed in community lower limb clinics and the majority of people diagnosed with non-limb threatening PAD are subsequently triaged for Primary Care management, it is important that opportunistic palpation for aortic aneurysms remains part of the PAD assessment, wherever that assessment takes place (Smith-Burgess 2017).

B6. **Other clinical tests**

Buergers Elevation Test

This brief clinical test may add some useful information to the clinician, when assessing for presence of severe PAD (Norgren et al, 2007).

The Buergers test can be useful in cases where vascular calcification is suspected due to incompressible leg arteries or abnormally high ankle pressures. The limb should be elevated, with the knee straight, to 45 degrees for one minute until dorsal veins empty. The limb is then slowly lowered.

Normal colour should be restored. If the colour on dependency becomes a dusky pink hyperaemia, this can indicate severe ischaemia and is termed a positive Buergers test (Norgren et al, 2007). It is not a highly accurate diagnostic test, but may help with clinical decision-making along with other history and clinical indicators.

Pole Test

The pole test can play an important role in lower limb vascular assessment especially in the diagnosis of critical limb ischaemia. Where elevated ABPI results indicate calcified /incompressible arteries and when toe pressures are not reliable or possible due to the presence of ulceration and gangrene, the pole test can be used as an alternative to calculate the ABPI (Paraskevas et al, 2006)

With the person in a supine position the pedal artery is located using a handheld doppler and the affected leg is slowly raised until the doppler signal can no longer be heard. A calibrated pole or other suitable measuring device is used to measure the vertical distance between the couch/heart and the height noted. The height in cm is multiplied by 0.735 which gives the absolute systolic pressure at the ankle to use in the ABPI (Sumner 1989).

The pole test can help to identify CLI and aid urgent access to vascular services. However the use of the Pole test is limited to ankle pressures of less than 60mmHg due to lower leg length and also limited by the flexibility of patient's limbs (Smith et al, 1994).

If severe PAD or CLI is suspected, but cannot be confirmed by initial lower limb arterial assessment, refer on to the Vascular Team urgently for further opinion and assessment, stating the key patient history and clinical presentation that justifies your suspicion

B7. Vascular assessment prior to nail surgery & wound treatment

It is important that an appropriate arterial assessment is undertaken prior to nail surgery and at the initial assessment of a new wound to allow safe proactive care. See Royal College of Podiatry Nail Surgery guidelines (2019) and **Appendix 10** for an example of a nail surgery pathway agreed with a local vascular surgery team and **Appendix 12** for guidance on wound assessment using the WIfI system.

Prior to considering nail surgery, a patient history and lower limb vascular assessment must always be conducted to help clinicians to exclude or confirm significant peripheral vascular disease which may impact on nail surgery healing. History and patient assessment as a minimum must include identification of:

Modifiable and non-modifiable risk factors:

- Non-modifiable: age, gender
- Modifiable: e.g. hypertension, diabetes, current / former smoker, cardiovascular disease, peripheral vascular disease, limb oedema, liver disease, renal function

Presence of medical conditions e.g. diabetes, rheumatoid arthritis, renal disease

Palpation of foot pulses

- The status of foot and ankle pulses should be assessed by palpation. Pulses should be graded as palpable or non-palpable.

Assessment of wave form/sounds of pulses:

- Evaluate the patient's pulse sounds/waveform within the foot using a hand-held Doppler. It should be carried out by a clinician who has competency to locate pulses and interpret the results. Ideally, all foot pulses should be regular with a rate of 60-70 beats per minute, with normal (biphasic or triphasic) sounds.

Intermittent claudication (IC) and ischaemic rest pain (RP):

- **Note**: IC and RP are indicators of peripheral vascular disease and atherosclerosis. These symptoms may be masked in patients with limited mobility and sensory neuropathy. The use of a validated tool, e.g. the Edinburgh Claudication questionnaire, may be of value in demonstrating presence of claudication.

Differential diagnosis of common causes of exercise-related leg pain:

- People reporting apparent non-vascular exercise-related lower leg pain should be assessed for other possible causes, e.g. nerve root compression, spinal stenosis, hip arthritis, chronic compartment syndrome, peripheral neuropathy.

History of venous disease:

- The venous status of the lower limb and foot should be assessed, to review for the presence of varicose veins, a history of deep vein thrombosis or varicose vein surgery.

If there are any indications of suspected peripheral arterial disease at this stage, such as non-palpable foot pulses, monophasic Doppler signals, symptoms of intermittent claudication or ischaemic rest pain, further non-invasive vascular assessment must be performed prior to considering nail surgery.

This must include one or more of the following:

- Ankle brachial pressure index or ankle systolic pressure
- Toe brachial pressure index or toe systolic pressure
- Arterial duplex assessment

Where results indicate non-severe peripheral arterial disease, nail surgery should only be considered with caution, taking into account the overall risks and benefits, and in consultation with the patient, their GP and / or the vascular team.

Where results indicate severe or critical limb ischaemia, the issues and decision making relating to nail surgery must be discussed with the local Vascular Team. For example, nail surgery must not be performed following any of the following results, without further urgent vascular opinion:

- ABPI is < 0.6 OR ankle systolic pressure is < 70 mmHg
- ABPI is > 1.4 AND foot pulses are non-palpable / monophasic
- Toe systolic pressure is < 40 mmHg*

(As per **Appendix 12**, if toe systolic pressure is < 60mmHg, seek further vascular opinion prior to any surgical procedure)*

Where an acute nail problem is identified and assessment indicates severe or critical limb ischaemia WITH infection also present, this must be made clear to the vascular team to help facilitate urgent triage, as with severe ischaemia and infection together, there may be a high immediate risk of sepsis, tissue necrosis, gangrene and potential amputation.

Section C – Limb Threatening Ischaemia & Blue Toe

C1. Critical limb ischaemia

Critical limb ischaemia (CLI) is a manifestation of PAD that describes people with chronic ischaemic rest pain, or people with ischaemic skin lesions, either ulcers or gangrene. The term should be used with reference to people with symptoms of rest pain for more than 2 weeks requiring regular analgesia, ischaemic ulceration or gangrene, and ankle systolic pressures less than 50mmHg (70mmHg if ulcers present) or toe systolic pressures less than 30mmHg (Norgren et al, 2007).

There is estimated to be approximately 500 – 1000 new cases of critical limb ischaemia every year per European / North American population of 1 million (Norgren et al, 2007).

- **These people need an urgent referral to a vascular team. Delays in referral may compromise the chances of successful surgical or endovascular revascularization.**
- **Integrated Care Pathways for Peripheral Arterial Disease, including suspected critical limb ischaemia, which have been developed and implemented by multi disciplinary clinicians and managers using the principles from these guidelines, can be found in Appendix 8.**

C2. Chronic Limb Threatening Ischaemia & WIfI

Chronic Limb Threatening Ischaemia (CLTI) can involve various stages of peripheral arterial disease in combination with other limb threatening factors primarily ulcers and / or infection. CLTI is defined by the presence of peripheral arterial disease in combination with rest pain, necrosis or lower limb ulceration > 2 weeks duration. Venous, traumatic, embolic & non-atherosclerotic aetiologies are excluded (Conté et al, 2019). CLTI is associated with increased risks of major amputation, impaired quality of life & mortality. All patients with CLTI should be referred urgently to a Vascular Surgeon.

The term CLTI differs from the well-established CLI (critical limb ischaemia) in that the latter implies threshold values of severely impaired perfusion rather than a continuum; for example CLI refers to a degree of severity of peripheral arterial disease alone & can be present without ulceration e.g. CLI with rest pain only. Whereas CLTI has varying specific thresholds & can essentially include peripheral arterial disease of any severity with a combination of ulceration and / or infection which together will put the limb at high risk of amputation.

WIfI (Wounds, Ischaemia & Foot Infections):

The WIfI classification system was developed & published by The Society for Vascular Surgery Lower Extremity Guidelines Committee in 2014. WIfI is a useful, universal tool for managing people with threatened limbs by focusing on the triad of factors which can put the limb at risk of amputation-Wound extent, level of ischaemia & foot infection (Mills et al, 2014). WIfI can aid clinical decision making, evaluation of interventions, development of treatment algorithms, setting people centred goals & managing patient & family expectations (Behan et al, 2017).

WIfI can be used for any person with a DFU or non-healing foot ulcer which has been present for > 2weeks / foot & lower leg necrosis /ischaemic rest pain /infection. It is not designed for people with Acute Limb Ischaemia, embolic, trauma or non-atherosclerotic disease including vasospastic disorders or venous ulceration.

WIFI provides an objective classification & grading system (0-3) of the 3 major factors which affect wound healing & lead to lower limb amputation.

1. Wound
2. Ischaemia
3. Foot infection

Following grading each category the system enables you to clinically stage the limb to estimate the risk of major amputation at one year. Evidence has demonstrated the WIfI classification systems ability to accurately stage amputation risk & its potential use to predict hospital duration, costs, wound healing rates & need for timely revascularization (Behan et al. 2017). Please see **Appendix 12** section for grading systems.

C3. Acute limb ischaemia (emergency)

Acute limb ischaemia (ALI) indicates a quickly developing or sudden reduction in limb perfusion, usually producing new or worsening symptoms and signs, and often threatening limb viability.

This may present as the rapid progression of PAD from IC to rest pain, to ischemic ulcers or gangrene. It can also occur as the result of a thrombosis or embolic event or the occlusion of a previous vascular intervention e.g. blocked bypass graft.

Observations of ALI may include the following:

Pain	Onset, intensity and location, variance over time
Pulseless	Non-palpation of pedal pulses is suggestive but not diagnostic of acute limb ischaemia. Ankle blood pressure index should be performed as typically a very low pressure is obtained or the Doppler signal is absent
Pallor	Most important when differs from contra-lateral limb
Parasthesia	Occurs in more than half of people
Paralysis	This is a poor prognostic sign in combination with other indicators
Perishing cold	The limb is receiving little / no oxygenated blood

The Inter-Society Consensus for the Management of PAD (Norgren et al, 2007) detail the above, and recommend that all people with sudden onset, suspected ALI should be evaluated immediately by a Vascular Specialist as the limb is in immediate danger of gangrene and amputation (within 6 hours).

All people with suspected acute limb ischaemia must be referred IMMEDIATELY to a Hospital Vascular Unit as a medical emergency, because the limb can become necrotic and non-salvageable within hours

C4. Blue Toe Syndrome

Blue toe syndrome is characterized by a sudden onset of an often painful blue, purple, red or black toe. The most common reason is local tissue ischaemia caused by small vessel occlusion. This is usually secondary to atheroembolic disease or arterial aneurysm, further 'upstream' in the arterial system. It is usually distinct from vasospastic disorders such as Raynauds Syndrome, where multiple digits on both feet and often the hands are affected, with a more diffuse clinical presentation (Poredos, 2004).

Differential diagnosis includes:

- Emboli from cardiac and arterial system
- Acquired hypercoagulability disorders
- Syndromes resulting in peripheral vascular pathology

Blue toe syndrome is often misdiagnosed on initial presentation with palpable foot pulses leading the clinician away from suspicion of a vascular pathology. The most important action is to refer on to the GP urgently for pain management and also refer on to the Vascular Consultant for further investigations. Further vascular tests such as duplex, angiogram and echocardiogram may be useful in detecting the origin of emboli.

NB: Opportunistic assessment by the Podiatrist of the abdominal aorta, femoral and popliteal pulses can add value during the vascular assessment at initial presentation. If these pulses are excessively pulsatile and expansile, this can be indicative of possible undiagnosed and asymptomatic arterial aneurysms. Clinical diagnosis or exclusion can then be confirmed by further non-invasive vascular investigations e.g. arterial duplex scanning.

Section D: Management of PAD risk factors and intermittent claudication

The first line treatment for the management of PAD should include optimisation of modifiable cardiovascular risk factors to minimise and delay avoidable cardiovascular events. The arterial assessment can pick up suboptimal blood pressure and arrhythmias in line with Public Health England's initiatives for cardiovascular disease prevention (2017) (**Appendix 14**)

All health professionals involved in the care of people diagnosed with PAD should be aware that many of the risk factors for this disease are modifiable, and can be treated and managed appropriately at any stage of disease progression from early onset to severe or critical limb ischaemia:

Smoking cessation is a factor that must be addressed. Smoking increases cardiovascular mortality by accelerating atherosclerosis and enhancing the effects of other risk factors such as diet, hyperlipidaemia and hypertension. Various treatment therapies are available, over the counter and via GP's surgeries. Nicotine replacement therapy has been shown to positively influence people motivated to stop smoking.

In a Public Health England evidence review, electronic cigarettes are considered with best estimates to be 95% safer than continued smoking of tobacco. The report recommends that: Clinicians could inform people who are still smoking tobacco of this and encourage them to consider switching, if they are failing to quit smoking tobacco by other means (McNeil et al, 2015)

Supervised exercise. These regimes are beneficial and effective for patients with intermittent claudication, to help improve claudication symptoms and walking distances. This is recommended as the first line treatment for people with intermittent claudication (NICE, 2012). Supervised exercise programmes are available in some areas via Physiotherapy, Exercise Therapist and Cardiac Rehabilitation services. Salford Royal Foundation Trust has been the first NW regional NHS Trust to commission access to their existing Cardiac Rehabilitation programme for people with intermittent claudication, proving both cardiovascular risk reducing interventions and supervised exercise (Matthews et al, 2016). This model has been replicated with similar outcomes elsewhere (Matthews et al 2021)

Self-exercise. People with PAD should be encouraged to increase their cardiovascular and leg exercise by walking to stimulate the development of the collateral circulation and for their heart health. It is very important to help people with intermittent claudication understand that they are not going to do any harm by pushing into the pain, and walking to the point of maximal pain, resting and then walking on again will eventually improve their walking. The Chief Medical Office provides guidelines for cardiovascular exercise advising at least 30 minutes of moderate exercise, getting breathless but still being able to talk and no chest pain at least 5 times per week. See exercise infographics in **Appendix 11**.

Best cardiovascular medical therapy including lipid lowering therapy should be commenced and reviewed periodically for all people diagnosed with PAD (eg Atorvastatin 80mg daily), adding in antiplatelet therapy for people with intermittent claudication (eg Clopidogrel 75mg). It is important that hypertension is also optimally controlled and monitored (NICE, 2012). Recent cardiovascular guidelines have recommended opening up existing cardiac or cardiovascular rehabilitation services to a broader population of people with arterial disease, including people with PAD (BACPR, 2017).

Rivaroxaban use in the management of PAD: The Cardiovascular Outcomes for People using Anticoagulation Strategies (COMPASS) trial took place in 2017 to investigate the benefits of Rivaroxaban and Aspirin as a combination therapy for the prevention of recurrent cardiovascular events (Eikelboom et al, 2017). The findings of this trial suggest that Rivaroxaban when co-administered with Aspirin, is indicated for the prevention of atherosclerotic events in adult patients with coronary artery disease or symptomatic PAD at high risk of ischaemic events (NICE TA607, 2019). The recommended dose is Rivaroxaban 2.5mg taken orally twice daily in combination with a daily dose of 75-100mg Aspirin taken orally.

The assessment for suitability of this drug regimen is multi-faceted and it is important to consider it as an option rather than a panacea. Rivaroxaban is a direct oral anti-coagulation (DOAC) drug. The use of this combination therapy therefore increases bleed risk and as such, the patient should be properly assessed for this risk before commencement of treatment (see **Appendix 13** for bleed assessment tool - information only).

The second part of this assessment involves determining their risk for ischaemic events. A person with PAD is considered high risk of ischaemic events therefore making them eligible for this regimen (NICE TA607, 2019). NICE recommends that the prescriber ensures the risk of ischaemic events is weighed against the risk of bleeds.

Key Recommendation

Where symptomatic PAD is diagnosed and bleed risks reviewed, dual therapy of Rivaroxaban + aspirin should be considered for prescribing, as per NICE TA 607. This combination therapy should not be instigated where people are assessed as having a high bleed risk

Important considerations in lower limb ulcer treatment

It is expected that this regimen will be encountered quite regularly in the future for people with PAD. It is also regularly used for the management of atrial fibrillation (AF) and stroke risk, commonly co-existing in patients with active foot or leg ulceration. It is important to understand the implications of active DOAC treatment particularly in those people with current foot or leg ulceration who may benefit from advanced therapies such as larvae or topical negative pressure therapy. Wound location and its proximity to vessels in the foot is of paramount importance in relation to bleed risk. A discussion with the person around risk/benefit of stopping DOAC for duration of therapy is important in conjunction with the completion of a CHA□DS□-VASc Score if the person is taking this medication for AF or stroke risk.

Weight management can be beneficial in people with arterial disease who present with hyperlipidaemia, hypertension and obesity. Weight reduction and good diet are a key part of a cardiovascular risk management strategy. Weight loss classes can be helpful in providing ongoing support to those trying to lose weight (NICE, 2012).

Naftidrofuryl is the only vasodilator medicine currently recommended by NICE, which is effective in some people to help with the improvement of intermittent claudication. It can be considered with people who have not been able to reduce claudication symptoms with exercise and prefer not to, or are not appropriate for vascular surgery (NICE, 2012).

Key Recommendation

- All people with confirmed PAD should have modifiable cardiovascular risks explained, addressed and reviewed at every opportunity with Health Professionals
- All people with confirmed PAD should have appropriate cardiovascular risk reducing medicines prescribed and reviewed periodically, to help optimally reduce cardiovascular & limb risks

Section E: Venous and Lymphatic System

Poor venous and/or poor lymphatic drainage lead to an accumulation of waste products in the tissues causing oedema – this has an adverse effect on tissue viability. Foot and ankle oedema may occasionally be the first presenting symptom of systemic disease (NICE, 2013). Oedema will cause increased footwear pressure and may lead to further problems. If this is a long-standing problem assessment for specialist footwear may be appropriate.

A unilateral presentation of leg or foot oedema suggests a peripheral cause e.g. deep vein thrombosis, whereas a symmetrical presentation is more likely to be systemic e.g. congestive heart failure, renal failure or low protein levels in blood.

E1. Signs of venous or lymphatic insufficiency

Oedema	oedema of the legs and feet can be pitting or non-pitting
Varicose veins	these are dilated, tortuous veins that bulge unevenly to give a knotted appearance. An aching sensation associated with ankle oedema may suggest a problem with venous drainage and varicosities may be more apparent upon standing
Telangiectasia	the appearance of tiny thread veins usually around the medial malleolus
Haemosiderin staining	brownish skin pigmentation following the course of superficial veins
Atrophie blanche	white patches on the skin around the ankles due to fibrosis & sclerosis of the tissues caused by strangled microcirculation
Lipodermatosclerosis	induration caused by fibrosis of subcutaneous fat
Varicose eczema	discoloured, scaly, lichenified skin in the presence of oedema – this condition may be very itchy and may lead to the development of ulcers
Congested Lymph	build-up of lymph fluid in the tissues which causes the legs to appear reddened
Cellulitis	infection which may cause legs to become painful, hot and red
Lymphoerrhoea (weeping oedema)	the expelling of lymph fluid from the skin when the tissues are congested with lymph build-up.
Phlebitis	inflammation of veins, causing mild pain and soreness when pressure is applied over the involved vein
Evidence or history of previous venous ulceration	is a risk factor for re-ulceration

(NICE, 2013; Bergan et al, 2006)

E2. Deep vein thrombosis

Deep vein thrombosis (DVT) occurs most commonly in the calf veins and frequently follows surgery, bed rest or periods of immobility. Taking a medical history may reveal pointers such as a recent long haul flight, an oral contraceptive pill containing oestrogen or a family history of DVT. It usually presents as swelling and pain in the calf or lower limb, though many patients have few or no symptoms and are diagnosed when pulmonary embolism occurs.

Differential diagnosis includes superficial thrombophlebitis, muscle tears, ruptured Tendo–Achilles, Baker's cyst and fracture (Vowden et al, 1999). DVT carries a high morbidity and mortality rate, and so any suspected DVT should be treated as a clinical emergency with patients being directed to DVT out-patient services or Accident and Emergency for DVT assessment, after discussing with their GP if possible (NICE NG 158 2020)

The Wells DVT score is a quick guidance tool that can be used to assess likelihood and guide further action, by any clinician who suspects their patient may have a DVT. See **Appendix 6**.

All people presenting with a suspected undiagnosed DVT and a Wells Score of 2 or more should be referred for further assessment

E3. Signs of poor lymphatic drainage - lymphoedema

Lymphoedema may be classed as primary or secondary. This can be distinguished from venous insufficiency related oedema by the lack of varicose veins.

Primary lymphoedema: Is congenital or hereditary in cause and can be unilateral or bilateral, with a frequently slow onset. It is identified at birth, puberty or at hormonal changes such as pregnancy. It begins as a soft pitting form but becomes harder and non-pitting with time.

Secondary lymphoedema: Arises as a result of trauma to the lymph system such as damage due to injury, surgery, malignant disease, infection or radiotherapy and obesity.

It is usually unilateral and considerable fibrosis can occur. Lymphoedema is frequently complicated by infection causing the limb to become red, hot and painful.

Pitting / non-pitting oedema: The common clinical test is for digital pressure to be firmly applied to the affected area for a period of 10 seconds. If an imprint remains, the oedema is described as pitting.

If the area cannot be depressed this indicates non-pitting oedema which is a chronic condition caused by fibrosis of the tissues (McLeod-Roberts, 1996)

Clinicians are advised to liaise with the patient's GP initially for further opinion and management of these conditions.

Section F: Audit and Research

There are various national and international clinical guidelines available to assist clinicians, managers and commissioners to benchmark, audit, research and deliver research-led, quality clinical services for people with peripheral arterial disease.

NICE Guidelines on PAD (2012, updated 2018), the subsequent NICE Quality Standards (2014) and NICE TA607 (2019), along with international guidelines (Conte et al, 2019 & IWGDF 2019), provide clinicians and their NHS organisations with recommendations and standards, that all patients should reasonably expect to receive. They also contain research recommendations that will guide clinicians and researchers who are looking to prioritise research activity and are more likely to attract funding to support it.

An example of benchmarking or audit tool that can be used by clinicians and clinical services to measure themselves against, is provided in **Appendix 9**. Further information on how to facilitate the use of this tool for peer / clinical service review can be obtained from the 2017 Review Group Chair.

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Appendix 1 - Edinburgh Claudication Questionnaire

Pride in Pennine | Quality-Driven Responsible Compassionate

The Pennine Acute Hospitals NHS Trust

Brief Peripheral Arterial Assessment and Referral Form

Patient details

Name	NHS Number DoB
Contact phone number (important):	

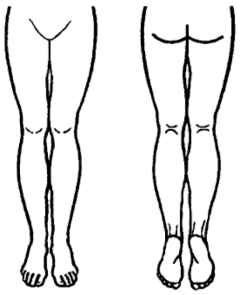
Known cardiovascular risks (circle)

Smoking history | Diabetes | Hypertension | High cholesterol

Overweight / obese | No cardiovascular exercise | Carotid / coronary disease

Edinburgh Intermittent Claudication Questionnaire (Leng & Fowkes, 1992)

1. Do you get pain or discomfort in your legs when you walk? **Yes** / No
   (If 'no' you do not need to continue with questions 2 - 5)
2. Does the pain ever begin when you are standing still or sitting? Yes / **No**
3. Do you get this pain if you walk uphill or when you hurry? **Yes** / No
4. Do you get this pain when you walk at an ordinary pace on the level? **Yes** / No
5. Does this pain disappear when you rest for less than 10 minutes? **Yes** / No



6. Where do you get the pain or discomfort? Mark the place(s) with an 'x' on the diagram.

Typical claudication, if in calf

Atypical claudication, if only in thighs or buttocks

Not claudication, if in the hamstrings, feet, shins, joints or radiates in the absence of calf pain

Foot Pulses	**Right**		**Left**	
	Palpable	Signal indicates	Palpable	Signal indicates
Posterior tibial	Y **N**	Tri Bi **Mono**	Y **N**	Tri Bi **Mono**
Dorsalis pedis / anterior tibial	Y **N**	Tri Bi **Mono**	Y **N**	Tri Bi **Mono**

Please tick as appropriate:

☐ Not previously been seen by the Leg Circulation Service or a Hospital Vascular Team

Refer to Leg Circulation Service for a peripheral arterial diagnostic assessment with <u>any</u> of the following:

☐ The Edinburgh Claudication Questionnaire is positive for leg pain / discomfort

☐ There are 2 non-palpable pulses in a foot **<u>and</u>** there are other cardiovascular risks or limb indications

☐ Monophasic Doppler signals at post tibial artery **<u>and</u>** there are other cardiovascular risks or limb indications

Or, consider referring to Secondary Care Vascular Team <u>urgently</u> if critical limb ischaemia is indicated after discussing with vascular clinician and GP:

☐ Cold, pulseless foot, with monophasic / non-audible Doppler signals
and severe pain at rest in toes / feet **or** tissue loss / necrosis

Additional comments:

Clinician:	Date:	Time:	Location:

If from GP Practice, please include the summary of medical history, current medicines and recent blood results
Fax / post all referrals to: The Leg Circulation Service, Harpurhey Health Centre, 1 Church Lane, Harpurhey, Manchester, M9 1BE.
Tel 0161 861 2439 (Mon – Fri, 8.30am – 4.30pm) Fax 0161 205 5860

Appendix 2 - Differential diagnosis (Leg pain)

Questions for patient: "Do you get pain/discomfort in your legs?"	Circulation pain			Nerve pain	
	Intermittent claudication	**Ischaemic rest pain**	**Noctrurnal cramps (non-ischaemic)**	**Painful neurop-athy**	**Spinal stenosis**
What does it feel like?	**Aching** **Tightening** **Cramp-like**	**Severe pain / cramp / ache** **Un-remitting** **Cant sleep**	Ache Cramp Tightness Locking-up	Burning Tingling Pins & Needles	Weakness Sharp pain Dull ache
Where do you feel it?	**Calf** **Thigh** **Buttocks**	**Toes & feet & lower leg**	Foot Calf Thigh	Entire leg / below knee	Hip Thigh Buttocks Calf
What brings it on?	**During walking or exercise**	**Constant** **Leg elevation** **Lying in bed**	At rest Sudden movement	May come and go	Exercise / standing for a long time
What makes it worse?	**Going up hill** **Walking fast**	**Constant** **Leg elevation** **Lying in bed**	Sudden movement	Lying in bed Worse at night	Exercise / standing for a long time
What relieves the pain?	**Resting**	**''Nothing''** **Strong pain medicine** **Hanging leg out of bed** **Cooling foot and leg** **Standing**	Rubbing area Walking around	Standing Walking around	Lumbar Spine flexion
Other characteristics	**Reproducible**	**Absent / poor pulses / Doppler** **Low / high ABPI** **Low TBPI** **Visible atrophy** **History of PAD**	Can be helped with Quinine	Diabetes Alcohol Dependency Vitamin B deficiency	Frequent / history of back problems

Appendix 3 - Doppler technique

Doppler technique and interpretation of waveforms

Equipment Needed

- Doppler unit with 8 Mhz and 5Mhz probe. A 5Mhz probe is useful for oedematous limbs or deeper pulses e.g. popliteal or femoral pulses.
- Ultrasound gel
- Ear phones (if preferred, or for noisy clinics)
- Cleansing wipes for Doppler and sphyg cuff decontamination
- Hand-washing facilities, alcohol hand gel & examination gloves

Method

1. Apply a liberal amount of gel around the area where you would expect to locate the pulse, in a raised blob. See Figure A Page 9 for the usual foot and ankle pulse sites. The gel should be as free from air as possible. An ultrasonic gel should be used.
2. Earphones can be useful when evaluating the phasic quality of the pulses as the flow in different directions is heard in stereo. The signal is amplified and the earphones limit the interference from outside sounds. This is helpful in a noisy clinic.
3. 'Anchor' your probe hand to the limb you are checking, to help stabilise the probe over the artery and obtain the best signal. Place the probe at an angle of between 45-60 degrees on to the skin surface, with the probe pointing toward the heart. If the probe is applied with too much pressure to the skin, this may affect the flow and/or occlude the vessel and the signal can be diminished or disappear.
4. Sweep the probe across the surface of the skin until the clearest pulsatile signal is obtained.
5. Remember that veins are located next to arteries. A venous signal can be likened to the sound of a continuous howling gale, therefore reposition the Doppler probe to locate the adjacent artery.

Interpretation

Arterial sounds/signals

In the lower limb, the normal Doppler waveform signal detected from arterial flow has three phases and in therefore described as triphasic. With an audible Doppler this results in 3 distinct sounds and with a visual waveform device, 3 distinct peaks on the graph.

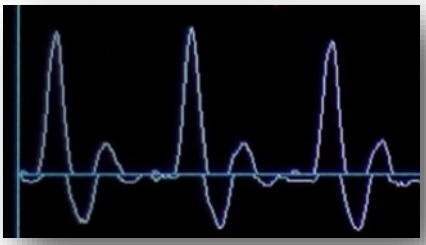
Phase 1: When the heart contracts, blood accelerates in a forward direction within the vessel. This is the loudest noise.

Phase 2: A drop in pressure from peak systole leads to reverse flow within the vessel

Phase 3: Elastic recoil of the vessel at the end stage of diastole leads to a further forward flow component.

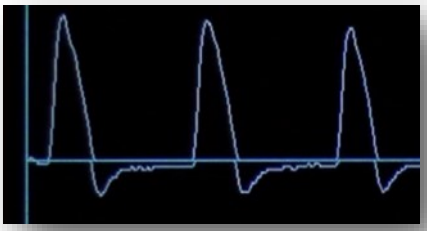
Triphasic signal

This indicates that the vessels are healthy. As a guide it can be useful to listen to your own radial artery.



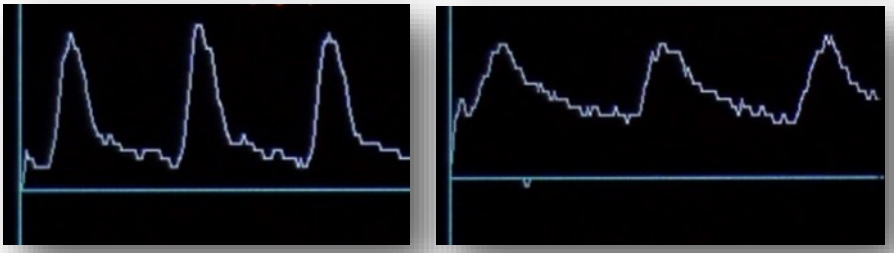
Biphasic signal

Reduction in the reverse flow and loss of the third phase is considered a normal part of the aging process but may indicate a proximal stenosis, so may warrant further assessment if the patient is symptomatic.



Monophasic signal

Indicates the presence of diseased arteries. In cases of complete proximal occlusion and collateral circulation blood flow is monophasic and continuous over the cardiac cycle, often producing an audio signal which can be described as “howling” not to be not be confused with venous flow.



NB Although the loss of reverse flow phase is normally an indication of the severity of arterial disease, some patients will show no reverse flow due to recent exercise or high ambient temperature, producing vasodilated distal circulation.

Irregular signal

An irregular heart beat will cause an often fast waveform and sound. This can be constant or intermittent. If the patient is not aware of this abnormality and it has not been investigated or if they have a previous diagnosis of atrial fibrillation and are not on anticoagulation therapy they should be referred to their GP for further investigation.

Arterial calcification

In this situation, the sound generated has been likened to that of ‘soldiers marching’ although quite often it is not possible to detect any obvious pathology until an ABPI is attempted and Doppler pulse sounds cannot be stopped by the time the cuff is inflated to around 220mmHg or more. It is important not to apply excessively high pressures (250mmHg+), as it may cause skin damage and severe pain.

With vessel wall calcification, the lumen of the artery may be either stenosed or non-stenosed. The Doppler signal and audible phases (mono / bi / tri) can help establish presence of occlusive disease proximal to femoral, popliteal and foot pulses.

In the presence of hyperaemia either from infection of a Charcot foot the waveform may be above the base line

Hyperaemic monophasic doppler signals can occur due to a 'squeezing' effect on the arteries of the lower limb secondary to infection & its associated oedema. It is important to take this into consideration when interpreting doppler signals. In this situation it is important to consider the full clinical picture including; history (any known PAD prior to infection), signs/symptoms of both infection & PAD, complete Lower Limb Arterial Assessment outcome & comparison of doppler signals prior to the infection (if known).

It is also important to note that hyperaemia can occur secondary to Charcot Neuro-Arthropathy. If hyperaemic monophasic signals secondary to infection are suspected then it would be advisable to repeat the doppler assessment within 5-7 days as the infection improves/resolves in order to confirm this diagnosis or alternatively if you have access arrange for a lower limb arterial duplex (within 5-7 days) to confirm diagnosis / rule out any underlying significant atherosclerotic disease.

However, for people with signs or symptoms of severe limb threatening infection / ischaemia (eg deteriorating ulcers / rest pain), with poor monophasic Doppler signals, consider an URGENT referral to your hospital based Vascular Surgery Team/MDT with view for an urgent arterial duplex to investigate further & vascular opinion (within 24 hours).

The interpretation of Doppler signals and waveforms should be performed by a clinician with the knowledge, skills and competence to do so.

Appendix 3B - Atrial fibrillation early detection pathway

Podiatrists are ideally placed to carry out opportunistic checks for undiagnosed atrial fibrillation (AF) as part of routine podiatry assessment.

AF is a common heart condition that causes the heart to beat irregularly and often fast.

The risk of having a stroke increases five – fold in people with AF and 25% of patients who suffer an AF- related stroke are unaware that they have the condition. Most people who present with AF are asymptomatic but symptoms can include breathlessness, palpitations, chest discomfort, syncope or dizziness, reduced exercise tolerance, malaise and polyuria.

Risk factors for AF can include high blood pressure, heart valve disease, excess alcohol consumption. Incidence is increased in the over 60's and in patients with diabetes. Detection of AF is also one of Public Health England 10 year cardiovascular risk reduction targets 2019

The pathway attached has been developed to support clinicians to refer patients on for further investigations (The College of Podiatry Podiatric detection of Atrial Fibrillation 2018)

Manchester Health & Care Commissioning

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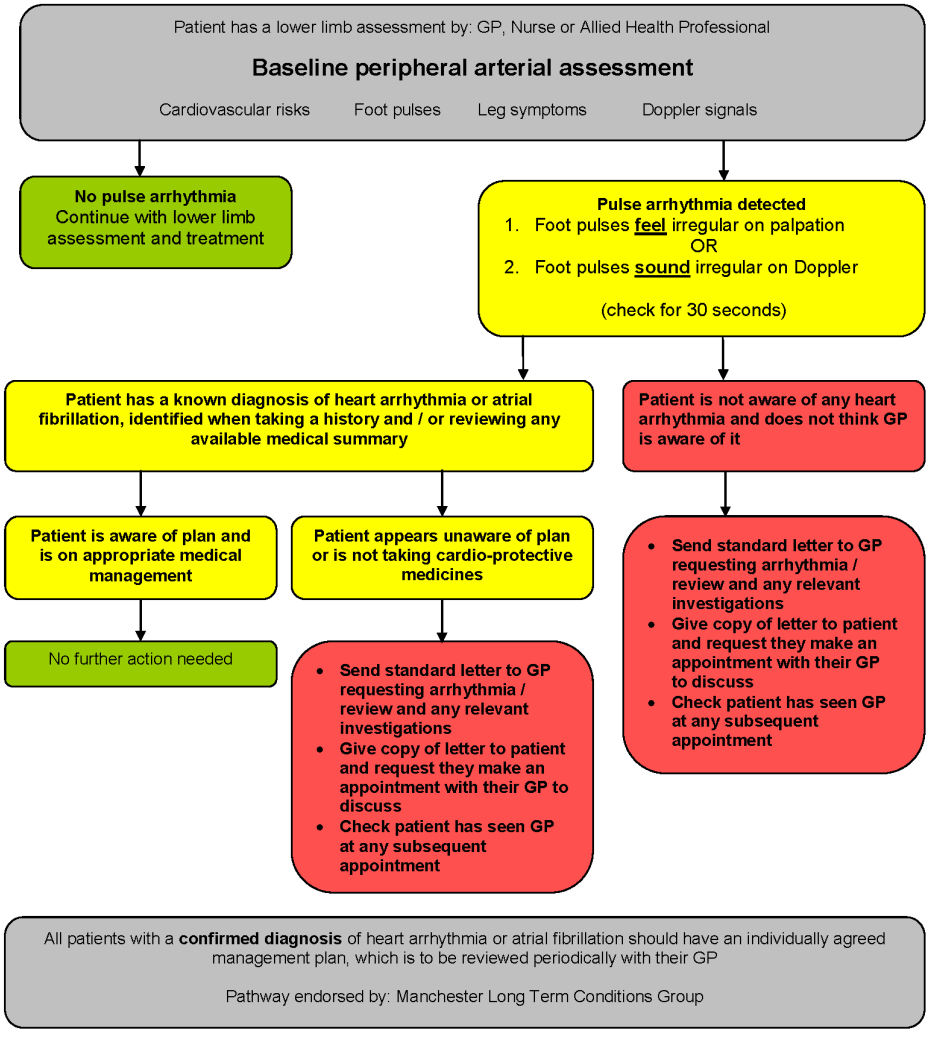
Atrial Fibrillation Early Detection Pathway (Podiatry)



Initiated 2018
Review 2020

Atrial Fibrillation Early Detection Pathway (Podiatry) endorsed by:

Name	Position
J Crompton	Commissioner, Manchester Health and Care Commissioning
M Fox	Vascular Specialist Podiatrist, Manchester Leg Circulation Service
Dr C Frame	Heart Failure Clinical Lead, Manchester Health and Care Commissioning
G Holt	Clinical Lead, Community Podiatry Service, North Manchester

Group / Team

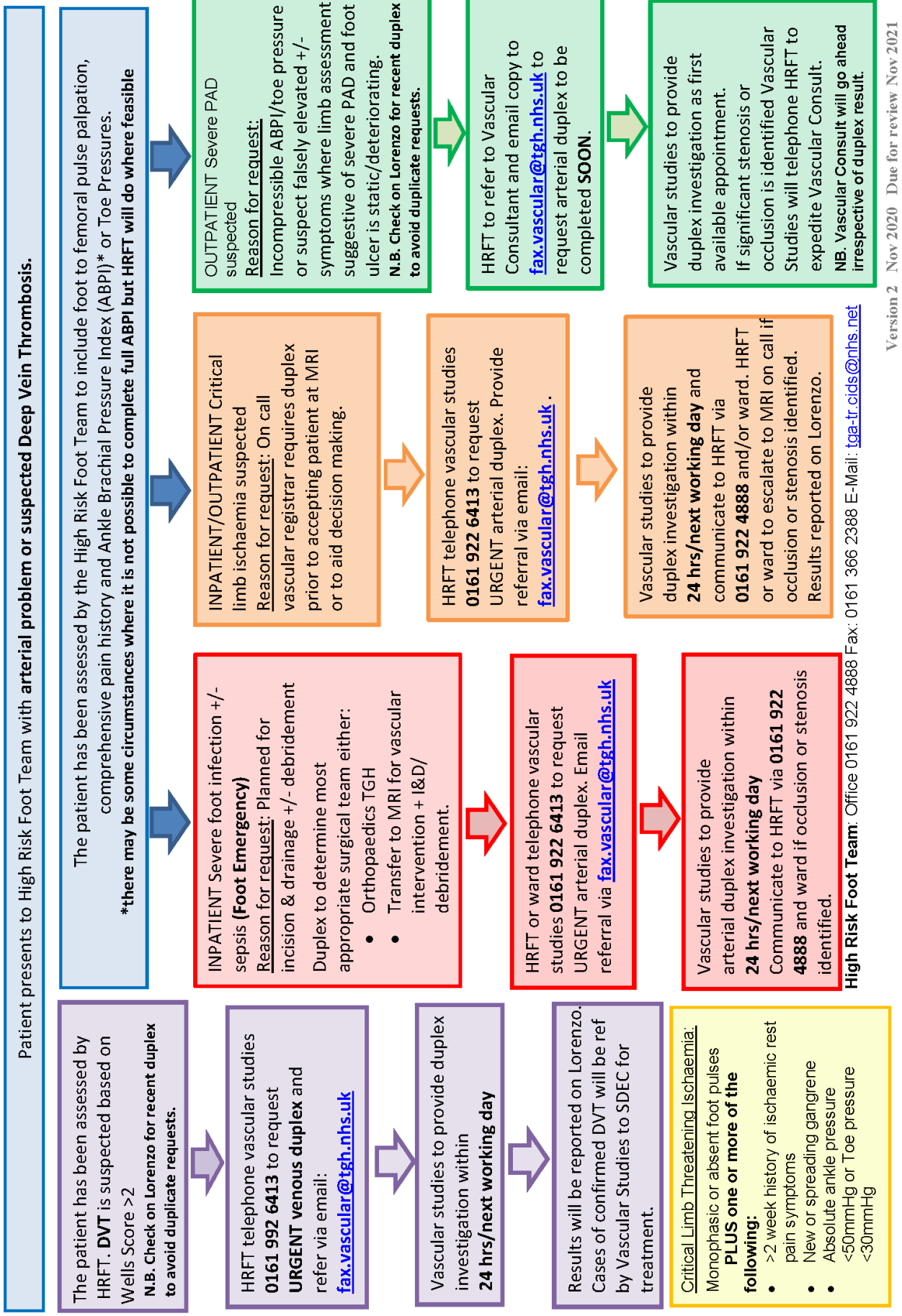
Community Podiatry Service, Northern Care Alliance

Community Services Governance Group, Northern Care Alliance

Long Term Conditions Group, Manchester Health and Care Commissioning

Manchester Leg Circulation Service, Manchester Local Care Organisation

Appendix 3C - Duplex Pathway for High Risk Foot



Appendix 4 - Performing an Ankle Brachial Pressure Index assessment

Equipment needed

- Doppler unit with 8Mhz probe
- Ultrasound gel
- Sphygmomanometer with a suitable size of cuff for the patient being assessed.
- Calculator

Method

1. The patient should be at rest 5 to 10 min in the supine position, relaxed, head and heels supported, in a room with comfortable temperature (19°C–22°C/66°F–72°F).
2. The patient should not smoke at least 2 hours before the ABI measurement.
3. The cuff should be chosen adequately according to the limb size. The width should contour at least 40% of the limb circumference.
4. The cuff should not be applied over a distal bypass (risk of thrombosis) or over ulcers. Any open lesion posing potential contamination should be covered with an impermeable dressing.
5. The patient should stay still during the pressure measurement. If the patient is unable to not move his/her limbs (eg, tremor), other methods should be considered.
6. Similar to the brachial blood pressure measurement, the cuff should be placed around the ankle using the straight wrapping method. The lower edge of the cuff should be 2 cm above the superior aspect of the medial malleolus (Figure 2).
7. An 8- to 10-MHz Doppler probe should be used. Doppler gel should be applied over the sensor.
8. After the Doppler device is turned on, the probe should be placed in the area of the pulse at a 45° to 60° angle to the surface of the skin. The probe should be moved around until the clearest signal is heard.
9. The cuff should be inflated progressively up to 20 mm Hg above the level of flow signal disappearance and then deflated slowly to detect the pressure level of flow signal reappearance. The maximum inflation is 300 mm Hg; if the flow is still detected, the cuff should be deflated rapidly to avoid pain.
10. The detection of the brachial blood flow during the arm pressure measurement should also be done by Doppler.
11. The same sequence of limb pressure measurements should be used. The sequence should be the same for clinicians within a same center.

(From Aboyens et al, 2012)

Interpretation

ABPI > 1.3 indicates arterial calcification

ABPI < 0.9 indicates PAD

ABPI < 0.4 or ankle systolic pressure < 50mmHg (70mmHg with ulcer) indicates severe or critical limb ischaemia

Discuss results with GP (PAD) or Vascular Team (CLI) as necessary, in addition to other clinical presenting factors (ulcers / pain) and clinical assessment findings

Appendix 5 - Performing a toe systolic pressure assessment

Equipment needed

- Doppler unit
- Sphygmomamometer
- Toe cuffs

  and
- Photoplesythmography sensor (PPG)

  or
- 8mhz Doppler probe & ultrasound gel

Method

1. Rest the patient lying flat ideally, for at least 10 minutes (use this time to take a history and check foot and leg pulses)
2. Place toe cuff around the toe
3. Attach toe cuff to sphyg
4. If using PPG sensor, attach to apex of toe with surgical tape or similar and check that a pulse waveform has been located
5. If using 8 mhz Doppler, locate pulse waveform by using coupling gel and locating at distal sides or apex of toe
6. Inflate the sphyg cuff lightly and slowly until you see the waveform disappear. Note the pressure and continue to inflate until 20-30 mmHg above that pressure (super systolic)
7. Slowly release the pressure in the cuff at about 2 – 5 mmHg per second until the waveform reappears
8. This is the toe systolic pressure. Make a note of it
9. Deflate the cuff completely

Interpretation

Toe systolic pressure < 60mmHg indicates significant ischaemia

Toe systolic pressure < 30mmHg indicates critical limb ischaemia

Discuss results with Vascular Team as necessary, in addition to other clinical presenting factors (ulcers / pain) and clinical assessment findings

(Consensus by NW CEG, 2017)

Appendix 6 - Wells DVT prediction score

For use in people presenting with suspected deep vein thrombosis (NICE CG 144, 2012).

Two-level DVT Wells score

Clinical feature	Points	Patient score
Active cancer (treatment ongoing, within 6 months, or palliative	1	
Paralysis, paresis or recent plaster immobilisation of the lower extremities	1	
Recently bedridden for 3 days or more or major surgery within 12 weeks requiring general or regional anaesthesia	1	
Localised tenderness along the distribution of the deep venous system	1	
Entire leg swollen	1	
Calf swelling at least 3cm larger than asymptomatic side	1	
Pitting oedema confined to the symptomatic leg	1	
Collateral superficial veins (non-varicose)	1	
Previously documented DVT	1	
An alternative diagnosis is at least as likely as DVT	-2	
Clinical probability simplified score		
DVT likey	2 points or more	
DVT unlikey	1 point or less	

Adapted with permission from:

- Wells PS et al. (2003) Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. New England Journal of Medicines 349: 1227-35

- The National Clinical Guideline Centre

If Wells Score is 2 or more, refer on using local DVT pathway for DVT diagnostic assessment or discuss Wells Score with the patients GP

Appendix 7 - Examples: Brief PAD and CLI assessment & referral forms

Examples of assessment and referral forms that clinicians can use, when suspecting peripheral arterial disease, critical limb ischaemia or chronic limb threatening ischaemia.

Pride in Pennine | Quality-Driven Responsible Compassionate

The Pennine Acute Hospitals NHS Trust

Brief Peripheral Arterial Assessment and Referral Form

Patient details

Name	NHS Number DoB
Contact phone number (important):	

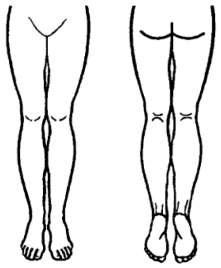
Known cardiovascular risks (circle)

Smoking history | Diabetes | Hypertension | High cholesterol

Overweight / obese | No cardiovascular exercise | Carotid / coronary disease

Edinburgh Intermittent Claudication Questionnaire (Leng & Fowkes, 1992)

1. Do you get pain or discomfort in your legs when you walk? **Yes** / No
   (If 'no' you do not need to continue with questions 2 - 5)
2. Does the pain ever begin when you are standing still or sitting? Yes / **No**
3. Do you get this pain if you walk uphill or when you hurry? **Yes** / No
4. Do you get this pain when you walk at an ordinary pace on the level? **Yes** / No
5. Does this pain disappear when you rest for less than 10 minutes? **Yes** / No



6. Where do you get the pain or discomfort? Mark the place(s) with an 'x' on the diagram.

Typical claudication, if in calf

Atypical claudication, if only in thighs or buttocks

Not claudication, if in the hamstrings, feet, shins, joints or radiates in the absence of calf pain

Foot Pulses	**Right**		**Left**	
	Palpable	Signal indicates	Palpable	Signal indicates
Posterior tibial	Y **N**	Tri Bi **Mono**	Y **N**	Tri Bi **Mono**
Dorsalis pedis / anterior tibial	Y **N**	Tri Bi **Mono**	Y **N**	Tri Bi **Mono**

Please tick as appropriate:

☐ Not previously been seen by the Leg Circulation Service or a Hospital Vascular Team

Refer to Leg Circulation Service for a peripheral arterial diagnostic assessment with any of the following:

☐ The Edinburgh Claudication Questionnaire is positive for leg pain / discomfort

☐ There are 2 non-palpable pulses in a foot **and** there are other cardiovascular risks or limb indications

☐ Monophasic Doppler signals at post tibial artery **and** there are other cardiovascular risks or limb indications

Or, consider referring to Secondary Care Vascular Team urgently if critical limb ischaemia is indicated after discussing with vascular clinician and GP:

☐ Cold, pulseless foot, with monophasic / non-audible Doppler signals
and severe pain at rest in toes / feet **or** tissue loss / necrosis

Additional comments:

Clinician:	Date:	Time:	Location:

If from GP Practice, please include the summary of medical history, current medicines and recent blood results
Fax / post all referrals to: The Leg Circulation Service, Harpurhey Health Centre, 1 Church Lane, Harpurhey, Manchester, M9 1BE.
Tel 0161 861 2439 (Mon – Fri, 8.30am – 4.30pm) Fax 0161 205 5860

NHS Logo
Manchester Local Care Organisation

Named GP
GP address

Manchester Leg Circulation Service
(Peripheral Arterial Disease)
Office: Harpurhey Health Centre
Tel: 0161 861 2439
Mon – Fri, 9.00am to 4.00 pm
Date:

For GP Action / Information

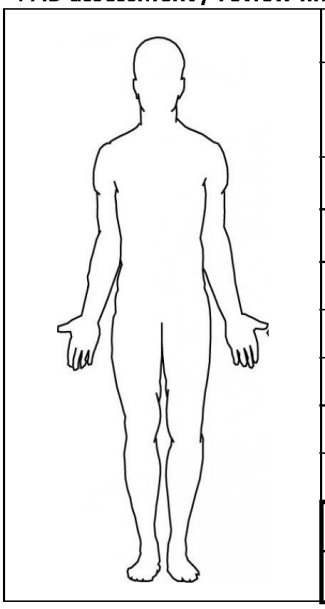
Re: Name: Address: Tel: NHS: DoB:

Assessment: Lower limb peripheral arterial

Clinical diagnosis:

Treatment plan & GP actions:

PAD assessment / review findings, adapted from NICE CG 147 (2018)



	Right				Left			
Pulses	Palpable Y - yes N - no	Doppler T – Tri B – Bi M - Mono	Systolic pressure mmHg Resting	Post-ex	Palpable Y - yes N - no	Doppler T – Tri B – Bi M - Mono	Systolic pressure mmHg Resting	Post-ex
Brachial / radial								
Additional findings	Abdominal aorta pulsatile & expansile:				Pulse irregular:			
Femoral								
Popliteal								
Peroneal								
Post tibial								
Anterior tibial / Dorsalis pedis								
Ankle brachial pressure index								
Toe systolic pressure								

Relevant medical history including allergies & depression screening:

Modifiable vascular risk profile:

Lower limb symptoms:

Lower limb signs:

Additional comments:

Yours sincerely

Clinician Name **- Vascular Specialist Podiatrist, Manchester Leg Circulation Service**
CC:

NHS Manchester University NHS Foundation Trust

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NHS Northern Care Alliance NHS Group

Critical & Chronic Limb Threatening Ischaemia - Assessment and Referral Form

Patient details

Name Address	NHS Number Date of Birth
Contact phone number **(important)**:	
Usual GP:	Practice:

Known vascular related history (circle) Patient already known to the Vascular Team at: ROH MRI

Smoking / Ex Diabetes Hypertension Hyperlipidaemia Peripheral arterial disease
Carotid disease / TIA / CVA Ischaemic heart disease Myocardial infarction Angina
Angioplasty Bypass Chronic kidney disease Other:

Brief lower limb arterial assessment

	Right foot				Left foot			
Foot Pulses	Palpable Yes, no or ?	Doppler signal (Tri / Bi / Mono or ?)	Systolic pressure		Palpable Yes, no or ?	Doppler signal (Tri / Bi / Mono or ?)	Systolic pressure	
			Ankle	Toe			Ankle	Toe
Posterior tibial								
Anterior tibial/ Dorsalis pedis								

Critical / Chronic limb threatening ischaemia indicators - consider for all foot, heel or leg wounds if:
□ Foot pulses are not easily palpable or
□ Doppler signals are monophasic / unclear / absent at ankle & foot pulses or
□ Severe & constant pain in foot when at rest, present for more than 2 weeks

Limb threat	Wound	Ischaemia (mmHg)	Toe	Ankle	Foot (or leg) Infection	
Low ↓ **High**	**0:** No ulcer, no gangrene	**0**:	≥60	≥100	**0:** Non-infected	
	1: Small ulcer, no gangrene	**1**: Mild	40-59	70-99	**1:** Mild	<2cm cellulitis/erythema
	2: Deep ulcer, gangrene	**2**: Moderate	30-39	50-69	**2**: Moderate	>2cm cellulitis/erythema
	3: Extensive ulcer / gangrene	**3**: Severe	<30	<50	**3**: Severe	Systemic response/sepsis
Grade (severity)	**Wound:**	**Ischaemia:**			**Foot (or leg) Infection:**	

(Adapted from: VSGBI QIF 2019, Global Vascular Guidelines CLTI 2019 & IWGDF Guidelines 2019)

ACTION TAKEN: Phone colleague for advice and /or Vascular On-Call Registrar, to agree next steps, if moderate to severe ischaemia is indicated **AND** person also has a deep or extensive wound **OR** moderate to severe infection

ROH - Tel: 0161 624 0420 Registrar bleep: 7424
Email: Clinical.Vascular@nca.nhs.uk **(confirm receipt by phone)**

MRI: Tel: 0161 276 1234 (Vascular Registrar on-call)
Email: vashotclinic@mft.nhs.uk

Name of Vascular Registrar: Hospital:

DECISION AGREED: ☐ Admit within 24 hours ☐ Urgent vascular out-patient (within 7 days if available)

☐ Alternative decision agreed:

☐ GP informed of admission or urgent referral ☐ Patient informed to take medicines and overnight items

Additional comments:

Clinician:	Date:	Time:	Location:

Send copies of this form to GP and Vascular Team, if referring on. File a copy in the patient notes.
Supply a copy to the patient, if attending urgent vascular appointment within 24 – 72 hours.

Appendix 8 - Integrated pathways for PAD and critical limb ischaemia

Integrated pathways developed in the North West region - published and endorsed nationally, for both PAD and critical limb ischaemia.

NHS Manchester

The Pennine Acute Hospitals NHS Trust

Peripheral Arterial Disease (PAD) Integrated Care Pathway

(for patients with North and Central Manchester GPs)

Patient has a lower limb assessment by: GP, Nurse or Allied Health Professional

Baseline peripheral arterial assessment

Modifiable cardiovascular risks | Foot pulses | Leg symptoms | Doppler signals

No PAD
- Foot pulses palpable
- No intermittent claudication
- Doppler signals tri / bi phasic
- No ischaemic rest pain
- No clinical signs of PAD

Consider differential diagnosis

Suspected PAD
- Foot pulses non-palpable
- Symptoms of intermittent claudication
- Doppler signals monophasic
- Clinical signs eg skin / nail atrophy, cold pale feet, chronic wound, slow capillary refill time
- Sub-optimally managed existing PAD

Severe / critical limb ischaemia
- Foot pulses absent / not palpable **OR**
- Doppler signals monophasic / absent

PLUS any of the following
- Ischaemic rest pain (toes / feet)
- New gangrene or necrosis
- Ankle systolic < 50mmHg

Refer to the Leg Circulation Service for non-invasive lower limb vascular assessment, diagnosis / exclusion of PAD and an individually agreed management plan: education, lifestyle change, medicines, surgical options

Refer urgently to Hospital Vascular Team by contacting the Vascular Team or the on-call Vascular Registrar, if it appears acutely limb threatening

Non-surgical management
- Early – moderate or stable PAD
- Individual management plan
- Review in 3 – 12 months or if leg symptoms worsen

Refer for surgical opinion
- Worsening / severe / critical PAD
- Severe lifestyle impacting symptoms
- Ankle brachial pressure index < 0.4
- Ankle systolic pressure < 50mmHg

Follow up within 1 working day to ensure that Hospital Vascular Team has received and triaged the referral. Document this clearly in clinical notes.

All patients with a **confirmed diagnosis** of PAD should have an individually agreed management plan, which is to be reviewed periodically with their GP, the Leg Circulation Service or the Hospital Vascular Team.

The management plan will include discussing cardiovascular & limb risk and negotiating management options (lifestyle, medicines, surgery), to be reinforced by all Health Professionals involved in management of the lower limb

PAD / CV risk management	Target	Source
Antiplatelet therapy	Initiate for all with established PAD	NICE CG 2012, SIGN 2006
Lipid lowering therapy	Initiate for all with established PAD	NICE CG 2014, SIGN 2006
Hypertension	BP < 140/90 mmHg	NICE CG 2011
Smoking	Aim for quit	NICE CG 2012, SIGN 2006
Obesity	BMI < 30	NICE CG 2014
Moderate cardiovascular exercise	30 minutes, 5 times per week	DOH 2011
Glycaemic control (if has diabetes)	HbA1c < 7.0 % or < 53 mmol/mol	NICE CG 2014, IFCC 2007

This pathway is based on PAD consensus from NICE, SIGN, TASC II, Target PAD and local expert opinion

Peripheral Arterial Disease Integrated Care Pathway 2012 endorsed by:

Clinician	Position
Dr C Dang	Consultant Physician (diabetes), PAHT
J Dyce	Leg Ulcer Nurse Specialist, PAHT
M Fox	Vascular Specialist Podiatrist, PAHT
H Gordon	Podiatry Services Manager, PAHT
Mr M Hadfield	Consultant Vascular Surgeon, PAHT
J Harker	Nurse Consultant Tissue Viability, PAHT
Mr R Ibrahim	Consultant Vascular Surgeon, PAHT
Dr S Jackson	General Practitioner, Urban Village MC
S Lake	District Nurse Lead, PAHT
Mr M Madan	Consultant Vascular Surgeon, PAHT
B O' Shea	Practice Nurse, Urban Village MC
Mr T Oshodi	Consultant Vascular Surgeon, PAHT
M Proudman	Tissue Viability Nurse Lead, PAHT
D Ruff	Vascular Nurse Specialist, PAHT
Dr M Savage	Consultant Physician (diabetes), PAHT
L Smith	Vascular Nurse Specialist, PAHT
L Stuart MBE	Consultant Podiatrist, PAHT
P Yates	Principal Podiatrist, PAHT

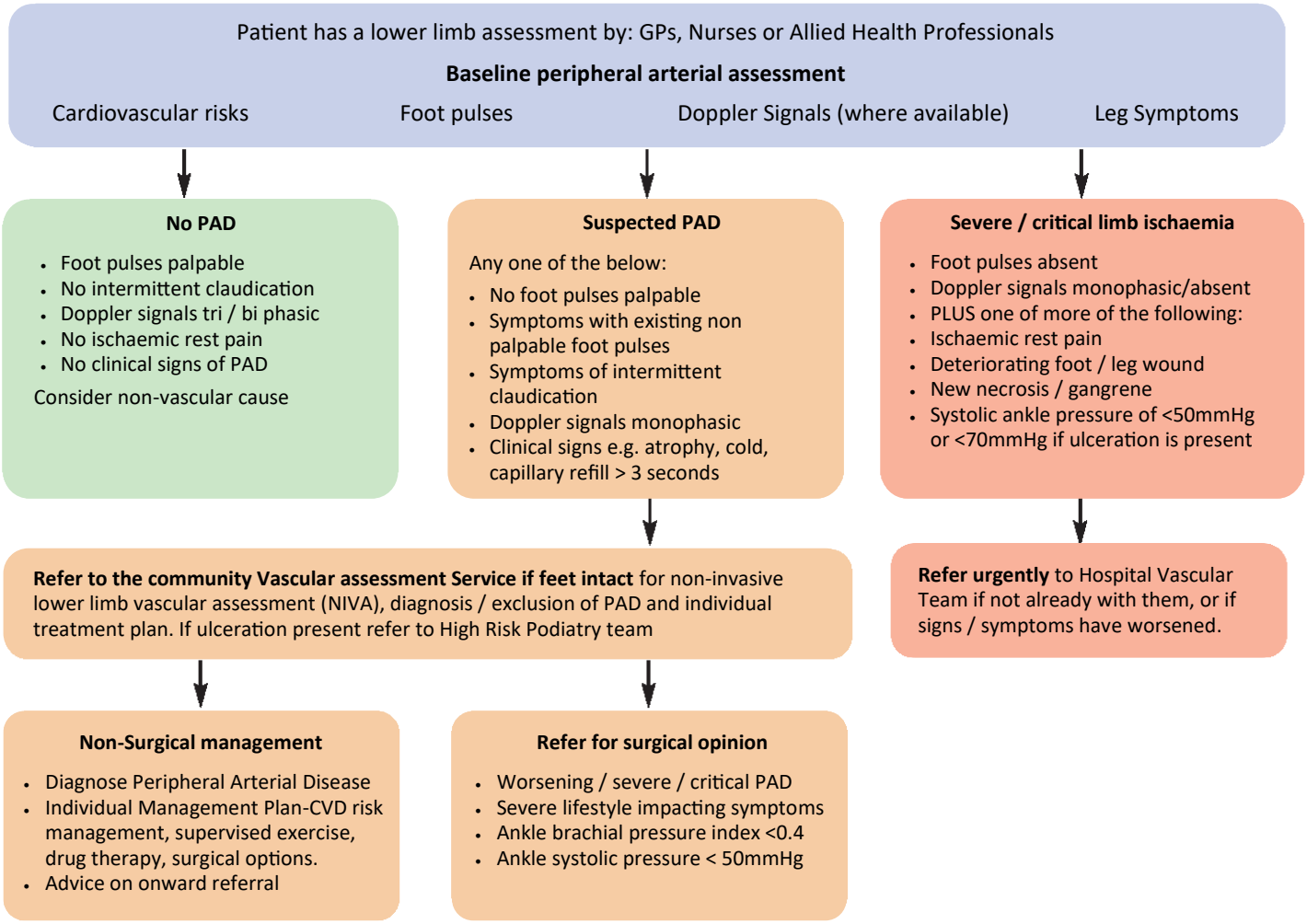
Group / Team

North Manchester High Risk Lower Limb Governance Group, PAHT

Medicine and Community Services Governance Group, PAHT

Surgical Division Governance Group, PAHT

Salford Lower Limb Vascular Triage Service PAD Pathway



All patients with a **confirmed diagnosis** of PAD should have an individually agreed management plan, which should be reviewed periodically with their GP.

The management plan will include targeting cardiovascular risk factors, limb problems and negotiating treatment options (lifestyle, medicines, surgery) by GPs, Nurses and Allied Health Professionals involved in management of the lower limb.

PAD / CV risk management	Target	Source
• Antiplatelet therapy	Initiate for all with established PAD	NICE 2010, SIGN 2006
• Lipid lowering therapy	Initiate for all established PAD	NICE 2021, SIGN 2006
• Hypertension	BP < 140/90 mmHg (<150/90 for over 80s)	NICE 2011
• Smoking	Aim for quit	SIGN 2006
• Obesity	BMI < 30	NICE 2006
• Light cardiovascular exercise	30 / 45 Minutes, 3 to 5 times per week	DOH 2004
• Glycaemic control (if has diabetes)	HbA_{1C} <7.0% or < 53 mmol / mol	NICE 2008, IFCC 2007

This pathway is based on PAD consensus from SIGN, TASC II, NICE, Target PAD and local guidance.

(Matthews et al, 201)

Appendix 9 - NICE PAD Quality Standards Audit tool

These brief audit tool templates can be used to identify if a Lower Limb Clinic or Service is meeting the minimum quality standards for PAD, published by NICE (2014)

Blank audit template

PAD clinical benchmarking tool, for use with NICE PAD Quality Standard (2014)		
Target population: All adults seen with suspected PAD		
NHS organisation:		
Team:		
Date of benchmarking exercise:		
Clinician leading audit:		
Quality Statements (NICE 2014)	**Currently**	**%**
1. People who have symptoms of, or who are at risk of developing, peripheral arterial disease (PAD) are offered a clinical assessment and ankle brachial pressure index (ABPI) measurement.	red	0%
2. People with PAD are offered an assessment for cardiovascular comorbidities and modifiable risk factors.	red	0%
3. People with intermittent claudication are offered a supervised exercise programme.	red	0%
4. People with PAD being considered for revascularisation who need further imaging after a duplex ultrasound are offered magnetic resonance angiography (MRA).	red	0%
5. People with intermittent claudication are offered angioplasty only when imaging has confirmed it is appropriate, after advice on the benefits of modifying risk factors has been given and after a supervised exercise programme has not improved symptoms.	red	0%
Benchmarking exercise performed against 20 patients records		
Full evidence of Quality Standard being met in 80 - 100% of patients clinical records checked	green	
Some evidence of Quality Standard being met in 50 - 79% of patients clinical records checked	amber	
No evidence of Quality Standard being met in less than 50% of patients clinical records checked	red	

Example of completed audit template

PAD clinical benchmarking tool, for use with NICE PAD Quality Standard (2014)		
Target population: All adults seen with suspected PAD		
NHS organisation: Pennine Acute Hospitals Trust		
Team: Manchester Leg Circulation Service		
Date of benchmarking exercise: November 2016		
Clinician leading audit: Martin Fox		
Quality Statements (NICE 2014)	**Currently**	**%**
1. People who have symptoms of, or who are at risk of developing, peripheral arterial disease (PAD) are offered a clinical assessment and ankle brachial pressure index (ABPI) measurement.	green	100%
2. People with PAD are offered an assessment for cardiovascular comorbidities and modifiable risk factors.	green	100%
3. People with intermittent claudication are offered a supervised exercise programme.	green	80%
4. People with PAD being considered for revascularisation who need further imaging after a duplex ultrasound are offered magnetic resonance angiography (MRA).	red	?%
5. People with intermittent claudication are offered angioplasty only when imaging has confirmed it is appropriate, after advice on the benefits of modifying risk factors has been given and after a supervised exercise programme has not improved symptoms.	red	?%
Benchmarking exercise performed against 20 patients records		
Full evidence of Quality Standard being met in 80 - 100% of patients clinical records checked	green	
Some evidence of Quality Standard being met in 50 - 79% of patients clinical records checked	amber	
No evidence of Quality Standard being met in less than 50% of patients clinical records checked	red	

Contact the North West PAD Clinical Effectiveness Group for original copies of the audit tool or other forms or pathways in these appendices.

Appendix 10 - Nail surgery

Manchester Local Care Organisation
Leading local care, improving lives in Manchester, with you

NHS Northern Care Alliance NHS Group
Salford | Oldham | Bury | Rochdale | North Manchester

Nail Surgery Arterial Assessment & Integrated Care Pathway

(for patients registered with Manchester GPs)

Baseline peripheral arterial pre-operative assessment

Modifiable cardiovascular history / risks | Leg / foot symptoms | Foot pulses* | Doppler signals*

*If any doubts with the subjective assessments above, toe systolic pressures +/- ABPI must be added

No indications of PAD
- Foot pulses **easily palpable AND**
- Doppler **clearly tri / bi phasic**
- No intermittent claudication
- No ischaemic rest pain
- No other clinical signs of PAD
- Low risk limb – no history of foot ulcers or severe renal disease or connective tissue disorders with vasculitis

Complete pre-op nail surgery assessment and plan to proceed if there are no other contra-indications

Suspected PAD
- Foot pulses not easily palpable
- Doppler poor biphasic / monophasic
- Symptoms - intermittent claudication Clinical signs e.g. chronic skin / nail atrophy, cyanosed / pale or cold feet, slow capillary refill time > 3 seconds
- Increased risk limbs OR ANYONE with history of chronic ulcers (> 2 - 4 weeks), renal failure, connective tissue disorders & vasculitis

Refer to High Risk Foot Team
For additional non-invasive lower limb vascular assessment, including:
- Ankle and toe pressures,
- Diagnosis / exclusion of PAD
- Opinion on severity, benefits vs risks and an individually agreed patient management plan including: education, lifestyle change, medicines, surgical options

Consider proceeding with caution if:
- Toe > 60mmHg or Ankle > 70 mmHg / ABPI > 0.6 and Doppler signals biphasic
- ABPI > 1.3 AND Doppler signals biphasic
- Signs of calcification discussed with Podiatric Surgeon / Vascular Team
- Patient fully informed of risks & benefits
- Consider no tourniquet / phenolisation
- Consider time of year (avoid colder months)
- If in doubt refer for vascular surgical opinion

Severe / critical limb ischaemia
- Foot pulses absent / not palpable **AND / OR**
- Doppler signals monophasic / absent

PLUS any of the following
- Ischaemic rest pain (toes / feet)
- New gangrene or necrosis
- Ankle systolic < 50mmHg
- Toe systolic < 30 mmHg

Refer urgently to Hospital Vascular Team for opinion. Contact the on-call Vascular Registrar, if it appears immediately limb-threatening, e.g. with:
- Spreading infection / cellulitis
- Wet necrosis / gangrene

Follow up within 1 working day to ensure that Hospital Vascular Team has received and triaged the referral. Document this clearly in clinical notes.

Refer for vascular surgical opinion
- Severe / limb-threatening / worsening PAD
- Lifestyle-impacting vascular symptoms
- ABPI < 0.6, ankle < 70mmHg or toe < 60 mmHg
- Incompressible ankle / toe pressures AND Doppler signals poor biphasic or monophasic

Pathway Endorsed by: Community Podiatry Service, North Manchester
Mr Naseer Ahmad, Consultant Vascular Surgeon, Manchester Royal Infirmary
Dr Frank Bowling, Consultant Podiatric Surgeon, Manchester Royal Infirmary

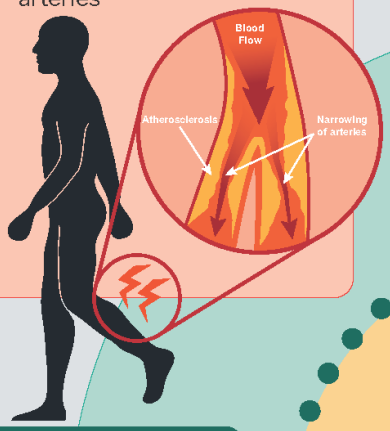
Initiated December 2018
Updated October 2020
Review December 2021

Appendix 11 - PHE & Circulation Foundation Exercise infographics

Exercise for Intermittent Claudication

What is intermittent claudication?

- Leg muscle pain or discomfort during walking
- Usually caused by narrowed arteries



NICE National Institute for Health and Care Excellence

RECOMMENDS EXERCISE

Supervised exercise classes produce the greatest benefits - ask your doctor or specialist if these are available locally

Benefits of exercise

- Reduces pain
- Reduces the need for vascular procedures
- Improves heart and vascular health
- Improves mood
- Improves sleep
- Maintains healthy weight

Walk at a speed that you can maintain for 3-10 minutes

to reduce pain and improve fitness

Walk regularly for exercise

some is good, more is better, make it a habit

Rest until the pain subsides then walk again

Continue until moderate-to-strong leg pain develops

Key recommendations

- Aim to complete 30-60 minutes of walking per session
- Follow the walk-rest-walk pattern (central diagram)
- 3-5 sessions per week

Further guidance

- **Do not fear walking with leg pain** – it will not harm you
- **Build up gradually** – your walking speed and time
- **Be patient** – it usually takes several weeks of exercise to improve symptoms

General tips

- Wear comfortable clothing, keep hydrated
- Choose routes with resting places
- Build in variety, involve others, keep it fun
- Do not exercise if you are unwell
- Seek medical advice if you experience chest pain, dizziness or sickness

Do strengthening and balance activities as well

... on at least 2 days per week
... to stay strong and reduce the risk of falling

Where can I find out more information about this condition?
The Circulation Foundation: *www.circulationfoundation.org.uk*

Source:
Based on the BASES Expert Statement by Tew, Harwood, Ingle, et al. in The Sport and Exercise Scientist, Issue 57 (Autumn 2018), *https://www.bases.org.uk/imgs/autumn_2018_7601_bas_expert_statement__v2_569.pdf*

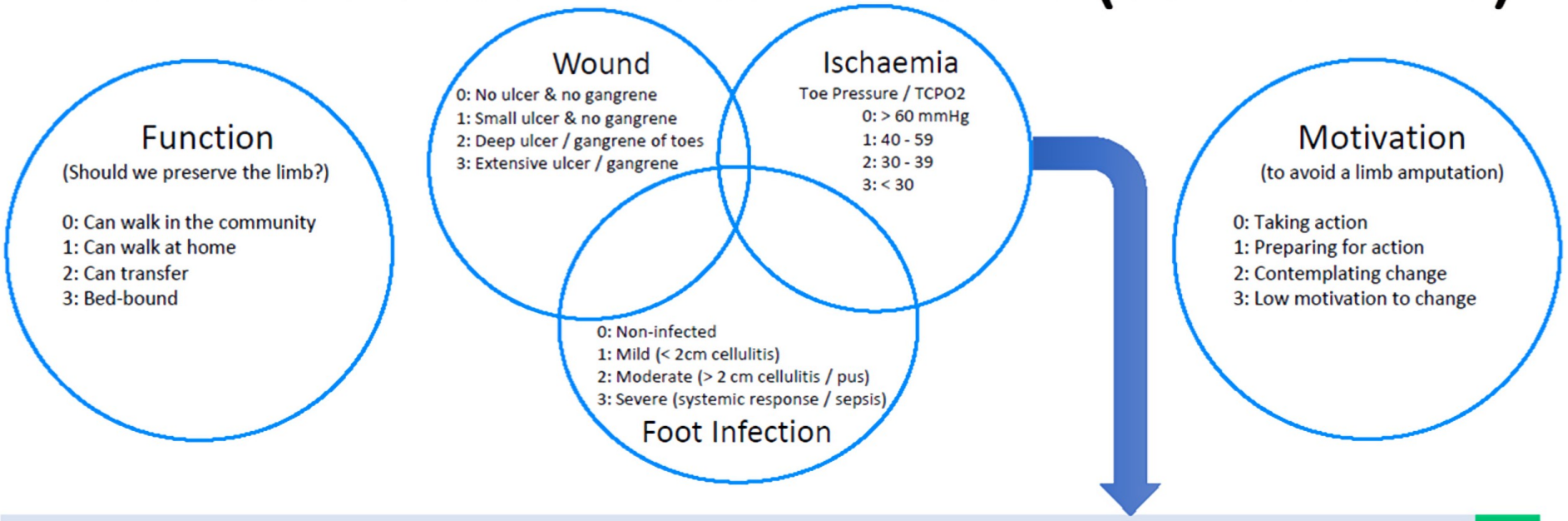
Disclaimer:
This infographic is not a validated clinical decision aid.
Any reliance placed on this information is strictly at the user's own risk.

Thanks:
To the reviewers who helped to produce this infographic, which was co-funded by The Circulation Foundation and Northumbria University.

CIRCULATION FOUNDATION The Vascular Charity

Accessed 27/08/21 at: New - Infographic for Intermittent Claudication | circulationfoundation.org.uk

WIfI Foot Ulcer Classification (& WIfI FM)



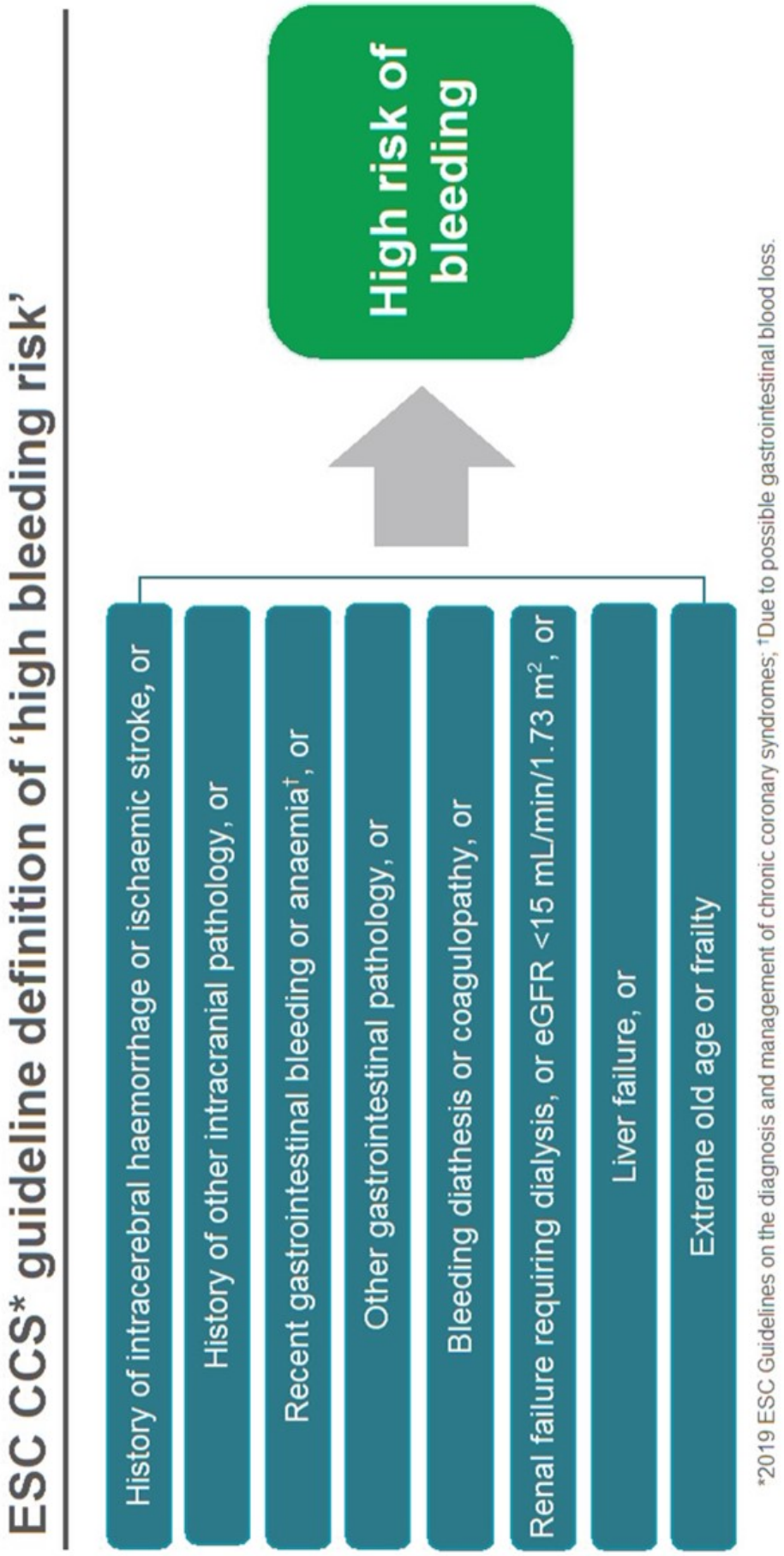
Ischaemia: 0 = lower amputation risk, through to 3 = higher amputation risk *

	Toe mmHg	Ankle mmHg	ABPI	*Doppler*	*Foot pulses*
0:	≥ 60	≥ 100	≥ 0.8	*Triphasic*	*All easily palpable*
1:	40-59	70-99	0.6-0.79	*Bi/monophasic*	*Not all easily palpable*
2:	30-39	50-69	0.4-0.59	*Monophasic*	*Non-palpable*
3:	< 30	< 50	< 0.4	*Mono / absent*	*Non-palpable*

** Consider in combination with overall clinical presentation, plus wound & foot / limb infection severity*

(Adapted by Martin Fox from; Mills et al 2014, Khan et al 2020, Rollnick et al 2008, Tehan et al 2018, Londero et al 2016)

Appendix 13 - ESC infographic on bleed risk

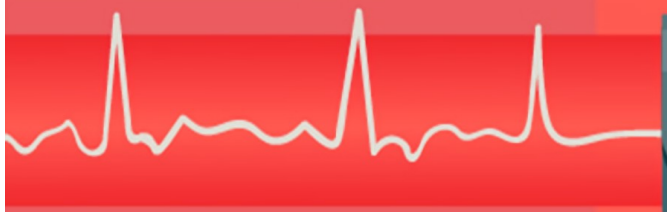


Public Health England

Health Matters

10 year cardiovascular disease ambitions for England

Atrial fibrillation (AF)



85%

of the expected number of **people with AF are detected by 2029**

90%

of patients with AF who are already known to be at high risk of a stroke **to be adequately anticoagulated by 2029**

High blood pressure

80%

of the expected number of **people with high blood pressure are diagnosed by 2029**

80%

of the total number of people already diagnosed with high blood pressure are **treated to target as per NICE guidelines by 2029**

High cholesterol

75%

of people **aged 40 to 74 have received a formal validated CVD risk assessment** and **cholesterol reading** recorded on a primary care data system in the last five years by 2029

45%

of people **aged 40 to 74 identified as having a 20% or greater 10-year risk** of developing CVD in primary care are treated with statins by 2029

25%

of people with **Familial Hypercholesterolaemia (FH) are diagnosed and treated** optimally according to the NICE FH Guideline by 2024

The ambitions are underpinned by the need to do more to reduce health inequalities

Reduce the gap significantly in amenable CVD deaths between the most and least deprived areas by 2029

Health Matters: Preventing cardiovascular disease Saving hearts and minds together Summary

Too many people are still living with undetected and poorly managed atrial fibrillation, high blood pressure and raised cholesterol. Working with partners, Public Health England (PHE) and NHS England have agreed ambitions which seek to tackle the A, B and C of secondary prevention, and reduce the health inequalities associated with cardiovascular disease (CVD) over the next 10 years.

Scale of the Problem

CVD is the leading cause of death worldwide, accounting for 17.9 million lives each year, 31% of all global deaths.

Poor cardiovascular health can cause heart attacks, strokes and the onset of vascular dementia. Good cardiovascular health is also linked to good mental health and wellbeing, including reduced feelings of stress, anxiety and depression. What's good for the heart is also good for the brain.

Falling mortality rates from heart disease were the biggest cause of increases in life expectancy between 2001 and 2016 in England. However, since 2011 the rate of increase in life expectancy has slowed for both sexes as improvements in heart disease mortality have plateaued. This highlights the need for a renewed drive to prevent CVD deaths, which still account for one in four of all deaths in England; the equivalent to one death every four minutes. In 2016, heart disease was the leading cause of death for men and the second biggest cause of death for women after dementia.

Although we have almost halved CVD mortality over recent decades, there is no room for complacency in the efforts required to address the major challenges that CVD continues to play in individual lives, communities and society as a whole.

In 2016, 33,812 people under the age of 75 died from CVD, making this one of the largest causes of premature mortality. Morbidity is also a major issue for health and social care, with 6.8 million people living with cardiovascular conditions.

Yearly healthcare costs in England relating to CVD are estimated at £7.4 billion, with an annual cost to the wider economy of £15.8 billion. There is also significant variation in the incidence of CVD. For example, in 2016 to 2017 the premature (under 75 years) death rate for Manchester (140.7 per 100,000) was nearly four times higher than that for Mid Suffolk in the East of England (37.0 per 100,000).

CVD ambitions and secondary prevention

The NHS Long Term Plan includes a major ambition to prevent 150,000 strokes and heart attacks over the next ten years by improving the treatment of the high-risk conditions – hypertension (high blood pressure), high cholesterol and atrial fibrillation (AF).

These common conditions can cause CVD, which includes heart attack and stroke, and many cases of dementia. Although treatment of these conditions is very effective at preventing cardiovascular events, late diagnosis and under treatment is common.

To complement the Long Term Plan, the National CVD Prevention System Leadership Forum has agreed specific ambitions for the detection and management of the high risk conditions, known as the ABC:

- Atrial fibrillation (AF)
- Blood pressure
- Cholesterol

Ten Year Ambitions

Atrial fibrillation (AF)

- 85% of the expected number of people with AF are detected by 2029
- 90% of patients with AF who are already known to be at high risk of a stroke to be adequately anticoagulated by 2029

High blood pressure

- 80% of the expected number of people with high blood pressure are diagnosed by 2029
- 80% of the total number of people already diagnosed with high blood pressure are treated to target as per NICE guidelines by 2029

High cholesterol

- 75% of people aged 40 to 74 have received a formal validated CVD risk assessment and cholesterol reading recorded on a primary care data system in the last five years by 2029
- 45% of people aged 40 to 74 identified as having a 20% or greater 10-year risk of developing CVD in primary care are treated with statins by 2029
- 25% of people with Familial Hypercholesterolaemia (FH) are diagnosed and treated optimally according to the NICE FH Guideline by 2024

The ambitions are underpinned by the need to do more to reduce health inequalities

- Reduce the gap significantly in amenable CVD deaths between the most and least deprived areas by 2029

Notes and reflections

North West NHS Podiatry Services
Peripheral Arterial Disease Clinical Effectiveness Group