Doppler ultrasound is undertaken as part of holistic assessment for patients with leg ulcers. The Doppler is used to detect arterial blood flow in the macro-circulation of the lower limbs (Doppler et al, 1843) and give the ankle-brachial pressure index (ABPI), indicating the degree of ischaemia (Vowden and Vowden, 2001). This helps to determine if the ulcer has developed due to venous, arterial or mixed venous-arterial disease.

In the UK, 70% of ulcers occur as a result of venous disease (French, 2005), 10% from arterial disease, 10–15% due to both arterial and venous disease, and 2–5% from more unusual causes (Radley and Shaw, 2008).

Leg ulceration caused by venous disease requires graduated compression (Wounds UK, 2002; Anderson, 2008) to aid venous return, disperse oedema and optimise oxygen levels to surrounding tissue, promoting ulcer healing (Royal College of Nursing [RCN], 2006). Once healed, compression hosiery is required to help prevent ulcer recurrence (Vandongen and Stacey, 2000).

Arterial ulceration usually results from peripheral arterial disease (PAD), which is a progressive disease (Baker et al, 2005). Vascular intervention may be necessary to increase peripheral perfusion and promote healing of ulcers, although there is a risk of re-occlusion (Ovcharenko et al, 2009; Morris-Stiff et al, 2011).

The following survey was undertaken to find out how often patients wearing compression hosiery for venous disease had their ABPI recorded.

It also aimed to gain an understanding of what clinical nurse specialists (CNSs) thought to be the desired frequency of follow-ups, and whether they perceive there to be a more ‘at-risk’ group with greater needs.

**FREQUENCY OF ABPI ASSESSMENT**

Monitoring ABPI is essential, especially in those wearing compression hosiery, as it can change over time (Simon et al, 1994), particularly in the presence of PAD. Monitoring should take place every three months for those in compression hosiery with an ABPI of \(<0.9\), with diabetes, with reduced mobility or symptoms of claudication, and annually for those in compression hosiery without complications (Wounds UK, 2002; RCN, 2006).

However, in the author’s experience, use of the term ‘without complications’ lacks sufficient clarity and, therefore, may confound good nursing practice.

**AIM**

The research question was: ‘How often should patients in compression hosiery have their ABPI recorded?’

The author aimed to answer this question by understanding what constitutes current practice in monitoring ABPI in patients with venous disease once compression hosiery has been prescribed, with particular reference to frequency. She also sought expert CNS opinion on whether any group was more at-risk of PAD (Long, 1996).

**METHODOLOGY**

Data was collected throughout 2006/2007 using postal questionnaires, which were sent out to CNSs responsible for leg ulcer services. Nine closed and open-ended
questions were developed from the literature on vascular assessment.

A small pilot study of the questionnaire was carried out before the survey to refine the data collection methodology and to ensure clarity and readability. Three nurses from the local trust, who were experienced in leg ulcer care, were included and questions adjusted according to their responses (Pollitt and Hungler, 1999; Burns and Grove, 2003).

Findings from the pilot study indicated that the questionnaire was clear, short, had appropriate spaces for answers, and only took a few minutes to fill in. All these factors are a positive influence in securing a good response rate to a postal questionnaire (Oppenheim, 1992; Robson, 2000).

Inclusion and exclusion criteria
All senior leg ulcer/tissue viability nurse specialists from primary care trusts (PCTs) in England were invited to participate in the study. Those who had been involved in the pilot were excluded from the final study.

Ethical approval and confidentiality
Ethical approval was obtained from the City University Ethics Committee and Consent forms were signed by all participants and returned to the researchers. Confidentiality was assured in that no information obtained would be linked to any specific CNS or workplace (Data Protection Act, 1998 [amended 2003]).

STUDY SAMPLE
A systematic sample was obtained by targeting 302 identified PCTs in England (http://www.nhs.uk/England), as leg ulcer services mainly take place in the community (Anderson, 2006). Reliability was considered by establishing current practice, which may not have been synonymous with guidelines (Burns and Grove, 2003).

In 2006, the questionnaire was sent to all tissue viability, vascular, and leg ulcer specialist nurses in England whose names were obtained from the Infection Control and Wound Care Yearbook 2005, which is updated on an annual basis and so is a fairly comprehensive list. The names were also cross-referenced to ensure that all PCTs were covered.

The questionnaire was accompanied by a letter requesting that it should be forwarded to the appropriate person if they were not responsible for leg ulcer services. Seventy-three (46.1% of the total distributed) completed questionnaires were identified for analysis.

RESULTS
The survey set out to examine current clinical practice in England. Some CNSs had responsibility for up to eight PCTs and hospitals. Therefore, factual data is represented by the number of PCTs (n=148; 49%) and hospitals (n=15; 9.2%). Where individual opinion was sought, the data is represented by the number of respondents (n=73), as their opinion may not reflect current practice.

Nurses were given one month to respond, but any that had not responded within two weeks were sent a copy of the questionnaire as a reminder. The 73 respondents who were included covered a total of 163 PCTs and hospitals in England (148 PCTs and 15 hospitals).

Desired and actual frequency of follow-up
Ninety percent (n=70) agreed that obtaining an ABPI was necessary for patients wearing compression hosiery for venous disease.

Of these, 48% (n=35) would like to undertake ABPI follow-up every 3–6 months, 32% every 6–12 months, and 4% would never follow-up. In terms of actual (rather than desired) follow-up, 38% of patients were monitored 3–6-monthly. Only 9% of PCTs were assessing every three months. While this is less than RCN (2006) recommendations, it may be reflective of others (Wounds UK, 2002). However, 5% never recorded ABPI at follow-up.

High risk patients
The author asked the question: ‘Is there a group of patients wearing compression hosiery that you might consider are at a higher risk of developing a reduction in ABPI readings?’

Sixty-eight respondents (93%) agreed that there was an ‘at-risk group’ of patients who could potentially experience a reduction in their ABPI. These were identified as having one or more risk factors, such as diabetes, peripheral vascular or arterial disease, rheumatoid arthritis, advanced age, cardiac history and previous cerebral-vascular accident. Table 1 shows the frequency of follow-up for high-risk patients.

Fifty-three percent of PCTs see high-risk patients for three-monthly follow-up, in line with current guidelines (RCN, 2006; Wounds UK, 2002). A further 28% provide 3–6-monthly follow-up. However, it is a concern that in 1% of the PCTs, there was no follow-up at all.

DISCUSSION
The qualitative data from open-ended questions (for example, ‘Why do you think ABPI is necessary — please give examples of high risk groups?’) was analysed using Burnard’s (1991) framework for analysis. For purposes of discussion, qualitative and quantitative themes were divided into five sections:

1. ABPI monitoring and frequency in practice
2. Desired frequency of monitoring
3. Risk factors for high-risk groups
4. Frequency of ABPI recording in high-risk groups
5. Other discussion points:
   a) resource issues
   b) ABPI recording
   c) implications for practice.

1. ABPI monitoring — frequency in practice
Ninety-six percent of respondents agreed that obtaining ABPI was
necessary for patients who wear compression stockings for venous disease. This demonstrates that CNSs understand that ABPI is necessary. Some examples of the rationale given were:

*In case of deterioration in the arterial circulation.*

*To exclude arterial insufficiency since last assessment.*

*To detect arterial changes as part of ongoing holistic assessment.*

Patients were reviewed at intervals of 3–12 months by 73.5% of PCTs, which is in line with some guidance (Wounds UK, 2002), but not others (RCN, 2006), and in 5% of PCTs, ABPI was not reviewed or recorded at all in patients with healed venous leg ulcers wearing compression hosiery.

Three respondents thought that ABPI was not necessary for these patients, arguing that if ABPI was within normal limits on the first assessment, there was no further need for it to be performed routinely.

As there are no studies that report a reduction of normal ABPI with less than two arterial risk factors on first assessment, this group of patients may not require frequent monitoring, but annual as recommended (Wounds UK, 2002).

However, if patients are not regularly monitored, an enormous responsibility is placed on them to detect and report deterioration in their peripheral arterial status. Not all patients will be able to recognise deterioration of their arterial circulation due to poor cognitive ability and/or reduced mobility, and the latter’s condition may mask intermittent claudication (a symptom of PAD).

Thus, normal ABPI on first assessment should not be used in isolation as a basis for deciding on the frequency of follow-up ABPI monitoring.

The needs of each patient should be assessed individually and care tailored accordingly, in order to act in the best interest of the patient (NMC, 2007).

### 2. Desired frequency of monitoring

Three respondents (4%) saw no need to measure ABPI in patients in compression hosiery for venous incompetence. One volunteered the following comment to justify this:

> With observation, any deterioration can be detected and appropriate action taken to address this.

However, the respondent did not clarify who would be observing — the patient and/or the nurse. For the nurse to observe the patient, regular review would be necessary.

While there appeared to be a desire to follow-up more frequently; 52.1% (n=85) at 3–6 months and 25.77% (n=42) at 6–12 months, excluding the ‘no time-frame’ given, there was no difference between actual and desired frequency of follow-up.

### 3. Risk factors for high-risk groups

The most frequently listed at-risk group were patients with diabetes (83%). However, 17% of respondents did not mention this group as high risk. The author concluded that this may be due to a lack of knowledge, or that they did not consider this at the time of completing the form.

Two respondents acknowledged that ABPI may not be reliable in patients with diabetes, as they can have falsely elevated readings (Reiber et al, 1998; Vowden and Vowden, 2001).

According to one respondent, type-1 diabetes mellitus (insulin dependent) was a greater risk factor. Studies have found impaired hyperaemic response in patients with type-1 diabetes (Rayman et al, 1986; Shore et al, 1991), thus microvascular disease may be present in the absence of major arterial disease. Vowden and Vowden (2001) advocate the recording of toe pressures in patients with diabetes.

Moreover, other clinical indicators and a thorough physical and clinical history should be incorporated into assessment (Barkauskas, 2002).

### Table 1: Frequency of follow-up for high-risk patients

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Number of PCTs</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three months</td>
<td>87</td>
<td>53</td>
</tr>
<tr>
<td>3–6 months</td>
<td>45</td>
<td>28</td>
</tr>
<tr>
<td>6–12 months</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td>12+ months</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Never</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>No time-frame</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>167</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Almost half of the respondents (44%) stated that mixed venous and arterial disease and peripheral vascular disease were risk factors for ABPI deterioration. It is a concern that this represents less than half of the total respondents in view of the progressive nature of atherosclerosis. In the author’s clinical experience, these patients should be a priority for more frequent follow-up (Rose, 2000; Baker et al, 2005).

Nineteen percent of respondents listed the elderly/very old (suggested age range 70–85+ years) as high risk. However, patients should not be classified according to their age alone. Other factors, such as clinical indicators, impaired cognitive ability or psycho/social factors should be considered (Arevalo, 2001; Kumar and Clarke, 2001; Leedham, 2002).

Table 2 presents other risk factors identified by respondents.

Individual respondents identified each of the following as risk factors for ABPI reduction: anaemia, deep vein thrombosis (DVT), chronic obstructive pulmonary disease, venous ulcer and longstanding orthopaedic problems, but there is no clinical evidence to support these.

If CNSs use these as risk factors to suggest increased frequency of follow-up, this is a waste of resources, which may jeopardise the frequency of follow-up for patients with greater clinical risk.

Overall, CNSs identified many risk groups where there is a greater risk of developing a reduction in ABPI recordings, which is
Wound Care Today’s Product Pyramid

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Listings of all products available within each category +

Links to relevant websites +

Extended product entries, including:
  › Specifications, how to use, and performance indicators
  › Key clinical evidence to underpin product use in clinical practice

= Comprehensive product information to guide formulary decision-making

⇒ www.woundcare-today.com

http://woundcare-today.com/categories-pyramid
supported by evidence-based literature (Langford, 1997; Lamont, 1999; Kumar and Clark, 2001; Perry, 2001; Pankhurst, 2004). This study contributes to the strength of evidence-based knowledge and provides more clarity for the rationale for follow-up interval.

4. Frequency of ABPI recording in high risk groups

Ninety-three percent of respondents agreed that there was a high-risk group of patients who could potentially develop a reduction in their ABPI. However, it is of concern that 1% of PCTs do not record ABPI in this high-risk group. Three respondents representing four PCTs said that they did not think a high-risk group existed, and there appeared to be a lack of awareness of the effect of compression hosiery on ABPI (Pankhurst, 2004).

There is some disparity between follow-up intervals for patients with similar risk factors. One respondent said that patients with diabetes and the elderly were followed-up three-monthly for the first six months, then six-monthly, as were those not perceived to be at high-risk. Another respondent stated that patients with ischaemic heart disease, diabetes and small vessel disease were followed-up three-monthly, then six-monthly, or at least yearly. In light of the progressive nature of PAD, these patients would certainly need to be seen more frequently for review.

The remaining 3% of those who identified cardiac history and diabetes as risk factors would only follow-up if ulceration was present.

The rationale for deciding the follow-up interval was not clear. The time interval for follow-up varied between PCTs, resulting in variation in practice and fragmentation in care provision. This may be due to increasing work pressures, as lack of resources may restrict the time nurses have to reflect on their practice and, more specifically, a lack of definitive follow-up recommendations in the national guidelines.

4a. Resource issues

Three respondents (n=3) cited resource issues, such as lack of time, leg ulcer clinics, staff and guidelines as restricting influences on how frequently they could follow-up patients, despite clinical need. One respondent stated that due to the closure of a community leg ulcer clinic, frequency of follow-up was uncertain. Another said that as they did not have a healed leg ulcer clinic they rarely followed-up and then only in the case of active ulceration.

IMPLICATIONS FOR PRACTICE

As this survey shows, the fragmentation in provision of care and lack of consensus on risk factors highlights a need to develop national clinical guidelines, which provide guidance on follow-up care for patients wearing compression hosiery.

Rather than setting a blanket standard for follow-up assessments, clinical practice should be based on individual patient risk factors. This would provide evidence-based practice and help to manage limited resources and nurse-time more effectively, and, ultimately, act in patients’ best interests (NMC, 2007).

Based on the findings of this survey, a peripheral arterial risk score chart has been developed and will be evaluated following publication of this article.

LIMITATIONS

Sample size was the main limitation of this survey — although the total population (153) was targeted, the response rate was 59% (91 responses), of which 18 were excluded (Polit and Hungler, 1999; Burns and Grove, 2003).

In the question on peripheral arterial risk groups, the respondents were asked to make a list of risk factors. However, it would have been more interesting to ascertain respondents’ rationale as to why they thought these were risk factors, and also to ascertain why the non-arterial risk groups were seen as a potential risk.

Without this information, answers have to be taken at face value.

Table 2: Other risk factors reported

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immobility or limited mobility</td>
<td>7</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>8</td>
</tr>
<tr>
<td>Small vessel disease</td>
<td>3</td>
</tr>
<tr>
<td>Inflammatory conditions</td>
<td>3</td>
</tr>
<tr>
<td>Concurrent arterial/cardiac disease</td>
<td>small number</td>
</tr>
<tr>
<td>Smoking</td>
<td>15</td>
</tr>
</tbody>
</table>

Identifying a smaller random sample of CNSs and using the questionnaire for a semi-structured interview would have provided more insight and rationale for their answers.

RECOMMENDATIONS

Despite the limitations, there are recommendations to be taken from the results:

- Nurses need to reflect on the rationale for their practice and service provision
- Patients need to be categorised according to risk factors, with the follow-up interval being decided accordingly
- A peripheral arterial risk score chart as an assessment tool would enable safer practice and a more standardised approach to follow-up interval
- Toe pressures should be taken in patients with diabetes
- Healthy leg clinics should help to manage limited time and resources more effectively
- National guidelines should be developed with more direction for the care of healed venous leg ulceration requiring long-term compression hosiery, taking into account different levels of risk group
- Gain an insight into patients’ preferences for follow-up care, particularly when required to wear compression hosiery for venous incompetence
- A two-armed longitudinal comparative study needs to be undertaken in patients who need to wear compression hosiery, comparing the arterial status of the at-risk patients to patients with no symptoms of peripheral arterial disease over a 3–5-year period.
CONCLUSION
This survey aimed to seek expert opinion and explore how often ABPI should be performed.

Nurses in England record ABPI in patients in compression hosiery for venous disease at three, six and 12-monthly intervals, or only if a concern arises. The majority of CNSs identified potential high-risk patient groups, the majority of which have their ABPI monitored every three months.

However, there were inconsistencies in time interval for follow-up in patients with similar risk factors. Finally, resources were identified as an influencing factor when deciding the interval of follow-up.

The survey highlights a need for more direction from national guidelines.

REFERENCES
Leedham I (2002) Falling through the net: young people who are homeless and have mild learning disabilities or other additional special needs. Tizard Learning Disability Review 7(1): 19–30

KEY POINTS
- The survey was undertaken to find out how often patients wearing compression hosiery for venous disease had their ABPI recorded.
- A total of 154 questionnaires were sent with 91 responses.
- Rather than setting a blanket standard for follow-up assessments, clinical practice should be based on individual patient risk factors.
- A peripheral arterial risk score chart as an assessment tool would enable safer practice and a more standardised approach to follow-up interval.
- Nurses in England record ABPI in patients in compression hosiery for venous disease at three, six and 12-monthly intervals, or only if a concern arises.
- The majority of clinical nurse specialists (CNSs) identified potential high-risk patient groups, the majority of which have their ABPI monitored every three months.
- However, there were inconsistencies in time interval for follow-up in patients with similar risk factors.
- Resources were identified as an influencing factor when deciding the interval of follow-up.