

## PRACTICE

## GUIDELINES

## Diagnosis and management of lower limb peripheral arterial disease: summary of NICE guidance

Jennifer Layden *senior project manager*<sup>1</sup>, Jonathan Michaels *professor of clinical decision science*<sup>2</sup>, Sarah Bermingham *senior health economist*<sup>1</sup>, Bernard Higgins *clinical director*<sup>1</sup>, on behalf of the Guideline Development Group

<sup>1</sup>National Clinical Guideline Centre, Royal College of Physicians, London NW1 4LE, UK; <sup>2</sup>University of Sheffield, Sheffield S10 2TN, UK

This is one of a series of *BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists.

Lower limb peripheral arterial disease (referred to as peripheral arterial disease in this summary) is common, affecting 3% to 7% of people in the general population and 20% of people over the age of 75.<sup>1</sup> It is associated with an increased risk of cardiovascular morbidity and mortality and severely limits people's functional capacity and quality of life. Peripheral arterial disease is often asymptomatic, but when it is symptomatic the most common presentation is intermittent claudication (pain in the legs, buttocks, or thighs brought on by walking and relieved by rest). Critical limb ischaemia is characterised by severely diminished circulation, ischaemic pain, ulceration, tissue loss, and/or gangrene. Owing to rapid changes in diagnostic methods, endovascular treatments, and vascular services, there is considerable uncertainty about the management of people with peripheral arterial disease, with management varying greatly across England and Wales.<sup>2</sup> This article summarises some of the most recent recommendations from the National Institute for Health and Clinical Excellence (NICE) on the management of peripheral arterial disease.<sup>3</sup>

### Recommendations

NICE recommendations are based on systematic reviews of the best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations are based on the Guideline Development Group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in *italic* in square brackets.

### Secondary prevention of cardiovascular disease in people with peripheral arterial disease

- Offer all people with peripheral arterial disease information, advice, support, and treatment with respect to the secondary prevention of cardiovascular disease, in line with published NICE guidance on smoking cessation<sup>4-7</sup>; diet, weight management, and exercise<sup>8-11</sup>; lipid modification and statin therapy<sup>12-14</sup>; the prevention, diagnosis, and management of diabetes<sup>15-19</sup>; the prevention, diagnosis, and management of high blood pressure<sup>20</sup>; and antiplatelet therapy.<sup>21</sup> [*Based on the experience and opinion of the Guideline Development Group (GDG)*]

### Diagnosis

- Assess people for the presence of peripheral arterial disease if they:
  - Have symptoms suggesting peripheral arterial disease (for example, leg pain brought on by exertion, rest pain, tissue loss, and/or foot ulcers)
  - Have diabetes, non-healing wounds, or unexplained leg pain
  - Are being considered for interventions to the leg or foot
  - Need compression hosiery.

[*Based on the experience and opinion of the GDG*]

- Assess people with suspected peripheral arterial disease by:
  - Asking about the presence and severity of possible symptoms of intermittent claudication and critical limb ischaemia (for example, about the nature and location of leg pain, how far the patient can walk, and the presence of nocturnal rest pain)

-Examining the legs and feet for evidence of critical limb ischaemia (for example, ulceration)

-Examining the femoral, popliteal, and foot pulses

-Measuring the ankle brachial pressure index (see recommendation below).

[Based on the experience and opinion of the GDG]

- Measure the ankle brachial pressure index in the following way:
  - The person should be resting and supine if possible.
  - Record systolic blood pressure with an appropriately sized cuff in both arms and in the posterior tibial, dorsalis pedis, and, where possible, peroneal arteries.
  - Take measurements manually using a Doppler probe of suitable frequency in preference to an automated system.
  - Document the nature of the Doppler ultrasound signals in the foot arteries.
  - Calculate the index in each leg by dividing the highest ankle pressure by the highest arm pressure.

[Based on experience and opinion of the GDG]

## Imaging

- Offer duplex ultrasonography as first line imaging to all people for whom revascularisation is being considered.
- Offer contrast enhanced magnetic resonance angiography to people who need further imaging (after duplex ultrasonography) before considering revascularisation. If contrast enhanced magnetic resonance angiography is contraindicated or not tolerated, offer computed tomography angiography instead.

[Both points are based on low to moderate quality evidence from diagnostic studies]

## Management of intermittent claudication

- Offer a supervised exercise programme to all people with intermittent claudication. [Based on very low to moderate quality evidence from randomised controlled trials and on an original health economic model with minor limitations and direct applicability]
- Consider providing a supervised exercise programme that involves two hours of supervised exercise a week for a three month period and encourages exercise to the point of maximal pain. [Based on experience and opinion of the GDG]
- Offer angioplasty to treat intermittent claudication only when:
  - Advice on the benefits of modifying risk factors has been reinforced and
  - A supervised exercise programme has not led to a satisfactory improvement in symptoms and
  - Imaging has confirmed that angioplasty is suitable for the person.

[Based on very low to moderate quality evidence from randomised controlled trials and on an original health economic model with minor limitations and direct applicability]

- Offer bypass surgery to treat severe, lifestyle limiting intermittent claudication only when angioplasty has been unsuccessful or is unsuitable, and when imaging has confirmed that bypass surgery is appropriate for the person. [Based on very low to moderate quality evidence from

*randomised controlled trials and on an original health economic model with minor limitations and direct applicability]*

- Consider naftidrofuryl oxalate for treating people with intermittent claudication, starting on the least costly preparation, only when supervised exercise has not led to a satisfactory improvement and the person prefers not to be referred for angioplasty or bypass surgery. Review progress after three to six months and discontinue naftidrofuryl oxalate if there has been no symptomatic benefit. [Based on experience and opinion of GDG]

## Management of critical limb ischaemia

- Ensure that all people with critical limb ischaemia are assessed by a vascular multidisciplinary team before treatment decisions are made. [Based on the experience and opinion of the GDG]
- Offer angioplasty or bypass surgery to people with critical limb ischaemia who require revascularisation, taking into account factors such as comorbidities, pattern of disease, availability of a vein, and patient preference. [Based on very low to moderate quality evidence from randomised controlled trials and published cost effectiveness evidence with potentially serious limitations and direct applicability]
- Do not offer major amputation to people with critical limb ischaemia unless all options for revascularisation have been considered by a vascular multidisciplinary team. [Based on the experience and opinion of the GDG and on published cost effectiveness evidence with potentially serious limitations and direct applicability]

## Overcoming barriers

A major problem in current practice is the failure to recognise the cardiovascular risk associated with a diagnosis of peripheral arterial disease and the importance of managing this risk through exercise, a healthy diet, smoking cessation, and management of diabetes, hypertension, and other related cardiovascular disease. The Guideline Development Group considered that the modification of risk factors for cardiovascular disease was a key priority for implementation as it was concerned that, although peripheral arterial disease is known to be a significant risk factor for cardiovascular morbidity and mortality, it may not be as widely recognised or as actively managed as other known risk factors. The guideline recommendation to offer supervised exercise programmes to all people with intermittent claudication is likely to lead to a major change to practice, but the availability and use of such programmes is variable and largely occurs within a secondary care setting.<sup>3</sup> Ideally, such programmes should be community based and easily accessible to patients. The set-up costs of new exercise programmes may be a barrier to implementation, but providers should note that the guideline recommendation of supervised exercise is backed by a detailed analysis showing this to be cost effective. Services could make use of or modify existing exercise programmes for cardiac or respiratory rehabilitation.

The members of the Guideline Development Group were Jonathan Michaels (chair), Barry Attwood, Andrew Beech, Andrew Bradbury, Duncan Ettles, Martin Fox, Michael Flynn, Ammy Lam, Peter Maufe, Ricky Mullis, Anita Sharma, Cliff Shearman, Hazel Trender, Raman Uberoi, Manohar Sharma (co-opted member). The technical team at the National Clinical Guideline Centre comprised Sarah Bermingham,

## Further information on the guidance

### Methods

The Guideline Development Group (GDG) followed the standard NICE methods in the development of this guideline ([www.nice.org.uk/about/nice/howwework/developingniceclinicalguidelines/developing\\_nice\\_clinical\\_guidelines.jsp](http://www.nice.org.uk/about/nice/howwework/developingniceclinicalguidelines/developing_nice_clinical_guidelines.jsp)).<sup>22,23</sup> The group developed clinical questions; collected and appraised clinical evidence; and evaluated the cost effectiveness of proposed interventions through literature review and original economic modelling. The draft guideline went through a rigorous reviewing process, in which stakeholder organisations were invited to comment; the group took all comments into consideration when producing the final version of the guideline. Quality ratings of the evidence were based on GRADE (Grading of Recommendations Assessment, Development and Evaluation) methodology ([www.gradeworkinggroup.org](http://www.gradeworkinggroup.org)). These relate to the quality of the available evidence for assessed outcomes rather than the quality of the clinical study.

The GDG comprised three vascular surgeons (including the chairperson), two patient members, two interventional radiologists, a vascular scientist, a podiatrist, a general medicine physician, a pharmacist, a physiotherapist, a nurse, a general practitioner, and a pain consultant.

### Future research

The GDG identified the following areas as priorities for research:

- What is the clinical and cost effectiveness of supervised exercise programmes compared with unsupervised exercise to treat people with intermittent claudication, taking into account the effects on long term outcomes and continuing levels of exercise?
- What is the effect of people's attitudes and beliefs about their peripheral arterial disease on the management and outcome of their condition?
- What is the clinical and cost effectiveness of a "bypass surgery first" strategy compared with an "angioplasty first" strategy to treat critical limb ischaemia caused by disease of the infrageniculate (below the knee) arteries?
- What is the clinical and cost effectiveness of selective stent placement compared with angioplasty plus primary stent placement to treat critical limb ischaemia caused by disease in the infrageniculate arteries?
- What is the clinical and cost effectiveness of chemical sympathectomy in comparison with other methods of pain control for managing critical limb ischaemic pain?

Jill Cobb, Bernard Higgins, Kate Kelley, Taryn Krause, Jennifer Layden, Jill Parnham, Laura Sawyer, Katrina Sparrow.

Contributors: JL wrote the first draft, and all authors were involved in writing further drafts and reviewed and approved the final version for publication. JM is the guarantor.

Competing interests: All authors have completed the ICMJE uniform disclosure form at [http://www.icmje.org/coi\\_disclosure.pdf](http://www.icmje.org/coi_disclosure.pdf) (available on request from the corresponding author) and declare: all authors were funded by NICE for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Provenance and peer review: Commissioned; not externally peer reviewed.

- 1 Leng GC, Lee A, Fowkes FG, Whiteman M, Dunbar J, Housley E, et al. Incidence, natural history and cardiovascular events in symptomatic and asymptomatic peripheral arterial disease in the general population. *Int J Epidemiol* 1996;25:1172-81.
- 2 Vascular Society of Great Britain and Ireland. The provision of services for patients with vascular disease. 2012. [www.vascularsociety.org.uk/library/vascular-society-publications.html](http://www.vascularsociety.org.uk/library/vascular-society-publications.html).
- 3 National Institute for Health and Clinical Excellence. Lower limb peripheral arterial disease: diagnosis and management. (Clinical guideline 147.) 2012. <http://guidance.nice.org.uk/CG147>.
- 4 National Institute for Health and Clinical Excellence. Smoking cessation services in primary care, pharmacies, local authorities and workplaces, particularly for manual working groups, pregnant women and hard to reach communities. (Public health guidance PH10.) 2008. <http://guidance.nice.org.uk/PH10>.
- 5 National Institute for Health and Clinical Excellence. Brief interventions and referral for smoking cessation in primary care and other settings. (Public health guidance PH1.) 2006. <http://guidance.nice.org.uk/PH1>.
- 6 National Institute for Health and Clinical Excellence. Varenicline for smoking cessation. (Technology appraisal 123.) 2007. <http://guidance.nice.org.uk/TA123>.
- 7 National Institute for Health and Clinical Excellence. Guidance on preventing the uptake of smoking by children and young people. (Public health guidance PH14.) 2008. <http://guidance.nice.org.uk/PH14>.
- 8 National Institute for Health and Clinical Excellence. Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children. (Clinical guideline 43.) 2006. <http://guidance.nice.org.uk/CG43>.
- 9 National Institute for Health and Clinical Excellence. Four commonly used methods to increase physical activity: brief interventions in primary care, exercise referral schemes,

pedometers and community-based exercise programmes for walking and cycling. (Public health guidance PH2.) 2006. <http://guidance.nice.org.uk/PH2>.

- 10 National Institute for Health and Clinical Excellence. Intervention guidance on workplace health promotion with reference to physical activity. (Public health guidance PH13.) 2008. <http://guidance.nice.org.uk/PH13>.
- 11 National Institute for Health and Clinical Excellence. Guidance on the promotion and creation of physical environments that support increased levels of physical activity. (Public health guidance PH8.) 2008. <http://guidance.nice.org.uk/PH8>.
- 12 National Institute for Health and Clinical Excellence. Cardiovascular risk assessment and the modification of blood lipids for the primary and secondary prevention of cardiovascular disease. (Clinical guideline 67.) 2008. <http://guidance.nice.org.uk/CG67>.
- 13 National Institute for Health and Clinical Excellence. Statins for the prevention of cardiovascular events in patients at increased risk of developing cardiovascular disease or those with established cardiovascular disease. (Technology appraisal 94.) 2006. <http://guidance.nice.org.uk/TA94>.
- 14 National Institute for Health and Clinical Excellence. Ezetimibe for the treatment of primary (heterozygous-familial and non-familial) hypercholesterolaemia. (Technology appraisal 132.) 2007. <http://guidance.nice.org.uk/TA132>.
- 15 National Institute for Health and Clinical Excellence. The clinical effectiveness and cost effectiveness of patient education models for diabetes. (Technology appraisal 60.) 2003. <http://guidance.nice.org.uk/TA60>.
- 16 National Institute for Health and Clinical Excellence. Diagnosis and management of type 1 diabetes in children, young people and adults. (Clinical guideline 15.) 2004. <http://guidance.nice.org.uk/CG15>.
- 17 National Institute for Health and Clinical Excellence. Type 2 diabetes: the management of type 2 diabetes (update). (Clinical guideline 66.) 2008. <http://guidance.nice.org.uk/CG66>.
- 18 National Institute for Health and Clinical Excellence. Diabetic foot—inpatient management of people with diabetic foot ulcers and infection. (Clinical guideline 119.) 2011. <http://guidance.nice.org.uk/CG119>.
- 19 National Institute for Health and Clinical Excellence. Preventing type 2 diabetes: population and community-level interventions in high-risk groups and the general population. (Public health guidance PH35.) 2011. <http://guidance.nice.org.uk/PH35>.
- 20 National Institute for Health and Clinical Excellence. Hypertension: clinical management of primary hypertension in adults. (Clinical guideline 127.) 2011. <http://guidance.nice.org.uk/CG127>.
- 21 National Institute for Health and Clinical Excellence. Clopidogrel and modified-release dipyridamole for the prevention of occlusive vascular events (review of technology appraisal guidance 90). (Technology appraisal 210.) 2010. <http://guidance.nice.org.uk/TA210>.
- 22 National Institute for Health and Clinical Excellence. Guidelines manual. 2009. [www.nice.org.uk/guidelinesmanual](http://www.nice.org.uk/guidelinesmanual).
- 23 National Institute for Health and Clinical Excellence. Social value judgements: principles for the development of NICE guidance. 2008. [www.nice.org.uk/about/nice/howwework/socialvaluejudgements/socialvaluejudgements.jsp](http://www.nice.org.uk/about/nice/howwework/socialvaluejudgements/socialvaluejudgements.jsp).

Cite this as: *BMJ* 2012;345:e4947

© BMJ Publishing Group Ltd 2012