

BRITISH JOURNAL OF
COMMUNITY
NURSING

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Peripheral arterial disease (PAD) is a substantial public health issue in the community, not least because it is a reliable marker of future vascular disease such as Congestive Heart Failure (CHF) and Cerebrovascular Accident (CVA) (Belch et al, 2007).

Belch et al (2007) explain that, in the UK, approximately 100,000 people are diagnosed every year and, as a result, 60% of patients with PAD die from myocardial infarction (MI) and 12% from cerebral vascular accident (CVA) (Tierney et al, 2000). People with PAD are 6 times more likely to die from CHF within 10 years than those without PAD.

For community nurses and those working with elderly patients, instances of PAD will be more frequent. Fowkes et al (1991) found the prevalence of PAD increases markedly with age, affecting 3% of people under the age of 60 years, rising to >20% in people over 75 years.

In fact, estimates suggest that out of these 100,000 people who are symptomatic and die within 5 or 10 years, 60% of them would have died from MI and further 12% from CVA. (Tierney et al, 2000; Belch et al, 2007).

As PAD is linked with age early recognition should also be a consideration in developing assessment pathways for its early detection.

The symptoms of PAD can vary depending of the advancement of the disease. The two classification systems adopted from the Trans-Atlantic Inter-Society Consensus Document on Management of Peripheral Arterial Disease (TASC II) international consensus document are Fontaine and Rutherford (Norgren et al, 2007) and both are illustrated in Table 1.

These classifications have similarities and differences. The Rutherford Categories are specific, giving 7 different categories with precise measureable ankle pressure levels post exercise. The Fontaine classification on the other hand is much less elaborate, giving an overall idea of symptoms in each category.

Both systems divide PAD symptoms into three levels:

- ◆ Asymptomatic
- ◆ Intermittent claudication (IC)
- ◆ Tissue loss.

Both classification systems describe early stages of PAD with no symptoms or mild IC. The word 'claudication' is derived from the Latin *claudicare*, meaning 'to limp', and is associated with the Roman Emperor Claudius, who is said to have walked with a limp (Bick, 2003). Cassar (2006) has described IC as pain affecting the calf, and less commonly the thigh and buttock that is induced by exercise and relieved by rest. Intermittent claudication occurs as a result of muscle ischaemia during exercise caused by obstruction to arterial flow. It is a common problem, with a prevalence of 0.6-10% (Garcia, 2006) which increases significantly with age.

Almost a fifth of the population over the age of 65 has IC (Diehm et al, 2004) and as a result of demographic changes in many developed countries, its prevalence in the general population is likely to rise dramatically over the next 20 years (Cassar, 2006). IC has a negative impact on various aspects of quality of life and on people's ability to continue to work (Marquis, 1998) as, for instance, it can significantly impact on the persons' mobility.

In the vast majority of cases atherosclerosis is the underlying pathology in IC. Cigarette smoking is by far the most potent risk factor for development of peripheral atherosclerosis and IC (Murabito et al, 1997) increasing the risk at least threefold, and the higher the numbers of pack years (a person's cigarette consumption calculated as the packs of cigarettes smoked per day, multiplied by the

ABSTRACT

Every year in the UK 100,000 people are diagnosed with peripheral arterial disease (PAD) (Belch et al, 2007). Those who are diagnosed are likely to suffer from cardiovascular complications and are six times more likely to die within 10 years, compared with people without PAD (Belch et al, 2007). This medical condition gives no symptoms at early stages and can develop manifesting itself through various degrees of intermittent claudication. This critical analysis will focus on the literature describing peripheral vascular problems with associated symptoms. It will also analyse current understanding of the quality of the vascular assessment within the primary care sector. As a natural consequence this piece of work will aim to highlight the role and significance of Healthcare Professionals within a new service pathway design for the community.

KEY WORDS

Older people ◆ PAD Classification ◆ ABPI History ◆ new era of ABPI testing ◆ implications for practice ◆ HCA role in the healthcare team

Table 1. Stratification of PAD**Fontaine classification (Fontaine et al, 1954). Rutherford categories (Rutherford et al, 1997)**

Stage	Clinical	Category	Clinical
I	Asymptomatic	0	Asymptomatic
IIa	Mild Claudication (CD > 50 meters)	1	Mild claudication (completes treadmill test / ankle pressures > 50 mmHg post treadmill test)
IIb	Moderate to severe claudication (CD > 50 meters)	2	Moderate claudication (between category 1 and 3)
		3	Severe claudication (unable to complete treadmill test / ankle pressures < 50 mmHg post treadmill test)
III	Ischaemic rest pain	4	Ischaemic rest pain
IV	Ulcration / gangrene	5	Minor tissue loss
		6	Major tissue loss

CD – claudication distance

Source: Naidoo NG, Benington S. Claudication of the lower limb: an approach to investigation and management Continuing Medical Education July 2009 Vol.27 No.7 301 - 305

length of consumption in years (e.g. 1.5 packs of cigarettes smoked per day for 20 years is 30 pack years)) the more severe the disease. Other major risk factors for IC are increasing age (Hiatt et al, 1995), diabetes (Muluk et al, 2001) and hypertension (Murabito et al, 1997). Cassar (2006) sees intermittent claudication as a symptom of a disease process, but also and more importantly – as a problem itself. Cassar puts a lot of stress on the importance of early detection and diagnosis and also describes the most important contributing factors increasing the risk of developing IC.

Usage of ABPI in clinical practice

The TASC II document (Norgren et al, 2007) states that the primary non-invasive screening test for PAD is the Ankle Brachial Pressure Index (ABPI). In the context of identifying a high-risk population, persons who should be considered for ABPI screening in the primary care or community setting include subjects with exertional leg symptoms, subjects aged 50 – 69 years who also have cardiovascular risk factors and all patients over the age of 70 years, and subjects with a 10-year risk of a cardiovascular event between 10% and 20% in whom further risk stratification is warranted. The TASC II (Norgren et al, 2007) document forms a reference guide for clinicians who have duty of care to prevent incidents of PAD.

The screening process is defined as the examination of a group of usually asymptomatic individuals to detect those with a high probability of having or developing a given disease (Houghton, 2007). The aim of this process is to reduce mortality and suffering from the disease. The TASC II (Norgren et al, 2007) document lays the foundations for early detection and screening for PAD sufferers and points that ABI is the method of choice to achieve this goal.

In the review paper by Vowden and Vowden (2001), the authors discussed the most recent understanding of the procedures involved in the ABPI testing. Before the early 1960s it was not routine practice to measure

blood pressure in the lower limb. Hamilton et al (1936) established the link between invasive arterial and cuff measurement of blood pressure, while Winsor (1950) noted the difference between arm and ankle pressures. Hocken (1967) using a stethoscope and auscultated Korotkoff's sounds which related to the endpoint detection of systolic and diastolic pressures established that it was feasible to measure the blood pressure in the foot but concluded that the use of thigh cuff has definite practical difficulties and inconvenience. He suggested that auscultation of the foot pulses should be the method of choice in measurement of the blood pressure in the leg.

Yao et al (1968) reported a method of recording arterial flow using ultrasound and the Doppler effect, incorporating flow velocity patterns and audible sound. They compared the accuracy of Doppler with pulse palpation, noting that in 136 legs in which the pulse could not be palpated, only 14 failed to show a Doppler signal. Using this technique Yao et al (1968) were able to define what constituted a normal and abnormal pressure index. They concluded that 'normal' individuals had an ABPI of more than 1 and that patients with arterial stenosis had an ABPI of less than 1. Yao et al (1968) demonstrated that Doppler is a reliable and simple method of measuring ankle systolic pressure and stated that it should be used in common practice.

Hand-held continuous-wave Doppler ultrasound is considered a reliable tool and has been validated and accepted into routine medical practice (Sumner, 1989; Carter, 1969; Yao, 1970). Sumner (1989), Carter (1969) and also Yao (1970) after reviewing data obtained following multiple testing of 'normal' patients and patients with arterial disease concluded that a 'normal' ABPI was 1.10 when a well-rested subject is lying supine and that an ABPI of less than 1.00 is highly suggestive of arterial obstruction. Sumner (1989) also stated that only rarely does a normal limb have an index of less than 0.92 but, as with all biological data, no exact cut-off can be identified.

The hand-held Doppler has been available for more

than 30 years and has been widely adopted as standard equipment by medical specialists for the past 25. However, nurses have been slow to embrace this 'new' technology (Vowden and Vowden, 2001). French (2005) conducted a survey within her hospital's primary care trust (PCT) as a part of her university master's programme. The aim of this study was to investigate issues that produced variations in community nurse use of Doppler ultrasound. Training programmes and guidelines were also scrutinised within this study. Fifteen community health centres across the West Midlands PCT were approached with 92% response forming a 50 nurse's sample. One of the key points from this particular study was that the training in the use of Doppler ultrasound was learnt from various sources resulting in variations in practice.

French (2005) concludes that in order for Doppler assessment to be carried out to the necessary levels of consistency and accuracy and for results to be interpreted as part of a holistic assessment, it may be necessary to limit the number of practitioners conducting the assessments.

The TASC II document (Norgren et al, 2007) has been developed by The Trans-Atlantic Inter-Society and provides reference guidelines for diagnosing PAD. This document indicates that ABPI is an agreed protocol for an early detection of PAD and is based on Doppler ultrasound test. Although validated and recognised through decades of research, Doppler ultrasound is being reluctantly accepted as an assessment method by trained nurses in the community (Vowden and Vowden, 2001)

Problems identified by practitioners

Inconsistencies within nursing training are among the greatest problems identified by practitioners running a risk of invalidating the whole diagnostic pathway as a process (Vowden and Vowden, 2001)

Variation in practice but also a lack of maintaining competency among nurses leads to Doppler ultrasound tests either being done incorrectly or not done at all (French, 2005). A survey conducted within West Midlands PCT (French, 2005) resulted in the recommendation to limit the number of professionals performing the Doppler ultrasound tests as part of the holistic assessment. Nurses who took part in this survey were mainly assessing patients with venous leg ulcers (VLU). If theory indicates that ABPI is to be tested in conjunction with VLU but the practice clearly shows that is not done properly, then what are the chances of having an ABPI test done on someone who has no symptoms at all? How reliable would be the Doppler ultrasound ABPI result performed by a randomly selected nurse in the community?

Evidence shows that early detection of PAD is critical to limit the risk of complications to the patient (Hirsch et al, 2001). Detecting early means before any symptoms of PAD are recognised. If a significant number of people are being diagnosed with PAD every year in the UK, limiting the number of professionals prepared to conduct the ABPI test will not help in detecting patients with early stages of

PAD. It will do the opposite; Doppler ultrasound testing would still be regarded as a complimentary holistic nursing assessment, but not as a screening test. Limited numbers of trained staff would mean scarce resources for patients. Screening tests, on the other hand, must be available and in abundance to effectively fulfil its defined role. The two just contradict each other. If health care services across the country are to increase PAD detection rates then more ABPI tests must become available to patients.

Discussion of Dopplex Ability

An automatic ABPI device (Dopplex Ability, Huntleigh) is now available, which is capable of calculating ABPIs easily and accurately in 3 minutes without the need to rest the patient. Results are automatically calculated, interpreted and displayed with pulse volume waveforms on the LCD panel (Huntleigh, 2011). A randomised crossover study (Lewis et al, 2011) has been conducted to determine the accuracy and agreement between conventional Doppler-based ABPI measurements and Dopplex Ability.

A randomised cross-over study design was chosen as three methods of blood pressure assessment were carried out on the same person. The three assessments were the Dopplex Ability unrested (timed), the Dopplex Ability rested and the Doppler rested (timed). Total sample size n=200 (100 subjects randomly assigned to each sequence). Initial results of 295 limbs show good correlation between unrested Dopplex Ability and Doppler and rested Dopplex Ability and Doppler. The Ability measurement takes significantly less time than a full Doppler ultrasound test.

The need to rest the patient is eliminated by the simultaneous cuff inflation and its simplicity allows it to be operated by a healthcare support worker. The result from such a test, however, would still have to be analysed by a trained member of the clinical team. This gives the Dopplex Ability unit the potential to be used as a cost effective screening tool for PAD in primary care settings. (Lewis et al, 2011)

Implications for practice

Despite decades of research in developing guidelines for early PAD detection many thousands of patients lose their lives as a result of cardiovascular complications (Belch et al, 2007, Tierney et al, 2000). Either through lack of training or staffing problems, essential ABPI tests aiming to identify patients with PAD are not being carried out (French, 2005). A Doppler ultrasound test can be unreliable if done by an untrained professional (French, 2005). Training itself, however, is provided from various sources and does not warrant consistent results. The Royal College of Nursing (RCN) published a document entitled *Guidance on safe nursing staffing levels in the UK* (Ball, 2010). It discusses predictions and plans to effectively and safely manage future nurse demands across the country. This document indicates plans to shift care away from hospitals and increase community based services, many of which are nurse led. But there is little evidence of this policy in reality, in terms

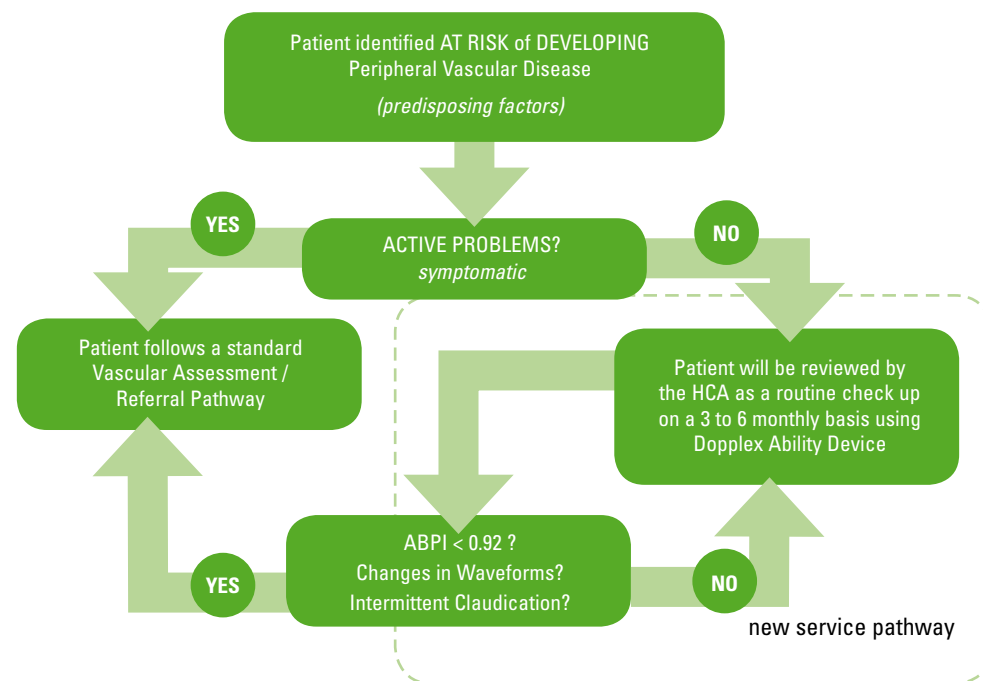


Figure 1: New proposed service pathway based on the validity of the New Huntleigh Dopplex Ability Device

of the size of workforce deployed or trained within the community. Added to this, across the UK, 27% of NHS community nurses are over 50 and will retire within the next 10 years (Ball et al, 2009). With the increase in volume of essential health services delegated from hospitals to the community and with decreasing number of nurses the non-essential screening services will come second on the priority list.

Proactive community services

On the other hand this could be an opportunity for community services to become more proactive than ever. The creation of a PAD screening service run by a nurse leader with a group of trained healthcare assistants (HCAs) could provide a solution (Nazarko, 2008). A reduction in numbers of competent trained nurses who are prepared to do a full Doppler ultrasound ABPI test would not affect the number of trained HCAs able to perform ABPI test with the use of Huntleigh Dopplex Ability device. It has been demonstrated (Lewis et al, 2011) that the ABPI can be a simple and reliable test which can be carried out by a trained HCA. The HCA would be in a position to "only" conduct the test. There is a competency and a skill to be gained, which can be done, as proven at Wound Healing Centres, Eastbourne. A competency programme of training through experience is aiming to empower people to be able to perform fairly simple repetitive test procedures. Being able to delegate this procedure to an HCA would mean more quality time available for analysing and targeting only those patient who are showing symptoms or

have their ABPI of less than 0.92.

The Dopplex Ability device is very simple to use with minimal training required (Huntleigh, 2011) and the ABPI test outcomes are consistent and reliable (Lewis et al, 2011). The testing device produces a printout, which can be passed on to the trained nurse who would make the clinical judgment on further action. The pathway for the new screening service is shown in *Figure 1*. Patients from the risk group would be seen by the HCA on a regular basis and would undergo the ABPI tests. If they had no PAD symptoms and ABPI test results were within normal range then they would continue to attend the assessment appointments on a scheduled basis. Test results would be passed onto the trained nurse for the record as well as for decision making process.

If the ABPI test result indicated any signs of early PAD the patient would then be scheduled for a full Doppler ultrasound ABPI testing order to investigate this further. This screening service model meets the criteria from both sides. The TASC II document (Norgren et al, 2007) which puts the ABPI test as a procedure of choice in early PAD detection and on the other hand withstands the low staffing challenge as nurses would not be directly involved in the majority of tests. As the role of the HCA has grown considerably in recent years there has been growing support for introducing more formal regulation to the role of Support Workers within the health care teams (Griffiths et al, 2010). The RCN (2012) in the document *Position statement on the education and training of health care assistants (HCAs)* provides the guidance on best practice in

relation to the training and education of HCAs in the UK working at levels 2–3 of the Public Health Skills and Career Framework (Rao, 2008).

Conclusion

This article sets a number of standards and forms a foundation for further policy development for commissioners, education providers and employers. One of the key points indicates the need to promote individual development through supervised training and appropriately delegated work.

By delegating the ABPI tests to HCAs following the training it would add to their skills portfolio (Nazarko, 2008). More training and education for HCAs would also provide a communication link and raise more awareness of PAD and its prevention across the healthcare team. In time HCAs would develop more skills and could provide an essential link between patients and trained professionals increasing the effectiveness of the whole screening system. This would mean more value added to the HCA position, more effective use of nursing skills and ultimately earlier and easier access to healthcare services for patients. **BJCN**

Acknowledgement: This article was completed as part of the Tissue Viability course at Cardiff University.

- Ball J, Pike G (2009) Past imperfect, future tense: nurses' employment and morale in 2009. Royal College of Nursing, London
- Ball J (2010) Guidance on safe nursing staffing levels in the UK. Policy Unit:10. Royal College of Nursing, London
- Belch J, Stansby G, Shearman C et al (2007) Peripheral arterial disease — a cardiovascular time bomb. *The British Journal of Diabetes and Vascular Disease* 7:236–9
- Bick C (2003) Intermittent claudication. *Nurs Stand* 17(42):45–52
- Carter SA (1969) Clinical measurement of systolic pressures in limbs with arterial occlusive disease. *JAMA* 207(10):1869–74
- Cassar K (2006) Intermittent Claudication Clinical Review. *BMJ* 333(11):1002–1005
- Diehm C, Kareem S, Lawall H (2004) Epidemiology of peripheral arterial disease. *Vasa* 33:183–9
- Fowkes FG, Housley E, Cawood EHH, et al (1991) Edinburgh artery study: prevalence of asymptomatic and symptomatic peripheral arterial disease in the general population. *Int J Epidemiol* 20(2):384–92
- French L (2005) Community nurse use of Doppler ultrasound in leg ulcer assessment *Br J Community Nurs* 10(9):S6, S8, S10
- Garcia LA (2006) Epidemiology and pathophysiology of peripheral arterial disease. *J Endovasc Ther* 13(suppl 2):II3–9.
- Griffiths P, Robinson S (2010), Moving forward with healthcare support workforce regulation a scoping review: evidence questions risk and options, Kings College London
- Hamilton WF, Woodbury RA, Harper HT (1936) Physiologic relationships between intrathoracic, intraspinal and arterial pressures. *Am Med Ass* 107:(11)853–856
- Hiatt WR, Hoag S, Hamman RF (1995) Effect of diagnostic criteria on the prevalence of peripheral arterial disease: the San Luis Valley diabetes study. *Circulation* 91(5):1472–9
- Hirsch A, Criqui M, Regensteiner J (2001) Peripheral arterial disease detection, awareness and treatment in primary care. *JAMA* 286(11):1317–1324
- Hocken AG (1967) Measurement of blood-pressure in the leg. *Lancet* 1(7488) 66–468
- Huntleigh (2001) <http://www.huntleigh-diagnostics.com/diagnostics/admin/files/20110617114402.pdf> (accessed 4 April 2013)
- Lewis J, Hawkins M, Barree P et al (2011) A comparison between Doppler Ability and the Doppler method for obtaining ankle brachial pressures. Cardiff and Vale University Health Board:1–4
- Marquis P (1998) Evaluation of the impact of peripheral obliterative arteriopathy on quality of life. *Drugs* 56(suppl 3):25–35

Despite decades of research in developing guidelines for early PAD detection, thousands of patients lose their lives as a result of cardiovascular complication. Essential ABPI tests aiming to identify patients with PAD are not being carried out

- Muluk SC, Muluk VS, Kelley ME et al (2001) Outcome events in patients with claudication: a 15-year study in 2777 patients. *J Vasc Surg* 33:251–7
- Murabito JM, D'Agostino RB, Silbershatz H, Wilson WF (1997) Intermittent claudication: a risk profile from the Framingham heart study. *Circulation* 96:44–9.
- Nazarko L (2008) The role of the care assistant in promoting wound healing. *Nursing and Residential Care* 10(3):113–117
- Norgren L, Hiatt WR, Dormandy JA et al (2007). TASC II Document. Inter Society Consensus for the Management of Peripheral Arterial Disease. *J Vasc Surg* 45(Suppl):S5–S6
- Rao M (2008) Public Health Skills and Career Framework Multidisciplinary/ multi-agency/multi-professional. Public Health Resource Unit, Skills For Health:9–77
- Royal College of Nursing (2012) http://www.rcn.org.uk/_data/assets/pdf_file/0005/441059/Position_statement_-_HCAs_Final_2.pdf (accessed 4 April 2013)
- Sumner DS (1989) Non-invasive assessment of peripheral arterial occlusive disease. In: Rutherford KS (ed.). *Vascular Surgery*. WB Saunders, Philadelphia
- Houghton Mifflin Company (2007) *The American Heritage Medical Dictionary*
- Tierney S, Fennessy F, Hayes DB. (2000) ABC of arterial and vascular disease. Secondary prevention of peripheral vascular disease. *BMJ* 320:1262–5
- Vowden K, Vowden P (2001) Doppler and the ABPI: how good is our understanding? *J Wound Care* 10(6):197–202
- Winsor T (1950) Influence of arterial disease on the systolic pressure gradients of the extremities. *Am J Med Sci* 220:117.
- Yao ST, Hobbs JT, Irvine WT (1968) Pulse examination by an ultrasonic method. *BMJ* 4(630):555–7
- Yao ST (1970) Haemodynamic studies in peripheral arterial disease. *Br J Surg* 57(10):761–6

LEARNING POINTS

- ◆ Peripheral arterial disease (PAD) is classified according to the severity of clinical symptoms.
- ◆ Usage of ABPI in clinical practice has a long history and serves as an important diagnostic tool in detecting PAD.
- ◆ Newly developed diagnostic device Huntleigh Dopplex Ability opens up a new chapter in the ABPI testing relating to patients “at risk” of developing PAD.
- ◆ New diagnostic pathway for PAD patients can be implemented based on practical findings from an RCT study (Huntleigh, 2011).
- ◆ New screening service pathway may mean that there will be a need to redefine HCAs' roles within the healthcare teams.