National Diabetes Foot Care Audit
Third Annual Report
England and Wales
14 July 2014 to 31 March 2017
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Introduction: Summary

• The National Diabetes Foot Care Audit (NDFA) is a measurement system of care structures, patient management and the outcomes of care for people with active diabetic foot ulcers.

• The NDFA is part of the National Diabetes Audit (NDA) portfolio within the National Clinical Audit and Patient Outcomes Programme (NCAPPOP), commissioned by the Healthcare Quality Improvement Partnership (HQIP).

• Data on patient care can be submitted from any healthcare provider treating diabetic foot ulcers. Data on care structures can be submitted from any commissioner.

• Explicit consent to participate was given before any patient data was collected. From August 2017 participation in the audit is mandatory and patient consent is no longer required in England. Patients in Wales must still be consented.

• The audit collects data on patients and services in England and Wales. Collection started on 14 July 2014.
**Introduction: Why is diabetic foot care important?**

- In 2014-15 the annual cost of diabetic foot disease to the NHS in England was estimated at around £1 billion, in addition to the personal/social costs of reduced mobility and sickness absence.
- More than 64,000 people with diabetes in England and Wales are thought to have foot ulcers at any given time.
- Only around three in five people with diabetes who have had a diabetic foot ulcer survive for five years.
- Treatment for diabetic foot disease may involve amputation. There are around 7,000 leg, foot or toe amputations in people with diabetes in England each year.
- Lower limb amputation is carried out more than 20 times as often in people with diabetes than it is in people without diabetes.
- Only around half of people who have lost a leg because of diabetes survive for two years.

**Notes:** 1. Adapted from Kerr, M (2017). 2. Incidence methodology taken from Kerr, M (2017) and adapted to include the Welsh diabetic population (population figures taken from the 2016 Quality Outcome Framework).
Introduction: Why is this report important?

“People living with diabetes must be able to be confident that, locally, there are foot care services that they can rely on. It is important for services to work effectively to prevent diabetic foot disease. People with diabetes also need to know that the best treatment is available at all stages of diabetic foot disease to ensure the best possible outcomes.”

Corinne Wykes and Roy Johnson
Patient Representatives, NDFA

Findings and recommendations in this report support the audit questions:

1. Structures: Does treatment of active diabetic foot disease comply with national recommended guidelines?
2. Processes: Are the outcomes of diabetic foot disease optimised?
3. Outcomes: Are NICE recommended care structures in place for the management of diabetic foot disease?
Introduction: About this report

The NDFA has data on more than 22,000 episodes of diabetic foot ulceration in England and Wales – holding information on care structures, patient management and outcomes.

To produce the analysis for this report, NDFA patient data has been linked to:

- Core National Diabetes Audit (NDA) for demographic and primary care data;
- Hospital episode data to find amputation, revascularisation (restoration of blood circulation) and foot disease admissions.

Information is presented on:

- Care structures
- Ulcer severity
- Time to first expert assessment
- Mental health and learning disabilities
- Outcomes at 12 and 24 weeks
- Hospital admissions, including foot disease
- Hospital procedures (amputation/revascularisation)

Information is grouped by:

Main report: National (England and Wales)

Local reports:

- Sustainability and Transformation Plans (STP)
- Clinical Commissioning Groups (CCG)
- NHS Trust/Local Health Boards (LHB)
- Specialist foot care services
Key messages
Findings and Recommendations
Key messages: Care structures

Since the first survey in 2015, the NDFA has found that the basic framework for effective prevention and management of diabetic foot disease often seems to be missing.

**Are all 3 care structures confirmed?**

**No.** Less than half of participating commissioners confirmed that all three care structures were in place (47 per cent)

**Key recommendation**

Commissioners should work with local providers to ensure pathways meet NICE guidelines

**Are care structures associated with outcomes? - Yes**

<table>
<thead>
<tr>
<th>Referral for assessment pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>21% seen within 2 days (excl. self-referred)</td>
</tr>
<tr>
<td>43% severe ulcers</td>
</tr>
<tr>
<td>50% healed at 12wks (of ulcer/amputation)</td>
</tr>
</tbody>
</table>

| No                              |
| 16% seen within 2 days (excl. self-referred) |
| 48% severe ulcers               |
| 47% healed at 12wks (of ulcer/amputation) |

**Notes:** Please see Glossary ([Care structures](#)) for further information.
Key messages: Processes and outcomes

Since starting in 2014, the NDFA has firmly established the relationships between time to first expert assessment and ulcer severity, healing outcomes and hospital admissions.

Time to first expert assessment

Short ≤ 2 days
- 50% severe ulcer
- 48% healed at 12 wks
- 67% healed at 24 wks

Long > 2 months
- 56% severe ulcer
- 33% healed at 12 wks
- 54% healed at 24 wks

Key recommendation

Services should establish local pathways that **minimise the time taken to be seen** by a specialist foot care service.

Ulcer severity

Less severe
- 40% hospital admission
- 11% for foot disease
- 4% amputation
- 4% revascularisation
- 60% healed at 12 wks
- 74% healed at 24 wks

More severe
- 61% hospital admission
- 33% for foot disease
- 12% amputation
- 14% revascularisation
- 34% healed at 12 wks
- 56% healed at 24 wks

Notes: 1. revascularisation = restoration of blood circulation.
For people with diabetes

- If you experience loss of feeling (neuropathy), seek advice about how to prevent foot ulcers.
- If you have poor circulation (peripheral artery disease or ischaemia), seek advice about how to prevent foot ulcers.
- If you get a new foot ulcer, seek quick referral to a local specialist diabetes foot care service.

Resources at Diabetes UK will provide you with further information to help with managing your feet and who to contact if you have any of the above concerns.
**Key messages: Resources for people with diabetes**

**For people with diabetes:** The following resources will provide you with further information to help with managing your feet:

- The ‘Putting Feet First’ campaign: [https://www.diabetes.org.uk/get_involved/campaigning/putting-feet-first](https://www.diabetes.org.uk/get_involved/campaigning/putting-feet-first)
Key messages: Recommendations (2)

For healthcare professionals
Including podiatrists, diabetes specialist nurses, diabetes consultants and any healthcare professional that works with people with diabetes.

- Use the audit findings to encourage commissioners and service managers to ensure a NICE-recommended diabetes foot care service is in place.
- Create simple and rapid referral pathways.
- Participate in the NDFA to collaborate in this nationwide drive to improve the outcomes for diabetic foot disease.
Key messages: Recommendations (3)

For commissioners

- Ensure your local services have an easily accessible diabetes specialist foot care team. The South East SCN has prepared commissioning guidance and sample service specification which may help in developing these services¹.
- Ensure that your local diabetes specialist foot care services participate in the NDFA to help improve the disabling, lethal and costly consequences of diabetic foot disease.
- Appoint a diabetes foot disease lead to work with local providers, to review services and local care pathways and to ensure pathways meet NICE guidelines. Commissioners should use the NDFA findings for their local area as a key part of their gap analysis to understand overall NICE compliance and resource utilisation across their commissioning footprint.

Notes: 1. South East Coast Strategic Clinical Networks (2015)
NDFA Care Structures Survey

Results and Findings
NDFA Care Structures Survey: Overview

**Audit questions:** Are the following NICE-recommended care structures\(^1\) in place for the management of diabetic foot disease?

1. Training for routine diabetic foot examinations\(^2\)
2. An established Foot Protection Service pathway\(^3\)
3. An established Foot Disease pathway for new referrals – if needed – for an assessment within 24 hours\(^4\)

**Why is this important?**

The NICE guidance, supported by evidence from other studies, highlights the basic structures and pathways of care which are necessary to provide improved outcomes for people with diabetic foot ulcers.

Without this care infrastructure it is not possible to identify ulcer risk, minimise the onset of ulceration or treat diabetic foot disease efficiently and effectively.

**Key findings**

- Less than half of participating commissioners provide all three NICE-recommended care structures.
  47 per cent of full responders\(^5\)

- Pathways for rapid expert assessment are associated with shorter time to assessment and less severe ulcers.

- Pathways for rapid expert assessment are associated with better healing outcomes.

**Notes:** 1, 2, 3, 4, 5. Please refer to list of footnotes in the *footnote* section. Please see Glossary ([Care structures](#)) for further information.
NDFA Care Structures Survey: Participation

Methodology
To maximise the utility of the NDFA Care Structures Survey data, responses from the 2015, 2016 and 2017 surveys have been combined into one composite table, containing the commissioner’s latest response to each question.

With this methodology, data for 92 per cent of the commissioners active during the 2017 collection period is obtainable. 75 per cent of commissioners responded to the 2017 survey; 54 per cent answered the survey in 2016 and 60 per cent in 2015.

Commissioners are encouraged to submit to every NDFA Care Structures Survey, ensuring the survey data is as accurate and up-to-date as possible.

Composite responses (2015 to 2017)

- 207 Clinical Commissioning Groups (CCGs) in England and 7 Local Health Boards (LHBs) in Wales
- 191 CCGs and 6 LHBs responded to at least one NDFA Care Structures Survey in the last three years.
- 165 CCGs and 6 LHBs answered yes or no to all three questions
NDFA Care Structures Survey: Details (1)

Figure 1: Provision of care structures for the management of diabetic foot disease, Commissioners, England and Wales, 2017

<table>
<thead>
<tr>
<th>Service Pathway</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Uncertain (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training for routine diabetic foot examinations</td>
<td>60.4</td>
<td>32.0</td>
<td>7.6</td>
</tr>
<tr>
<td>Foot protection service pathway</td>
<td>85.0</td>
<td>13.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Referral for assessment pathway</td>
<td>67.2</td>
<td>27.6</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Source: NHS Digital

Notes: Please see Glossary (Care structures) for further information.
NDFA Care Structures Survey: Details (2)

Figure 2: Per cent of commissioners providing care structures for the management of diabetic foot disease, Commissioners, England and Wales, 2017

- **5.3** (no care structures)
- **2.3**
- **13.5**
- **2.9**
- **46.8**
- **17.0**
- **8.8**
- **3.5**

**Notes:**
Only full responders are included in this analysis i.e. commissioners that responded “yes” or “no” to all three survey questions (87 per cent of all the organisations that responded to a NDFA Care Structures Survey).

Please see Glossary (Care structures) for further information.

Less than half of participating commissioners provide all three care structures

47 per cent of full responders
### NDFA Care Structures Survey: Associations

#### Table 1: Ulcer characteristics and outcomes, by provision of a referral for assessment pathway, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Ulcer characteristic</th>
<th>Referral for assessment pathway?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-referred</td>
<td></td>
<td>30.6</td>
<td>23.0*</td>
</tr>
<tr>
<td>≤ 2 days(^1)</td>
<td></td>
<td>20.8</td>
<td>16.2*</td>
</tr>
<tr>
<td>&gt; 2 months(^1)</td>
<td></td>
<td>11.7</td>
<td>13.0 n</td>
</tr>
<tr>
<td>Ulcer severity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less severe</td>
<td></td>
<td>56.8</td>
<td>51.9*</td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td>43.2</td>
<td>48.1*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Referral for assessment pathway?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 week outcome(^2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alive and ulcer-free</td>
<td></td>
<td>50.4</td>
<td>46.9*</td>
</tr>
<tr>
<td>Persistent ulceration</td>
<td></td>
<td>47.8</td>
<td>51.3*</td>
</tr>
</tbody>
</table>

| 24 week outcome\(^2\) |                                |     |     |
| Alive and ulcer-free  |                                 | 67.6| 66.6 n|
| Persistent ulceration |                                 | 26.3| 27.6 n|

* = statistically significant at the 0.05 level (Yes vs No). n = not statistically significant

Provision of a referral for assessment pathway is associated with a shorter time to assessment, less severe ulcers, and better healing outcomes.

**Notes:** 1. Denominator excludes self-referrals. 2. Denominator excludes ulcers with an unknown outcome.
For localities, outcomes of the management of foot disease are dependent on the provision of the core recommendation:

**Availability of a designated expert foot care service for urgent assessment of new foot ulcers when necessary**

Where this is not available, clinical outcome is worse. In 2014-2017, less than half of all those responsible for commissioning care services were able to affirm that all three care structures were in place for their community.

**NDFA team**

There has been an additional £10 million transformation fund investment by NHS England to establish MDFTs where they do not exist currently, and to expand multi-disciplinary foot care service capacity where additional capacity is required.

**NHS England**

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**Recommendations**

All those responsible for commissioning footcare services in England and Wales should ensure that:

- A system of training is available for all healthcare professionals undertaking routine foot screening in diabetes.
- A pathway is established so that all people with diabetes who are at increased risk of foot ulceration can – where needed – receive from a Foot Protection Service:
  - Further assessment
  - Surveillance
  - Protective care
- A clear pathway exists to ensure that people with new diabetic foot ulcers are referred – according to NICE guidance – within one working day for expert assessment.
Participation: NDFA processes and outcomes

Results and Findings
Cohort


Case ascertainment

Three methods of establishing case ascertainment have been attempted, and all suggest the NDFA includes between 10 and 20 per cent of incident ulcers. Probable low case ascertainment should therefore be considered when interpreting NDFA findings, with acknowledgement that:

- The patients submitted to the NDFA may not be representative of the entire population of people with diabetic foot ulcers.
- Counts in the NDFA are likely to underestimate the true national figures (e.g. number of bed days).

Participation: Overview

132 providers

189 services

19,453 patients with 22,653 ulcer episodes

- 125 NHS trusts in England and 7 Local Health Boards (LHBs) in Wales
- 171 specialist foot care services in England and 18 in Wales
- With first expert assessment between 14 July 2014 and 31 March 2017

Notes: 1. Please refer to list of footnotes in the footnote section. Please see Glossary (Healthcare providers) for explanation of terms.
**Participation: Cumulative activity in 2014-2017**

Table 2: Participation in the NDFA processes and outcomes collection, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Audit year</th>
<th>Providers</th>
<th>Services</th>
<th>Patients</th>
<th>Ulcer episodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>104</td>
<td>142</td>
<td>5,121</td>
<td>5,320</td>
</tr>
<tr>
<td>2015-16</td>
<td>112</td>
<td>156</td>
<td>7,373</td>
<td>7,949</td>
</tr>
<tr>
<td>2016-17</td>
<td>113</td>
<td>159</td>
<td>8,703</td>
<td>9,384</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
<td>189</td>
<td>19,453</td>
<td>22,653</td>
</tr>
</tbody>
</table>

### Participated in ...

<table>
<thead>
<tr>
<th>Services</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 audit year</td>
<td>35</td>
<td>18.5</td>
</tr>
<tr>
<td>2 audit years</td>
<td>40</td>
<td>21.2</td>
</tr>
<tr>
<td>3 audit years</td>
<td>114</td>
<td>60.3</td>
</tr>
</tbody>
</table>

Notes: 2. Please refer to list of footnotes in the footnote section. Please see Glossary (Healthcare providers) for explanation of terms.
**Participation: Mental illness and learning disability**

**Audit question:** How many people with diabetic foot ulcers also have a serious mental illness or learning disability?

**How is this measured?** The National Diabetes Audit collects data on whether a person has a learning disability\(^3\) (since 2015-16) and/or serious mental illness (since 2016-17). NDFA patients are linked to find how prevalent these conditions are amongst people with diabetic foot ulcers.

**Why is this important?** Patients with these conditions may need additional help in order to best manage their care. Knowing the prevalence of these conditions can help foot care services plan how to support their patients.

**Key findings**

- 1.9 per cent of NDFA patients have a serious mental illness.
- 0.8 per cent of NDFA patients have a learning disability.
- Learning disability is no more prevalent in NDFA patients than in the general diabetic population.

*The number of NDFA patients with learning disability or serious mental illness recorded is so low conclusions cannot be made about the outcomes for these patients in comparison to others.*

**Notes:** 3. Please refer to list of footnotes in the footnote section.
Time to first expert assessment
Results and Findings
Time to first expert assessment: Overview

Audit question: Does the length of time to first expert assessment affect ulcer severity at presentation?

How is this measured? For each ulcer, the interval from initial presentation to a health professional to first assessment by a specialist who assumes care of the foot is recorded. Ulcer severity at first expert assessment is recorded using the SINBAD scoring system, where an ulcer is scored between 0 (least severe) and 6 (most severe). An ulcer with a SINBAD score of 3 or above is classed as a severe ulcer.

Why is this important? A relationship between longer times to first expert assessment and severe ulceration emphasises the importance of ensuring that prompt referral for specialist assessment is made – a linchpin of the NICE guidance\(^1\).

Key findings

- When the time to first expert assessment is $>2$ months, an ulcer is more likely to be severe.
  
  56 per cent vs. 35 to 50 per cent for shorter time intervals and self referred ulcers.

- Self-referred ulcers are less likely to be severe.
  
  35 per cent vs. 48 to 56 per cent for other categories

Recommendation

Every person with a foot ulcer should be referred for expert assessment along a clear care pathway that meets NICE guidance.

NICE guidance: People with diabetes who have an active foot problem should be referred to a specialist team within one working day for triage within one further working day\(^1\).

Notes: 1. Please refer to list of footnotes in the footnote section. Please see Glossary (Patient pathway/Referrals) for explanation of terms.
Almost two fifths of ulcers had a time to first assessment of two or more weeks (39 per cent, excluding self-referrers).

Almost one third of ulcers were self-referred (29 per cent).

**Notes:** Please see Glossary ([Patient pathway/Referrals](#)) for explanation of terms.
Time to first expert assessment: vs. audit year

Figure 4: Time to first expert assessment, by audit year, England and Wales, 2014-2017

More ulcers in 2016-17 had a time to expert assessment of >2 months than those seen in 2014-15

Notes: * = statistically significant at the 0.05 level (vs 2014-15).
\( n \) = not statistically significant (vs 2014-15). \( z \) = not applicable. Used as comparison group.
See Glossary (Patient pathway/Referrals) for explanation of terms.
There is little difference in the proportion of severe ulcers in the ≤ 2 month groups. Between 47.8 and 49.9 per cent, excluding self-referrers.

Ulcers seen with time to expert assessment >2 months are most likely to be severe. 56 per cent vs. 35 to 50 per cent.

**Notes:** * = statistically significant at the 0.05 level (vs ≤2 days). n = not statistically significant (vs ≤2 days). z = not applicable. Used as comparison group. See Glossary (Patient pathway/Ulcer characteristics/Referrals) for explanation of terms.
Time to first expert assessment: Commentary

The evidence derived from over 20,000 new diabetic foot ulcers suggests that early referral is associated with ulcers of lesser severity, and lesser severity is associated with better outcomes.

NDFA team

Recommendation

All people with diabetic foot ulcers should be referred promptly for early specialist assessment, in line with NICE guidance.
Outcomes: Alive and ulcer-free

Results and Findings
Alive and ulcer-free: Overview

Audit questions:
What proportion of people were alive and ulcer-free at 12 and 24 weeks after the first expert assessment by the specialist foot care team?

How do 12 and 24 week outcomes relate to:
- Ulcer severity
- Time to first expert assessment

How is this assessed?
At 12 and 24 weeks specialist foot care services record whether the patient is alive and, if so, whether they are free from active foot disease (i.e. the presenting ulcer has healed and there are no new unhealed ulcers).

Being ‘ulcer-free’ includes those patients who have had surgery (including major and minor amputation), provided all wounds have healed. Patients with an unknown outcome may include some patients who were lost to follow-up.

Key findings

- People are alive and ulcer-free at **24 weeks** in only two thirds of cases of a diabetic foot ulcer.
- **Severe** ulcers take longer to heal.
- Outcomes are worse if the time to first expert assessment is **≥14 days**.
- Outcomes for **self-referred** ulcers are better at 12 weeks, but are no different at 24 weeks.

Notes: 1. Please refer to list of footnotes in the footnote section, and see Glossary (Referrals) for explanation of terms.
# Alive and ulcer-free at 12 weeks: vs. ulcer severity

## Table 3: Alive and ulcer-free$^2$ at 12 weeks by ulcer severity, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>12 week outcome</th>
<th>All ulcers (22,653 episodes)</th>
<th>Less severe ulcer (12,320 episodes)</th>
<th>Severe ulcer (10,333 episodes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent known$^4$</td>
<td>Number</td>
</tr>
<tr>
<td>Alive and ulcer-free$^2$</td>
<td>9,967</td>
<td>48.2</td>
<td>6,715</td>
</tr>
<tr>
<td>Persistent ulceration</td>
<td>10,211</td>
<td>49.3</td>
<td>4,290</td>
</tr>
<tr>
<td>Deceased$^3$</td>
<td>520</td>
<td>2.5</td>
<td>201</td>
</tr>
<tr>
<td>Lost to follow up$^{1,4}$</td>
<td>740</td>
<td>-</td>
<td>471</td>
</tr>
<tr>
<td>Unknown$^4$</td>
<td>1,215</td>
<td>-</td>
<td>643</td>
</tr>
</tbody>
</table>

* = statistically significant at the 0.05 level (Less severe vs Severe).
$n$ = not statistically significant (Less severe vs Severe). $z$ = not applicable. Not used in cohort.
Alive and ulcer-free includes patients who have had an amputation provided all wounds have healed.

Notes: 1, 2, 3, 4. Please refer to list of footnotes in the footnote section.
Please see Glossary ([Patient pathway/Ulcer characteristics](#)) for explanation of terms.
Severe ulcers are less likely to be healed at 24 weeks. More than one in 25 ulcers are followed by death within 24 weeks.

Table 4: Alive and ulcer-free at 24 weeks by ulcer severity, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>24 week outcome</th>
<th>All ulcers (21,082 episodes)</th>
<th>Less severe ulcer (11,469 episodes)</th>
<th>Severe ulcer (9,613 episodes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent known</td>
<td>Number</td>
</tr>
<tr>
<td>Alive and ulcer-free²</td>
<td>12,203</td>
<td>65.5</td>
<td>7,531</td>
</tr>
<tr>
<td>Persistent ulceration</td>
<td>5,081</td>
<td>27.3</td>
<td>2,002</td>
</tr>
<tr>
<td>New ulceration after being ulcer-free³</td>
<td>537</td>
<td>2.9</td>
<td>368</td>
</tr>
<tr>
<td>Deceased³</td>
<td>809</td>
<td>4.3</td>
<td>312</td>
</tr>
<tr>
<td>Lost to follow up¹, 4</td>
<td>821</td>
<td>-</td>
<td>460</td>
</tr>
<tr>
<td>Unknown⁴</td>
<td>1,631</td>
<td>-</td>
<td>796</td>
</tr>
</tbody>
</table>

* = statistically significant at the 0.05 level (Less severe vs Severe).
n = not statistically significant (Less severe vs Severe). z = not applicable. Not used in cohort.
Alive and ulcer-free includes patients who have had an amputation provided all wounds have healed.

Notes: 1, 2, 3, 4, 5. Please refer to list of footnotes in the footnote section. Please see Glossary (Patient pathway/Ulcer characteristics) for explanation of terms.
Alive and ulcer-free: vs. time to expert assessment

Figure 6: Alive and ulcer-free² by time to first expert assessment, England and Wales, 2014-2017

% alive and ulcer-free at ...  

<table>
<thead>
<tr>
<th>Time to Assessment</th>
<th>12 weeks</th>
<th>24 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-referred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 2 days</td>
<td>48.0z</td>
<td>66.9z</td>
</tr>
<tr>
<td>3-13 days</td>
<td>48.2n</td>
<td>66.3n</td>
</tr>
<tr>
<td>14 days - 2 months</td>
<td>44.0*</td>
<td>64.0*</td>
</tr>
<tr>
<td>&gt; 2 months</td>
<td>33.1*</td>
<td></td>
</tr>
</tbody>
</table>

Notes: * = statistically significant at the 0.05 level (vs ≤2 days). 
\( n \) = not statistically significant (vs ≤2 days). \( z \) = not applicable. Used as comparison group.

2. Please refer to list of footnotes in the footnote section. Please see Glossary (Patient pathway/Referrals) for explanation of terms.

Time to assessment of 14+ days result in worse outcomes at 12 and 24 weeks

Self-referred ulcers are more likely to be healed at 12 weeks

But no difference at 24 weeks (vs. less than 14 days)
Alive and ulcer-free: Provider variation - less severe

Figure 7: Observed outcome rates for less severe ulcers by NHS Trust and Local Health Board\(^6\), England and Wales, 2014-2017

The observed rates of being alive and ulcer-free for less severe ulcers vary by over **40 percentage points** across care providers

...at 12/24 weeks with 50+ less severe ulcers

Notes: 2, 6, 7. Please refer to list of footnotes in the footnote section. See Glossary (Healthcare providers/Patient pathway/Ulcer characteristics/Statistical terms) for explanation of terms.
Alive and ulcer-free: Provider variation - severe

Figure 8: Observed outcome rates for severe ulcers by NHS Trust and Local Health Board[^6], England and Wales, 2014-2017

The observed rates of being alive and ulcer-free for severe ulcers vary by over 40 percentage points across care providers...at 12/24 weeks with 50+ severe ulcers

Notes: 2, 6, 7. Please refer to list of footnotes in the footnote section. See Glossary ([Healthcare providers]/[Patient pathway]/[Ulcer characteristics]/[Statistical terms]) for explanation of terms.

[^6]: England and Wales, 2014-2017
Alive and ulcer-free: Commentary

The rate at which people are found to be alive and ulcer-free has remained consistent over the course of the audit, and the audit findings concur with earlier associations found between time to assessment, ulcer severity and patient outcomes.

However, the NDFA has found that there continues to be a very wide variation in outcome rates across England and Wales. Healing rates at some providers are much lower, and although some of this variation may be due to differences in the population served by each provider, much appears to be related to other factors. Investigating these service level factors will be an important part of driving a higher rate of ulcer healing.

Recommendations

- All people with diabetic foot ulcers should be referred promptly for early specialist assessment, according to NICE guidance.
- Providers should endeavour to record all new instances of diabetic foot ulcers, and to complete outcome data for all patients registered in the audit, in order to ensure a more complete picture of patient outcomes.
- All audit participants should engage with audit-driven quality improvement work starting next year.
Outcomes: Factors associated with being alive and ulcer-free
Factors associated with being alive and ulcer-free:

Overview

Audit question: What characteristics are associated with patients that are alive and ulcer-free at 12 and 24 weeks?

How is this measured? NDFA and NDA data is combined in a logistic regression model that looks for factors that are associated with patients who have a (12 or 24 week) outcome as alive and ulcer-free.

Why is this important? A strong model would suggest that patient and ulcer characteristics account for much of the variation in healing rates across different providers, and would enable robust adjusted healing rates to be produced at provider-level. However, if a strong model cannot be produced, then it suggests that differences in patient outcomes do not arise from differences in the demographics of the population or the ulcer characteristics at first expert assessment.

Key findings

Main associations with being alive and ulcer-free are:
- Having a single foot ulcer
- People of Asian ethnicity

Main associations with not being alive and ulcer-free are:
- Ischaemia (poor circulation), ulcer size and depth, neuropathy (loss of feeling)
- Time to first assessment of >2 months
- Charcot foot disease

Limitations

The overall power of both healing models is poor (c-statistics <0.7), with much of the variation in outcome not explained by factors included in the model.

Notes: See Glossary (Statistical terms) for explanation of terms.
Factors associated with being alive and ulcer-free at 12 weeks: Findings

**WARNING!**
The predictive power of the statistical model is poor (c-statistic <0.7).

**Patient factors**

- More likely
  - Asian
  - Diabetic = 5-9yrs
  - BMI 35-40 (Obese)
  - Diabetic = 0-4yrs
  - Ethnicity = Unknown
  - Female

- Less likely
  - Current smoker
  - Smoking = Unknown
  - Ethnicity = Not stated

**Healed?**

- ✓

**Ulcer factors**

- More likely
  - Single ulcer
  - Charcot = Unknown
  - Self-referral

- Less likely
  - Foot exam >1 year ago
  - Time2Assessment 14d-2mths
  - On hindfoot
  - Infection
  - Charcot = Definite
  - Neuropathy
  - Deep ulcer
  - TimeToAssessment >2mths
  - Large ulcer
  - Ischaemia

**Notes:** Italics = confidence interval close to line of no effect (1.0). See Glossary (Statistical terms) for explanation of terms.
Factors associated with being alive and ulcer-free at 12 weeks: Commentary

Patient factors

- Asian
- Diabetic = 5–9 yrs
- BMI 35–40 (Obese)
- Diabetic = 0–4 yrs
- Ethnicity = Unknown
- Female

Healed?

- The more recently people have been diagnosed with diabetes the more likely they are to be alive and ulcer-free

Ulcer factors

- Charcot = Unknown
- Self-referral

- Foot exam >1 year ago
- Time2Assessment 14d-2mths
- On hindfoot
- Infection
- Charcot = Definite
- Neuropathy
- Deep ulcer
- TimeToAssessment >2mths
- Large ulcer
- Ischaemia

Caution: Association with a factor does not confirm a cause-and-effect relationship (or direction).

People of Asian ethnicity are more likely to be alive and ulcer-free

Current smokers are less likely to be alive and ulcer-free

A patient with Charcot disease is less likely to be alive and ulcer-free.

Longer times to assessment are linked with not being alive and ulcer-free.

When a patient has an ulcer with SINBAD characteristics it is less likely that they will become alive and ulcer-free.
Factors associated with being alive and ulcer-free at 12 weeks: Details

Figure 9: Odds ratios of factors associated with being alive and ulcer-free at 12 weeks\(^1\), England and Wales, 2014-2017

Notes:
1. See Glossary (Statistical terms) for explanation of terms.
Factors associated with being alive and ulcer-free at 12 weeks: Characteristics tested

<table>
<thead>
<tr>
<th>Patient characteristics: Association with outcome</th>
<th>Ulcer characteristics: Association with outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>Charcot disease</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>First ulcer in the audit</td>
</tr>
<tr>
<td>Care processes</td>
<td>Number of ulcers</td>
</tr>
<tr>
<td>Deprivation quintile</td>
<td>Time to assessment</td>
</tr>
<tr>
<td>Diabetes duration</td>
<td>Ulcer area</td>
</tr>
<tr>
<td>Diabetes type</td>
<td>Ulcer depth</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Ulcer infection</td>
</tr>
<tr>
<td>Foot surveillance</td>
<td>Ulcer ischaemia</td>
</tr>
<tr>
<td>Sex</td>
<td>Ulcer neuropathy</td>
</tr>
<tr>
<td>Treatment targets</td>
<td>Ulcer site (hindfoot)</td>
</tr>
<tr>
<td>Smoking status</td>
<td>Ulcer severity</td>
</tr>
</tbody>
</table>

Being alive and ulcer-free at 12 weeks is associated with many different factors.

6 patient factors and 9 ulcer factors.

There is no link between someone meeting their treatment targets for blood pressure, cholesterol, and HbA1c and being alive and ulcer-free.
Factors associated with being alive and ulcer-free at 24 weeks: Findings

**WARNING!**
The predictive power of the statistical model is **poor**
(c-statistic <0.7)

### Patient factors
- ▲ Asian
- ▲ Female ▲ BMI 30-35 (Obese) ▲ BMI 35-40 (Obese) ▲ Diabetic = 5-9yrs ▲ BMI 25-30 (Overweight)
- ▼ Diabetic = Unknown yrs ▼ Smoking = Unknown ▼ Current smoker
- ▼ Ethnicity = Not stated

### Healed?
- ✓

### Ulcer factors
- ▲ Single ulcer
- ▼ All care procs = No ▼ Foot exam >1 year ago ▼ Not first ulcer
- ▼ On hindfoot ▼ Neuropathy ▼ Deep ulcer ▼ Charcot ▼ TimeToAss’t >2mths ▼ Large ulcer ▼ Ischaemia

**Notes:** Italics = confidence interval close to line of no effect (1.0). See Glossary (Statistical terms) for explanation of terms.
Factors associated with being alive and ulcer-free at 24 weeks: Commentary

Patient factors

▲ Asian
▲ Female ▲ BMI 30-35 (Obese) ▲ BMI 35-40 (Obese) ▲ Diabetic = 5-9yrs ▲ BMI 25-30 (Overweight)

▲ Ethnicity = Not stated
▼ Diabetic = Unknown yrs
▼ Smoking = Unknown
▼ Current smoker

Healed?

When the patient is known to have had foot ulcers before, they are less likely to be alive and ulcer-free

Ulcer factors

▲ Single ulcer

▼ All care procs = No
▼ Foot exam >1 year ago
▼ Not first ulcer

▼ On hindfoot ▼ Neuropathy ▼ Deep ulcer ▼ Charcot ▼ TimeToAss’t >2mths ▼ Large ulcer ▼ Ischaemia

Caution: Association with a factor does not confirm a cause-and-effect relationship (or direction).

People whose ethnicity, diabetes duration and/or smoking status has not been recorded/stated are less likely to be alive and ulcer-free

Ulcer depth is less strongly linked to not being alive and ulcer-free at 24 weeks than at 12

Not having all care processes done is associated with not being alive and ulcer-free

A time to assessment of >2 months is linked with not being alive and ulcer-free

Healed people ▲ 46

People whose ethnicity, diabetes duration and/or smoking status has not been recorded/stated are less likely to be alive and ulcer-free

Commentary
Figure 10: Odds ratios of factors associated with being alive and ulcer-free at 24 weeks\(^1\), England and Wales, 2014-2017

Notes:
1. See Glossary ([Statistical terms](#)) for explanation of terms.
Factors associated with being alive and ulcer-free at 24 weeks: Characteristics tested

<table>
<thead>
<tr>
<th>Patient characteristics: Association with outcome</th>
<th>Ulcer characteristics: Association with outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>Charcot disease</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>First ulcer in the audit</td>
</tr>
<tr>
<td>Care processes</td>
<td>Number of ulcers</td>
</tr>
<tr>
<td>Deprivation quintile</td>
<td>Time to assessment</td>
</tr>
<tr>
<td>Diabetes duration</td>
<td>Ulcer area</td>
</tr>
<tr>
<td>Diabetes type</td>
<td>Ulcer depth</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Ulcer infection</td>
</tr>
<tr>
<td>Foot surveillance</td>
<td>Ulcer ischaemia</td>
</tr>
<tr>
<td>Sex</td>
<td>Ulcer neuropathy</td>
</tr>
<tr>
<td>Treatment targets</td>
<td>Ulcer site (hindfoot)</td>
</tr>
<tr>
<td>Smoking status</td>
<td>Ulcer severity</td>
</tr>
</tbody>
</table>

Infection of the ulcer is **not** associated with being alive and ulcer-free at 24 weeks.

Ulcer infection is associated with outcomes at 12 weeks.

There is **no link** between someone meeting their **treatment targets** for blood pressure cholesterol, and HBA1c and being alive and ulcer-free.
Factors associated with being alive and ulcer-free: Commentary

A large number of factors are weakly associated with being alive and ulcer-free at 12 weeks or 24 weeks. However, even with the large number of new ulcers now recorded in NDFA, no dominant factors have emerged and most of the substantial variation across England and Wales remains unexplained.

It is, however, interesting to note that there is no evidence of any association between outcome at 12 or 24 weeks and age, social deprivation or diabetes type.

Recommendation

Expert diabetes foot treatment services could use the differences identified by NDFA to explore collaboratively which aspects of their care programmes might influence time to healing.
Outcomes: Hospital admissions

Results and Findings
Hospital admissions: Overview

Audit questions: What proportion of people with a new foot ulcer have a hospital admission in the 6 months following first expert assessment? How many of their admissions are known to be related to foot disease?

Common reasons for hospital admission in people with diabetic foot disease include:
- Infection of the diabetic foot ulcer requiring antibiotics, wound debridement (removal of dead/infected tissue) and amputation
- Cardiovascular disease (heart attack, heart failure, stroke, compromised lower limb blood supply)

Why is this important?
- Management of diabetic foot disease should as far as possible be an outpatient activity, not requiring a hospital stay.
- Hospital admission for diabetic foot disease is costly to the NHS and can be distressing for those directly affected.

Findings

<table>
<thead>
<tr>
<th>Less severe ulcers</th>
<th>Severe ulcers</th>
</tr>
</thead>
<tbody>
<tr>
<td>40% had admissions in 6 months</td>
<td>61% had admissions in 6 months</td>
</tr>
<tr>
<td>5 day median length of stay</td>
<td>7 day median length of stay</td>
</tr>
<tr>
<td>Over 50,000 bed days</td>
<td>Over 100,000 bed days</td>
</tr>
</tbody>
</table>

Notes: Please see Glossary (Foot disease-related admission/Ulcer characteristics/Which admissions are included?) for explanation of terms.
## Hospital admissions: Ulcer severity

### Table 5: Hospital admissions within 6 months of first expert assessment\(^1\), by ulcer severity, NDFA patients, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Admissions</th>
<th>All ulcers (17,514 patients)</th>
<th>Less severe ulcer (9,401 patients)</th>
<th>Severe ulcer (8,113 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
</tr>
<tr>
<td>Any admission?(^2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not admitted</td>
<td>8,825</td>
<td>50.4</td>
<td>5,622</td>
</tr>
<tr>
<td>One or more admission</td>
<td>8,689</td>
<td>49.6</td>
<td>3,779</td>
</tr>
<tr>
<td>Foot disease admission?(^3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not admitted</td>
<td>13,791</td>
<td>78.7</td>
<td>8,358</td>
</tr>
<tr>
<td>One or more admission</td>
<td>3,723</td>
<td>21.3</td>
<td>1,043</td>
</tr>
</tbody>
</table>

* = statistically significant at the 0.05 level (Less severe vs Severe). n = not statistically significant

### Notes: \(^1\), \(^2\), \(^3\). Please refer to list of footnotes in the footnote section. Please see Glossary (Foot disease-related admission/Ulcer characteristics/Which admissions are included?) for explanation of terms.

---

Half of people with diabetic foot ulcers are **admitted** to hospital within 6 months.

People with **severe** ulcers are 1.5 times as likely to be admitted to hospital and **three** times as likely to be admitted for **foot disease**

33 vs. 11 per cent and 61 vs. 40 per cent
### Hospital admissions: Bed days

**Table 6: All hospital admissions within 6 months of first expert assessment:** bed days, by ulcer severity, NDFA patients, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Ulcer severity</th>
<th>Number of patients</th>
<th>Number of hospital admissions</th>
<th>Number of bed days[^4,^6]</th>
<th>Length of stay[^5]</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>Any admission[^2]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less severe</td>
<td>9,401</td>
<td>7,612</td>
<td>54,820</td>
<td>5.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Severe</td>
<td>8,113</td>
<td>11,242</td>
<td>108,651</td>
<td>7.0</td>
<td>13.3</td>
</tr>
<tr>
<td>All ulcers</td>
<td>17,514</td>
<td>18,854</td>
<td>163,471</td>
<td>6.0</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Foot disease admission[^3]</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less severe</td>
<td>9,401</td>
<td>1,549</td>
<td>17,017</td>
<td>8.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Severe</td>
<td>8,113</td>
<td>4,432</td>
<td>60,830</td>
<td>10.0</td>
<td>16.9</td>
</tr>
<tr>
<td>All ulcers</td>
<td>17,514</td>
<td>5,981</td>
<td>77,847</td>
<td>10.0</td>
<td>16.0</td>
</tr>
</tbody>
</table>

Notes: 1, 2, 3, 4, 5, 6. Please refer to list of footnotes in the footnote section. Please see Glossary (Foot disease-related admission/Ulcer characteristics/Which admissions are included?/Length of stay and bed days) for explanation of terms.
In a quarter of care providers, NDFA patients accounted for 1,600+ bed days within 6 months. NDFA patients, England and Wales, 2014-2017.

Equivalent to at least 9 beds occupied by NDFA patients per provider per day.

Notes: 1, 2, 4, 6, 7. Please refer to list of footnotes in the footnote section. Please see Glossary (Ulcer characteristics/Which admissions are included?/Length of stay and bed days) for explanation of terms.
The middle half of foot care providers had a median length of stay between 3.25 and 6 days for people with less severe ulcers.

The middle half of foot care providers had a median length of stay between 6 and 8 days for people with severe ulcers.

**Notes:** 1, 2, 5, 7. Please refer to list of footnotes in the footnote section. Please see Glossary (Ulcer characteristics / Which admissions are included? / Length of stay and bed days) for explanation of terms.
Outcomes: Hospital procedures
Results and Findings
Audit question: What proportion of people with diabetic foot ulcers have lower limb amputation and/or revascularisation procedures in the 6 months following first expert assessment?

Why is this important? Amputation is the most feared and disabling consequence of diabetic foot disease. Lower limb amputation is the surgical excision of bone and soft tissue of the foot or leg. Minor amputation (below the ankle) is a treatment for serious diabetic foot ulcers in which toes or part of the foot is removed. Major amputation (above the ankle) is carried out when all other treatments have failed.

Revascularisation procedures may save limbs from amputation. Revascularisation surgery is used to restore blood flow to tissue where it has become insufficient. The main types of revascularisation are: angioplasty (opening up blocked or partially blocked arteries) and vascular bypass (re-routing blood around a blocked section of artery).

Like all surgery, there are risks associated with these procedures and long hospital stays and periods of rehabilitation can ensue.

Key findings

Prevalence
- In the 6 months after their first expert assessment 8 per cent of NDFA patients undergo amputation and 8 per cent undergo revascularisation.

Length of stay
- Resultant hospital stays are long – a median of 14 days for amputation and 10 days for revascularisation.

Ulcer severity
- Patients with severe ulcers at first expert assessment were three times as likely to undergo amputation or revascularisation as those with less severe ulcers.

These findings emphasise the impact of ulcer severity at presentation on patient treatment and outcomes.
## Hospital procedures: Summary

Table 7: Hospital procedures within 6 months of first expert assessment\(^1\): by procedure type\(^2\), NDFA patients, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Procedure type(^2)</th>
<th>All ulcers (17,514 patients)</th>
<th>Patients(^2)</th>
<th>Admissions(^2)</th>
<th>Procedures(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
</tr>
<tr>
<td>Any amputation</td>
<td></td>
<td>1,469</td>
<td>8.4</td>
<td>1,667</td>
</tr>
<tr>
<td>… Minor (below the ankle)</td>
<td></td>
<td>1,269</td>
<td>7.2</td>
<td>1,416</td>
</tr>
<tr>
<td>… Major (above the ankle)</td>
<td></td>
<td>293</td>
<td>1.7</td>
<td>299</td>
</tr>
<tr>
<td>Any revascularisation</td>
<td></td>
<td>1,352</td>
<td>7.7</td>
<td>1,524</td>
</tr>
<tr>
<td>… Angioplasty</td>
<td></td>
<td>1,194</td>
<td>6.8</td>
<td>1,301</td>
</tr>
<tr>
<td>… Open procedures</td>
<td></td>
<td>151</td>
<td>0.9</td>
<td>154</td>
</tr>
<tr>
<td>… Bypass</td>
<td></td>
<td>201</td>
<td>1.1</td>
<td>204</td>
</tr>
</tbody>
</table>

Notes: 1, 2. Please refer to list of footnotes in the footnote section. Please see Glossary (Revascularisation procedures / Amputation procedures / Which admissions are included?) for explanation of terms.
### Hospital procedures: Ulcer severity

Table 8: Hospital procedures within 6 months of first expert assessment\(^1\): by ulcer severity, NDFA patients, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Procedure type</th>
<th>Less severe ulcer (9,401 patients)</th>
<th>Severe ulcer (8,113 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td>Any amputation</td>
<td>370</td>
<td>3.9 *</td>
</tr>
<tr>
<td>... Minor (below the ankle)</td>
<td>329</td>
<td>3.5 *</td>
</tr>
<tr>
<td>... Major (above the ankle)</td>
<td>65</td>
<td>0.7 *</td>
</tr>
<tr>
<td>Any revascularisation</td>
<td>374</td>
<td>4.0 *</td>
</tr>
<tr>
<td>... Angioplasty</td>
<td>330</td>
<td>3.5 *</td>
</tr>
<tr>
<td>... Open procedures</td>
<td>49</td>
<td>0.5 *</td>
</tr>
<tr>
<td>... Bypass</td>
<td>57</td>
<td>0.6 *</td>
</tr>
</tbody>
</table>

* = statistically significant at the 0.05 level (Less severe vs Severe). \(n\) = not statistically significant

**Notes:** 1, 2. Please refer to list of footnotes in the **footnote** section. Please see Glossary ([Revascularisation procedures]/[Amputation procedures]/[Ulcer characteristics]/[Which admissions are included?]) for explanation of terms.
### Table 9: Hospital procedures within 6 months of first expert assessment¹: bed days, by procedure type, NDFA patients, England and Wales, 2014-2017

<table>
<thead>
<tr>
<th>Procedure type²</th>
<th>Number of hospital admissions</th>
<th>Number of bed days³, ⁵</th>
<th>Length of stay⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>Mean</td>
</tr>
<tr>
<td>Any amputation</td>
<td>1,667</td>
<td>28,694</td>
<td>14.0</td>
</tr>
<tr>
<td>… Minor only (below the ankle)</td>
<td>1,368</td>
<td>19,099</td>
<td>11.0</td>
</tr>
<tr>
<td>… Major only (above the ankle)</td>
<td>251</td>
<td>7,728</td>
<td>25.0</td>
</tr>
<tr>
<td>Any revascularisation</td>
<td>1,524</td>
<td>21,424</td>
<td>10.0</td>
</tr>
<tr>
<td>…Angioplasty only</td>
<td>1,227</td>
<td>15,599</td>
<td>9.0</td>
</tr>
<tr>
<td>…Open procedure only</td>
<td>58</td>
<td>850</td>
<td>8.0</td>
</tr>
<tr>
<td>…Bypass only</td>
<td>119</td>
<td>2,161</td>
<td>15.0</td>
</tr>
</tbody>
</table>

¹ The median length of hospital stays involving amputation is 14 days, rising to 25 days for major amputation.

² Notes: 1, 2, 3, 4, 5. Please refer to list of footnotes in the footnote section.

Please see Glossary (Revascularisation procedures/Amputation procedures/Length of stay and bed days) for explanation of terms.
The audit has found a clear association between ulcer severity at assessment – and therefore also time to assessment - and the likelihood of the patient going on to be admitted to hospital within the next six months. This association holds for all admissions, including revascularisation and amputation. Patients with severe ulcers are more likely to be admitted to hospital, to have longer hospital stays, and to undergo major amputation.

**NDFA team**

**Recommendation**

- To reduce the incidence of severe diabetic foot ulcers, and through that reduce admissions, amputations and hospital bed days, healthcare professionals should promptly refer people with diabetic foot ulcers for specialist assessment. Commissioners should ensure that the pathways necessary for this are in place.
Outcomes: Factors associated with amputation

Results and Findings
**Factors associated with amputation: Overview**

**Audit question:** What characteristics are associated with patients that go on to have a lower limb amputation within 6 months?

**How is this measured?** NDFA, NDA and hospital activity data is combined in a logistic regression model that looks for factors that are associated with whether a patient has a minor or major amputation following their first expert assessment.

**Why is this important?** If factors associated with amputation can be identified and a strong model produced, the model can adjust local amputation rates to account for providers’ unique patient profiles and enable fairer comparisons between services.

---

## Key findings

### Better outcomes (not having an amputation) are strongly associated with:
- Having a single foot ulcer

### Worse outcomes (having an amputation) are strongly associated with:
- Ischaemia (poor circulation), ulcer depth and size
- Smoking (major amputation)
- Hindfoot ulceration (major amputation)
- Bacterial infection (minor amputation)

---

**Limitations**

The overall power of both amputation models is reasonable (c-statistics 0.7 to 0.8), with some of the variation in outcome still not explained by the model.

---

Notes: See Glossary ([Statistical terms](#)) for explanation of terms.
Factors associated with minor amputation:
Findings

**LIMITATIONS:**
The predictive power of the statistical model is reasonable (c-statistic 0.7 to 0.8)

### Patient factors

- **More likely**
  - Diabetic = 30+yrs
  - Aged 55-64
  - Diabetic = 20-29yrs
  - Aged 45-54

- **Less likely**
  - Diabetic = 0-4yrs
  - Aged 85+
  - Female

### Ulcer factors

- **Yes**
  - Ischaemia
  - Deep ulcer

- **More likely**
  - Infection
  - Large ulcer
  - HbA1c(58) target = Not met
  - HbA1c(58) target = Unknown
  - Neuropathy

- **Less likely**
  - Charcot = Unknown
  - Single ulcer
  - TimeToAssessment >2months
  - Charcot = Definite

- **No**
  - On hindfoot

**Notes:** Italic = confidence interval close to line of no effect (1.0). See Glossary (Statistical terms) for explanation of terms.
Factors associated with minor amputation:

**Commentary**

**Patient factors**

- **Diabetic = 30+yrs**
  - Aged 55-64
- **Diabetic = 20-29yrs**
  - Aged 45-54
- **Diabetic = 0-4yrs**
  - Aged 85+
  - Female

**Ulcer factors**

- **Ischaemia**
- **Deep ulcer**
- **Infection**
- **Large ulcer**
- **HbA1c(58) target = Not met**
- **HbA1c(58) target = Unknown**
- **Neuropathy**
- **Charcot = Unknown**
- **Single ulcer**
- **TimeToAssessment >2months**
- **Charcot = Definite**
- **On hindfoot**

---

**Caution:** Association with a factor does not confirm a cause-and-effect relationship (or direction).

- If the patient has had diabetes for a long time they are more likely to have a minor amputation.
- Older patients are less likely to have a minor amputation.

**Factors associated with minor amputation:**

- A minor amputation is more likely if the HbA1c target has not been reached.
- If a patient has Charcot disease, a minor amputation is unlikely to help.
- When the ulcer is on the hindfoot a minor amputation would rarely help heal the ulcer.

- When a patient has bacterial infection of the toe it may prompt a minor amputation.

**After a long time to assessment it is less likely the ulcer can be treated with a minor amputation.**

- If a patient is a current smoker they are more likely to have a minor amputation.

**Patient factors**

- **Diabetic = 0-4yrs**
- **Aged 85+**
- **Female**

**If the patient has had diabetes for a long time they are more likely to have a minor amputation.**

**Older patients are less likely to have a minor amputation.**

**When the ulcer is on the hindfoot a minor amputation would rarely help heal the ulcer.**

**When a patient has bacterial infection of the toe it may prompt a minor amputation.**

**Caution:** Association with a factor does not confirm a cause-and-effect relationship (or direction).
Factors associated with minor amputation: Details

Figure 13: Odds ratios of factors associated with minor amputation within 6 months\(^1\), England and Wales, 2014-2017

Notes:
1. See Glossary ([Statistical terms](#)) for explanation of terms.
### Factors associated with minor amputation: Characteristics tested

<table>
<thead>
<tr>
<th>Patient characteristics: Association with amputation</th>
<th>Ulcer characteristics: Association with amputation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at assessment</td>
<td>Charcot disease</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>First ulcer in the audit</td>
</tr>
<tr>
<td>Care processes</td>
<td>Number of ulcers</td>
</tr>
<tr>
<td>Deprivation quintile</td>
<td>Time to assessment</td>
</tr>
<tr>
<td>Diabetes duration</td>
<td>Ulcer area</td>
</tr>
<tr>
<td>Diabetes type</td>
<td>Ulcer depth</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Ulcer infection</td>
</tr>
<tr>
<td>Foot surveillance</td>
<td>Ulcer ischaemia</td>
</tr>
<tr>
<td>Sex</td>
<td>Ulcer neuropathy</td>
</tr>
<tr>
<td>Treatment targets</td>
<td>Ulcer site (hindfoot)</td>
</tr>
<tr>
<td>Smoking status</td>
<td>Ulcer severity</td>
</tr>
</tbody>
</table>

Amputations are more likely when an ulcer is deep, ischaemic or large in area at first expert assessment.

Ulcers on the hindfoot are unlikely to be treated with a minor amputation.

Minor amputation is associated with four patient-related factors and nine ulcer-related factors.
Factors associated with major amputation:

Findings

LIMITATIONS: The predictive power of the statistical model is reasonable (c-statistic 0.7 to 0.8)

Patient factors

- ▲ Current smoker
- ▲ Smoking = Unknown
- ▼ Single ulcer
- ▼ All care procs = No
- ▼ No foot exam
- ▼ First ulcer
- ▼ On hindfoot
- ▼ Neuropathy
- ▼ Deep ulcer
- ▼ Charcot
- ▼ Ass't >2 mnths
- ▼ Large ulcer
- ▼ Ischaemia

Major amputation?

- Yes
- More likely
- Less likely
- No

Ulcer factors

- ▲ Ischaemia
- ▲ Large ulcer
- ▼ On hindfoot
- ▼ Deep ulcer
- ▼ Single ulcer

Notes: Italics = confidence interval close to line of no effect (1.0). See Glossary (Statistical terms) for explanation of terms.
Factors associated with major amputation: Commentary

Caution: Association with a factor does not confirm a cause-and-effect relationship (or direction).

Patient factors

- ▲ Current smoker
- ▲ Smoking = Unknown

Major amputation?

Yes

Ulcer factors

- ▲ Ischaemia
- ▲ Large ulcer

- ▲ On hindfoot
- ▲ Deep ulcer

Less likely

No

Currently smoking patients are more likely to have a major amputation.

Very few patient factors are associated with major amputation.

Ulcers on the hindfoot are more likely to need a major amputation.

Major amputation is more likely when there are multiple ulcers.

Only a small number of factors are associated with major amputation.
Factors associated with major amputation:

Details

Figure 14: Odds ratios of factors associated with major amputation within 6 months\(^1\), England and Wales, 2014-2017

- Several ulcer characteristics are associated with having a major amputation: ischaemia (poor circulation), large ulcers, ulcers on the hindfoot and deep ulcers.
- Smoking is the only patient characteristic significantly associated with major amputation.
- Patients with single ulcers are less likely to have a major amputation.

Notes:
1. See Glossary ([Statistical terms](#)) for explanation of terms.
Factors associated with major amputation: Characteristics tested

<table>
<thead>
<tr>
<th>Patient characteristics: Association with amputation</th>
<th>Ulcer characteristics: Association with amputation</th>
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<tr>
<td>Age at assessment</td>
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<td>Treatment targets</td>
<td>Ulcer site (hindfoot)</td>
</tr>
<tr>
<td>Smoking status</td>
<td>Ulcer severity</td>
</tr>
</tbody>
</table>

Only one patient characteristic is associated with major amputation.

1 patient factor and 5 ulcer factors.

Major amputations are more likely when an ulcer is ischaemic or large in area at first expert assessment.

Being a current smoker is associated with having a major amputation.
Amputations are serious operations and are only undertaken if thought to be in a person’s best interest. They are of two types: **Minor** (which leaves the person with a foot they can stand on) and **Major** (which is undertaken above the ankle). It is known that rates vary by as much as sevenfold\(^1\) between localities.

The NDFA finds that major amputation is more likely if presenting ulcers are wider and deeper, if there is poor circulation and if cigarette smoking is current. If ulcers were less severe at presentation to the expert team, there might be a reduction in the number of amputations. However, it is likely that other factors such as decisions about improving blood flow or managing bone infection are also influential.

**Recommendations**

- Ensure pathways of care enable new ulcers to be assessed expertly without delay because longer time to assessment is associated with greater ulcer severity.
- Ensure that where poor circulation is a factor, people are promptly assessed for possible revascularisation.

**Notes:** Public Health England, 2017, [Diabetes profiles](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6404500/).
Footnotes:
Participation, Time to first expert assessment

Participation

1. See the NDFA Hospital Admissions Report 2014-2016: Slides 14, 40. Comparisons have also been made with the 2014/17 Public Health England footcare profiles. NDFA amputations in England were equivalent to 11 per cent of major amputations and 21 per cent of minor amputations that had been identified by PHE.

2. The 2014-15 audit year covered eight full months from 14 July 2014 to 31 March 2015.

3. See National Diabetes Audit - 2015-2016: Report 1, Care Processes and Treatment Targets

Time to first expert assessment

Footnotes: Care Structures Survey

Care Structures Survey

2. Recommendations 1.3.3-7 from the NICE guidelines for Diabetic foot problems: prevention and management.
3. Recommendation 1.3.8 from the NICE guidelines for Diabetic foot problems: prevention and management.
5. ‘Full responders’ are organisations that responded to the structures survey, answering either yes or no to each of the three questions.
Footnotes: Alive and ulcer-free

**Alive and ulcer-free**

1. The capacity to record whether a patient was lost to follow up was added to the audit system in August 2016. Patients who have been lost and were recorded in the audit prior to this date may appear as an ‘unknown’ outcome instead of ‘lost to follow up’.
2. ‘Alive and ulcer-free’ includes those patients who have had surgery (including major and minor amputation), provided all wounds have healed.
3. Crude death rate. Office for National Statistics (ONS) mortality tracing is pending approval, so the number of reported deaths in NDFA may be underestimated.
4. The ‘Known’ denominator excludes ulcers with an unknown outcome, and those lost to follow-up who are no longer under the care of the foot care service.
5. The patient was alive and ulcer-free at 12 weeks, and developed further ulceration in the next 12 weeks.
6. Provider organisations are only included in this analysis if they saw at least 50 relevant ulcer episodes in 2014-2017.
7. Providers with outcome rates outside the interquartile range (IQR) by more than 1.5 times the IQR are shown as ‘out of range’.
Footnotes: Hospital admissions

Hospital admissions

1. From first assessment by the specialist foot care service in the NDFA prior to 2017. Includes admissions that were ongoing at first expert assessment. Please see Glossary: Which admissions are included? for further information.
2. Admitted to hospital for any reason.
3. Foot disease identified at any point during the admission. Please see Glossary: Foot disease-related admission for further information.
4. Only includes bed days within the 6 months following first expert assessment. Excludes day cases. Please see Glossary: Length of stay and bed days for further information.
5. The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases. Please see Glossary: Which admissions are included? for further information.
6. Low NDFA case ascertainment means that the total figure across the NHS could be ten times that reported in the audit. See Footnotes: Participation 1 for further information.
7. Providers with bed-days outside the interquartile range (IQR) by more than 1.5 times the IQR are shown as ‘out of range’.
Hospital procedures

1. Patients are included where their first assessment by the specialist foot care service in the NDFA took place prior to 2017. Admissions that were ongoing at first expert assessment are included. Please see Glossary: Which admissions are included? for further information.

2. A single patient may undergo multiple revascularisation/amputation procedures.

3. Only includes bed days within the 6 months following first expert assessment. Excludes day cases. Please see Glossary: Length of stay and bed days for further information.

4. The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases. Please see Glossary: Which admissions are included? for further information.

5. Low NDFA case ascertainment means that the total figure across the NHS could be ten times that reported in the audit. See Footnotes: Participation 1 for further information.
Glossary

Information and definitions
Glossary: Healthcare providers

NDFA data is submitted by **specialist foot care services** that treat people with diabetic foot ulcers. This includes community and hospital based organisations.

Service providers are the specialist foot care service’s parent organisation. This is typically an **NHS Trust** in England or a **Local Health Board** (LHB) in Wales. It may also be an independent healthcare provider (IHP).

**Commissioners** decide what health services are needed and ensure that they are provided. Clinical Commissioning Groups (CCG) in England and LHBs in Wales are responsible for commissioning healthcare services.

The National Institute for Health and Care Excellence (**NICE**) produces guidelines for the treatment of diabetic foot problems. All diabetes foot care services should follow these guidelines, so that people with diabetes receive the best possible foot care.
Glossary: Patient pathway

The **first expert assessment** of the foot ulcer is undertaken by the specialist foot care service. Patients may self-refer to the specialist foot care service (self-referral) or they may be referred following **presentation to a health professional** (e.g. GP community team, Accident and Emergency or another specialist foot care service).

At 12 and 24 weeks following the first expert assessment, the specialist foot care service will record whether the patient is **alive and ulcer-free** (i.e. all ulcers present at the start of this episode have fully healed and no other ulcers remain unhealed). Being ulcer-free also includes those patients who have had surgery (including major and minor amputation), provided all wounds have healed. **Persistent ulcers** are ulcers that have not healed.

**Healed at 12 weeks** includes all ulcer episodes reported as healed at 12 weeks. **Healed at 24 weeks** includes all ulcer episodes reported as healed at 24 weeks plus those reported as healed at 12 weeks, unless a new ulcer episode occurred within 12 weeks of their 12 week assessment.
People seen by the specialist foot care service are generally referred to the foot care team by a health professional.

This will often be by a general practitioner (GP) who has identified a foot ulcer. Less often it will be by a hospital consultant – where a patient is referred after attending an A&E department, or after they have been seen by a specialist in another department (such as orthopaedics, renal services or dermatology). People may also be referred by community nurses, or another part of the specialist diabetes service.

Some people are seen by the specialist service after they have ‘self-referred’. These people have usually had an earlier foot ulcer and know the foot care team, or may have been identified as high-risk and attend a foot protection service. They will have been encouraged to contact the specialist foot care service at the first sign of trouble.

Most people with diabetes that develop a new foot ulcer do not and cannot refer themselves directly to a specialist foot care service and must be referred by a health professional – usually their GP.
Glossary: Care structures

The three NDFA Care Structures Surveys conducted in 2015, 2016 and 2017 asked commissioners in England and Wales (NHS Trusts and Local Health Boards) whether the following three care structures were in place:

1. **Training for routine diabetic foot examinations** (NICE NG19 recommendations 1.3.3-7)
   Is there a CCG/LHB wide training programme designed to ensure that all responsible healthcare professionals have the necessary competence to undertake foot risk examinations as part of routine annual diabetes review?

2. **Foot protection service pathway** (NICE NG19 recommendations 1.3.8)
   Is there an established pathway for referral of all people with diabetes who are defined as being at increased risk during annual foot examination to a designated Foot Protection Service? Such referral should enable further expert assessment and long term risk management. Contractual standards should include:
   - Waiting times
   - Re-call and review processes
   - Referral thresholds and pathways into and back from the expert Multi-disciplinary Foot Care Team or Service (MDFT or MDFS).

3. **Referral for assessment pathway** (NICE NG19 recommendations 1.4.1-2)
   For a person with new, deteriorating or recurrent diabetic foot disease is there an established pathway which can allow referral to an expert assessment within 24 hours, if needed?
Glossary: Ulcer characteristics

Ulcer characteristics are measured at the first expert assessment by the specialist foot care service. Overall ulcer severity is recorded using the SINBAD scoring system, which scores an ulcer between 0 (least severe) and 6 (most severe) depending on how many of the 6 SINBAD elements are present. The 6 SINBAD elements are:

- **Site (on hindfoot)** – Ulcer penetrates the hindfoot (rear of the foot).
- **Ischaemia** – Impaired circulation in the foot.
- **Neuropathy** – Loss of protective sensation in the foot.
- **Bacterial infection** – Signs of bacterial infection of the foot (e.g. redness, swelling, heat, discharge).
- **Area (≥ 1cm²)** – Ulcer covers a large surface area (1cm² or more).
- **Depth (to tendon or bone)** – Ulcer penetrates to tendon or bone.

An ulcer with a SINBAD score of 3 or above is classed as a **severe ulcer**.
An ulcer with a SINBAD score of less than 3 is classed as a **less severe ulcer**.

**Charcot foot disease** is a type of serious bone deformity associated with neuropathy.
Where a result is flagged as **significant at 0.05 level**, there is only a 5 per cent probability that the result is due to chance.

**Logistic regression** is used to examine the relationship between an outcome (e.g. alive and healed at 12 weeks) and related variables (e.g. ulcer characteristics). Backwards elimination is used to remove variables found not to be significant at 0.05 level, producing a final model that includes variables with significant associations only.

Two outputs are particularly useful when interpreting the results of a logistic regression model:

- **The c-statistic** can be used to assess the goodness of fit, with values ranging from 0.5 to 1.0. A value of 0.5 indicates that the model is no better than chance at making a prediction of membership in a group and a value of 1.0 indicates that the model perfectly identifies those within a group and those not. Models are typically considered reasonable when the c-statistic is higher than 0.7 and strong when the c-statistic exceeds 0.8 (Hosmer and Lemeshow, 2000).

- **Odds ratios** (OR) illustrate how strongly a particular value of a variable is associated with the outcome. The further from one the ratio is (either above or below), the stronger the association between it and the outcome. For example, an odds ratio of 0.764 would suggest a stronger association than an odds ratio of 0.830. An odds ratio of one would show that the variable value has no bearing on how likely the outcome is.

There is always a degree of uncertainty in the calculated odds ratio. This is described by the **confidence interval**. The wider the confidence interval, the less certainty there is in the odds ratio. If the confidence intervals are either side of 1 this indicates that the value taken by the variable has no bearing on how likely the outcome is. Where the confidence interval approaches 1 this indicates that the association with the outcome may be weak.
Glossary: Statistical terms (2)

Quartiles: Lists of values can be ranked numerically from lowest to highest.

• The **median** is the middle value in the ranked list.
• The **lower quartile** is the middle value of the lower half of the ranked list.
• The **upper quartile** is the middle value of the upper half of the ranked list.
• The **interquartile range** represents values between the lower and upper quartiles – the middle 50 per cent of the values in the ranked list.

• The interquartile range, along with minimum and maximum range values, can be plotted on a **box and whisker plot** – see example right.
• Values outside 1.5xIQR below the lower quartile and 1.5xIQR above the upper quartile are shown as points outside the plot.

• The **mean** is the average of the values in the list. The mean may be higher or lower than the median, depending on the extent to which the data is skewed (e.g. by very large values).
**Glossary: Which admissions are included?**

**All admissions** includes all hospital stays within or overlapping with the 6 month period after first assessment by the specialist foot care team (Stories A, B, and C below). Subsets include:

- **Foot disease** admissions, where foot disease is identified at any point during the hospital admission, including outside the 6 month window (Stories A, B, and C below, where event X is the start of the episode of care where foot disease is identified). This ensures that all admissions where foot disease is a significant factor are included.

- **Revascularisation and amputation** admissions, where the related procedures occur within the 6 month window (Stories A and B below, where event X is the relevant procedure date). Using this criteria ensures that the currency used for analysis (procedures undertaken within 6 months) is simple and easy to understand.

### Diagram

**Months**

<table>
<thead>
<tr>
<th>Story</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Admission and event X occurs within 6 month window</td>
</tr>
<tr>
<td>B.</td>
<td>Admission overlaps with 6 month window, event X occurs within 6 month window</td>
</tr>
<tr>
<td>C.</td>
<td>Admission overlaps with 6 month window, event X occurs outside 6 month window</td>
</tr>
<tr>
<td>D.</td>
<td>Admission and event X outside 6 month window</td>
</tr>
</tbody>
</table>

6 month window

First expert assessment

6 months post-assessment

<table>
<thead>
<tr>
<th>Admission included?</th>
<th>All admissions</th>
<th>Where event X is…</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Foot disease</td>
<td>Revascularisation</td>
</tr>
<tr>
<td>A.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>B.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>C.</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>D.</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

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**Glossary: Length of stay and bed days**

The full duration of the hospital admission contributes towards the **length of stay**, including days outside the 6 month window. This ensures that hospital stays that overlap with the beginning or end of the 6 month window are not artificially shortened. Length of stay is reported using the median (middle) value, which prevents skewing of results by very long stays.

**Bed days** are only counted if they occur within 6 months of first assessment by the specialist foot care service. This ensures that the currency (bed days within 6 months of first expert assessment) is easy to understand and also prevents patients with very long stays (e.g. long-term mental health admissions) from inflating the total.

<table>
<thead>
<tr>
<th>Story</th>
<th>Admission included?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admitted and discharged within 6 month window</td>
<td>Yes</td>
</tr>
<tr>
<td>Admission overlaps with assessment, concluded within 6 months</td>
<td>Yes</td>
</tr>
<tr>
<td>Admission overlaps with end of 6 month window</td>
<td>Yes</td>
</tr>
<tr>
<td>Admitted and discharged outside 6 month window</td>
<td>No</td>
</tr>
</tbody>
</table>

**6 month window**

**First expert assessment**

**6 months post-assessment**

**Key**

- **Length of stay counted?**
  - Yes
  - No

- **Bed days counted?**
  - Yes
  - No
Glossary: Foot disease-related admissions

**Diabetic foot disease** is defined as a foot affected by ulceration that is associated with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes¹.

People with diabetic foot ulcers sometimes require admission to hospital to treat their foot disease. This occurs when the condition of the foot threatens survival of either the foot or the patient. Such deterioration is often a result of infection (requiring intravenous antibiotics, with or without local surgery) or poor arterial blood flow. Resultant hospital stays and rehabilitation may be lengthy. In extreme cases amputation is required.

To identify foot disease-related admissions, all episodes of hospital care have been searched for the following clinical procedures or diagnoses predominantly associated with inpatient management of diabetes related foot disease²:

**Foot disease clinical diagnoses**
- Diabetes mellitus with peripheral circulatory complications
- Ulcer of the lower limb
- Decubitus ulcer
- Cellulitis
- Osteomyelitis
- Gangrene
- Atherosclerosis

**Foot disease clinical procedures**
- Debridement of a foot/leg wound
- Minor and major amputation of lower limb

**Notes:**
2. Public Health England (2017). Patients may have other conditions which are contributing factors towards their hospital stay.
Glossary: Revascularisation procedures

People with diabetes are more likely to experience problems with poor circulation than people who don’t have diabetes. Circulation problems can be treated non-surgically, but in some cases a person will need to undergo a surgical procedure in hospital to improve blood flow to tissue where it has become restricted.

Revascularisation describes the types of operations that restore blood flow\(^1\). Most revascularisation procedures can be grouped into two types:

1) **Angioplasty**, which involves inserting a balloon where blood flow is restricted and then inflating it to widen the blood vessel. It is usually a relatively non-invasive procedure.

2) **Vascular bypass**, which is an open procedure that involves making a blood vessel graft which travels around, or bypasses, the blood vessels which are restricted or blocked. It is generally a more complex procedure than an angioplasty.

3) Other types of **open procedure** including endarterectomy, a surgery which involve opening the artery and cleaning the away the deposits which are causing the blockage.

For reporting purposes, revascularisation must occur within 6 months of first expert assessment by the specialist foot care service. Any one patient may have more than one revascularisation-related admission and/or revascularisation procedure.

Notes: 1. The revascularisation coding used in the report was supplied by the National Vascular Registry.
Amputation, or surgical removal, of part of the foot or leg may be required when a diabetic foot ulcer cannot otherwise be successfully treated. When this is the case then an operation is needed to surgically excise bone and soft tissue in order to allow healing.

This may be a **minor amputation (below the ankle)** in which toes or part of the foot are removed in an attempt to save the leg. When this is not possible, **major amputation (above the ankle)** may be required.

Amputation is a life-changing event, with significant physical and psychological effects. Long hospital stays and periods of rehabilitation can result.

For reporting purposes, amputation must occur within 6 months of first expert assessment by the specialist foot care service. Any one patient may have more than one amputation-related admission and/or amputation procedure.
Further information
Audit references
Further information: Summary

For more information on the National Diabetes Foot Care Audit or access to the Service Level Analysis, please visit the NDFA webpage at http://content.digital.nhs.uk/footcare.

For further information about this report, please contact NHS Digital’s Contact Centre on 0300 303 5678 or email enquiries@nhsdigital.nhs.uk.
Further information: References

• NICE Guidelines: Diabetic foot problems: prevention and management; January 2016; http://www.nice.org.uk/guidance/ng19
• South East Coast Strategic Clinical Networks (2015) Patients with Diabetes Foot Care. Commissioning Guidance and Sample Service Specification
Further information: Acknowledgements

The NDFA team would like to thank all the teams who have worked hard to contribute to this unique and valuable insight into the care and outcomes of people with diabetic foot ulcers.

Development and delivery of the NDFA is guided by a multi-professional advisory group of clinicians and patient representatives, chaired by Professor William Jeffcoate. The NDFA Advisory Group members include:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>William Jeffcoate</td>
<td>Consultant Diabetologist, Nottingham University Hospitals NHS Trust, and Clinical Lead, N DFA</td>
</tr>
<tr>
<td>Bob Young</td>
<td>Consultant Diabetologist and Specialist Clinical Lead, N DA</td>
</tr>
<tr>
<td>Roger Gadsby</td>
<td>GP Clinical Lead, N DA</td>
</tr>
<tr>
<td>Emma Barron</td>
<td>Head of Health Intelligence, National Cardiovascular Intelligence Network (NCVIN), PHE</td>
</tr>
<tr>
<td>Sue Brown</td>
<td>Patient representative</td>
</tr>
<tr>
<td>Sophie Colling</td>
<td>NDA Project Support Officer, Diabetes UK</td>
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<tr>
<td>Laura Fargher</td>
<td>NDA Engagement Manager, Diabetes UK</td>
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<td>Michelle Goodeve</td>
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<td>Alex Harrington</td>
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<td>Naomi Holman</td>
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The Healthcare Quality Improvement Partnership (HQIP). The National Diabetes Foot Care Audit is part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP) which is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHS England. HQIP is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact that clinical audit has on healthcare quality in England and Wales. HQIP holds the contract to manage and develop the NCAPOP Programme, comprising more than 30 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual audits, also funded by the Health Department of the Scottish Government, DHSSPS Northern Ireland and the Channel Islands.

NHS Digital is the trading name of the Health and Social Care Information Centre. It is the trusted source of authoritative data and information relating to health and care. NHS Digital managed the publication of the NDFA Third Annual Report.

Diabetes UK is the largest organisation in the UK working for people with diabetes, funding research, campaigning and helping people live with the condition.

Supported by:

The national cardiovascular intelligence network (NCVIN) is a partnership of leading national cardiovascular organisations which analyses information and data and turns it into meaningful timely health intelligence for commissioners, policy makers, clinicians and health professionals to improve services and outcomes.