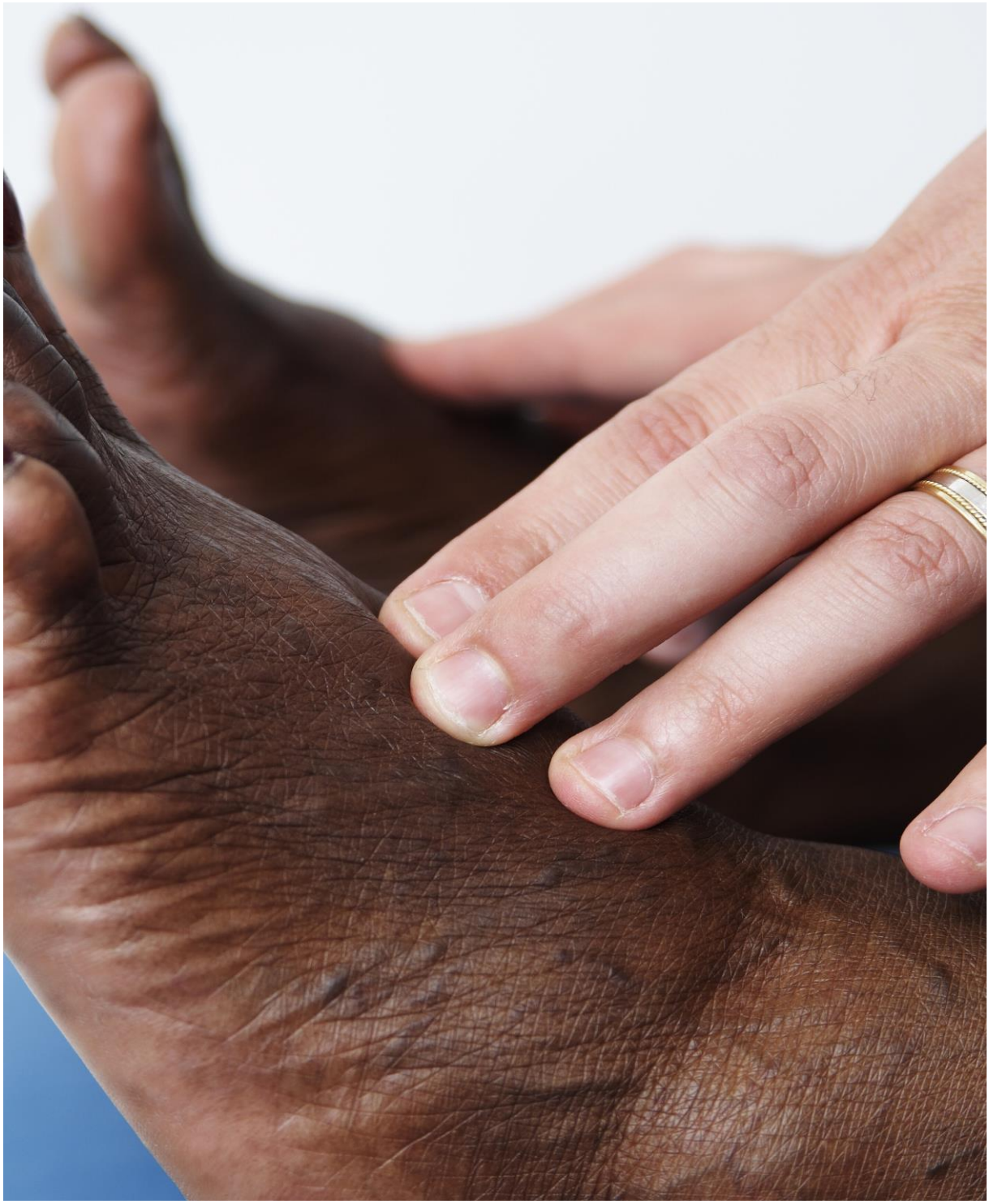
National Diabetes Foot Care Audit Report

2014-2015

England and Wales



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The Health and Social Care Information Centre (HSCIC) is the trusted source of authoritative data and information relating to health and care. The HSCIC managed the publication of the 2014-2015 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.

Contents

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Foreword

The impact of diabetic foot disease on people with diabetes is profound. It can be associated with disability, amputation and premature mortality. Its cost to the health service is considerable. Reassuringly, over the last ten years or so, we have seen much greater appreciation of the significance of diabetic foot disease, with strategies for its prevention and management the subject of repeated NICE guidelines.

Although the National Diabetes Audit (NDA) has from its inception included data on annual foot risk checks and rates of amputation, there has been no measurement system for the steps in between – the development and management of foot ulcers. I welcome this first report of the National Diabetes Foot Care Audit (NDFA), which for the first time provides measurements as to whether the NICE recommended clinical pathways are in place locally and how effective those pathways are in managing new diabetic foot ulcers. Future NDFA reports will also include detail on the incidence of ulcer recurrence, hospital admission, amputation and mortality.

It is encouraging that so many services (129) have participated in this first NDFA. Although the NDA team have tried to limit the local burden, it still requires appreciable commitment and organisation to take part. But the benefit of being able to benchmark referral pathways and healing times against peer services will provide much needed rigour and focus to local improvement efforts. This is clearly needed, and the NDFA shines a spotlight on key system challenges in this area such as provision of expert teams, delays in reaching expert teams and the impact of delays on healing times, ulcer severity and amputation. This first round suggests that there may be appreciable variations in all of these key parameters and suggests that there are substantial opportunities for improvement. Many of the most beneficial changes will likely require better multidisciplinary cross-organisational effort.

I am grateful to the NDA team for establishing this important national audit, and of course extremely grateful to the local teams that have worked hard to provide the data for analysis. We can now look forward to witnessing the improvement programmes that should follow, so that future results can document improvement in the outcomes for people with diabetic foot disease.

Professor Jonathan Valabhji
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Executive summary

Key messages

The first cycle of the NDFA includes data on over 5,000 people presenting with a new diabetic foot ulcer episode between 14 July 2014 and 10 April 2015. Almost 130 clinical foot care teams participated and 129 Clinical Commissioning Groups (CCGs) and Local Health Boards (LHBs) contributed to the NDFA Structures Survey.

Although estimated case ascertainment is low (10 per cent), the data collected in the first nine months of the new audit has provided a valuable initial insight into the links between the structures and processes of care and the clinical outcomes of people with diabetic foot ulcers in England and Wales.

Key findings

Audit findings can be grouped by the three key questions posed at audit inception:

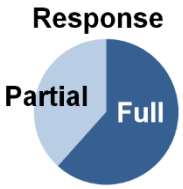
Structures Survey: are the nationally recommended care structures in place for the management of diabetic foot disease?

The current NICE guidelines recommend that commissioners and service providers ensure that there are robust protocols and clear local pathways for the continued and integrated care of people with diabetic foot disease across all settings. It is therefore necessary that:

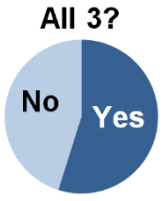
- Staff involved in the routine care of diabetes should be sufficiently skilled to undertake annual foot risk assessments and to refer those at increased risk of developing a diabetic foot ulcer to the foot protection service[1].
- A foot protection service is in existence for the assessment and continuing surveillance of those defined as being at increased risk in order to prevent diabetic foot ulcers, and to manage some of them in the community[2].
- A pathway for referral of people with diabetes with an active foot problem to a multidisciplinary foot care service or foot protection service within one working day and triaged within one further working day[3].

The audit found that the structures needed for the provision of such services were not universal.

- Almost 40 per cent of participating commissioning organisations were unable to give a definitive response (yes or no) to all of the NDFA Structures Survey questions.



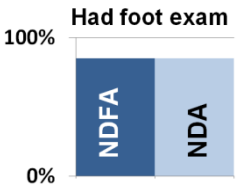
- More than 40 per cent of localities who could respond to all three questions did not have all three of the basic NICE recommended systems for preventing and managing diabetic foot disease.



[1] NICE (2015) Diabetic foot problems: prevention and management. Recommendation 1.3.3-1.3.7 http://www.nice.org.uk/guidance/ng19
[2] NICE (2015) Diabetic foot problems: prevention and management. Recommendation 1.2.1 www.nice.org.uk/guidance/ng19
[3] Ibid.

Processes: does the treatment of active diabetic foot disease comply with nationally recommended guidance?

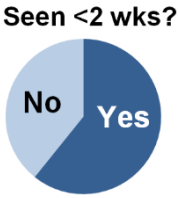
1. Annual foot checks
   - The audit found that people with diabetes presenting with a foot ulcer are just as likely to have had a NICE recommended routine foot check[4] in the preceding year as other people with diabetes (85 per cent in both groups).



At this stage it is not possible to conclude that the examination has no influence. Data quality concerns and variable referral pathways for people categorised as at an 'increased' or 'high risk' mean that further investigation is required.

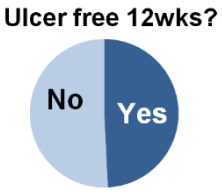
2. People with a newly occurring foot ulcer should be referred and triaged within two days

The audit found that:



- Almost 30 per cent of patients self-presented.
- Two fifths of patients who did not self-present were not seen by the foot care service until two weeks or more after the first healthcare contact for their ulcer.
- More than one in 10 of those who did not self-present were not seen for two months or more from the first healthcare contact**.**
- The longer the delay before being seen by the diabetic foot care team, the more likely were the foot ulcers to be severe.

Outcomes: are the outcomes of diabetic foot disease optimised?



The audit found that:

- One half of all patients were ulcer free at 12 weeks from first expert assessment.
- Patients who self-presented or who were seen by the specialist foot care service within two weeks of first assessment by another healthcare professional had higher rates of ulcer healing than those seen later.
- Patients presenting with more severe ulcers were almost twice as likely not to be ulcer free at 12 weeks after first expert assessment.

[4] NICE (2015) Diabetic foot problems: prevention and management. Recommendation 1.4.2 http://www.nice.org.uk/guidance/ng19

Recommendations

The following recommendations are made as a result of the findings of the audit.

Recommendations for people with diabetes

- People with diabetes should ensure that they have their feet checked at least once a year by a professional.
- People with diabetes should seek professional advice as soon as they notice any problems with their feet.

Recommendations for healthcare professionals

- All healthcare professionals should be aware of the need for prompt expert assessment of newly occurring foot ulcers in people with diabetes and should know how this assessment can be arranged.

Recommendations for commissioners

- Commissioners should ensure that NICE recommended diabetic foot care teams and pathways are in place.
- Commissioners should encourage all foot care services to register and submit details on as many as possible of their foot ulcer cases to the NDFA

Introduction

Background

The National Diabetes Foot Care Audit (NDFA) is part of the National Diabetes Audit programme (NDA).The NDA is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP) following advice to the Department of Health from the National Advisory Group on Clinical Audit and Enquiries (NAGCAE). The NDA is delivered by the Health and Social Care Information Centre (HSCIC), in partnership with Diabetes UK and the National Cardiovascular Intelligence Network (part of Public Health England).

Foot ulceration is common in people with diabetes. Around 10 per cent of people with diabetes will have a diabetic foot ulcer at some point in their lives[5] and the cost to the NHS is estimated at around £650 million (or £1 in every £150 the NHS spends)[6].

In this context, the NDFA has been designed to deliver a reliable, low burden measurement system for diabetic foot disease. The measurements include the basic structure of care services, the management of each person presenting with active disease of the foot and the outcomes.

This report is the first annual report from a continuous audit of diabetic foot disease in England and Wales. All organisations that provide a diabetic foot ulcer treatment service are eligible for inclusion in the audit.

The audit is a measurement system to support improvement in the quality of care of foot ulcers in people with diabetes and seeks to address three key questions:

- Structures: are the nationally recommended care structures in place for the management of diabetic foot disease?
- Processes: does the treatment of active diabetic foot disease comply with nationally recommended guidance?
- Outcomes: are the outcomes of diabetic foot disease optimised?

The report will be of importance to the public, especially to people with diabetes, to health planners and policy makers, as well as acute trusts, CCGs, LHBs, Strategic Clinical Networks (SCNs), primary care teams, and specialist diabetes and foot care services. The results of the audit will be used to monitor the quality of care provided for diabetic foot disease against NICE guidance[7].

The audit of the structure of care (NDFA Structures Survey) was conducted in October and November 2015 when all CCGs and LHBs responsible for the provision of foot care services were asked to complete a short survey consisting of three questions.

The audit of processes and outcomes is centred on people with diabetes who were first assessed by a specialist foot care team between 14 July 2014 and 10 April 2015. The baseline characteristics and outcomes after 12 week follow up were recorded. Data on outcomes at 24 weeks follow up are also recorded in the audit, and will be included in the next annual report.

[5] NICE Guidelines: Diabetic foot problems: prevention and management; August 2015; http://www.nice.org.uk/guidance/ng19

[6] Kerr M (2012) Foot Care for people with diabetes: the economic Case for Change. NHS Diabetes and Kidney Care. http://www.diabetes.org.uk/Documents/nhs-diabetes/footcare/footcare-for-people-with-diabetes.pdf

[7] NICE Guidelines: Diabetic foot problems: prevention and management; August 2015; http://www.nice.org.uk/guidance/ng19

Full data on outcomes, including hospital admissions and amputation, is dependent on Hospital Episode Statistics (HES) and the Patient Episode Database for Wales (PEDW) and the details covering the audit period will not be available until late 2016. The result is that data on these outcomes could not be included in this first report but will be included in the next annual report.

Data collection

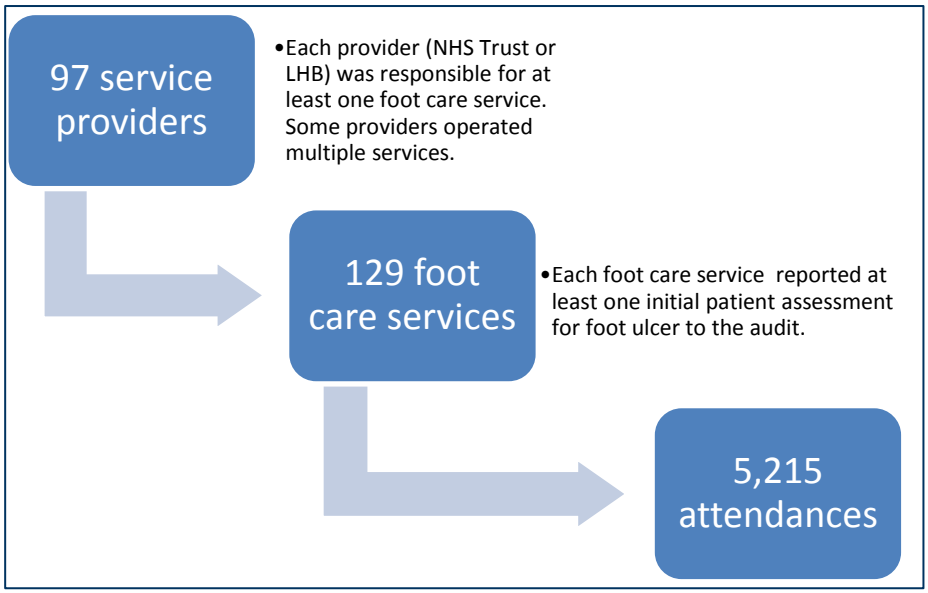
The majority of the data for the NDFA is collected and submitted by foot care teams. Each participating team obtains explicit consent from each person prior to data being collected. If the person does not consent, their information is not collected.

Some data items are obtained by linking the NDFA audit data to the NDA. Linkage to HES and PEDW will be undertaken in subsequent years.

Data for the NDFA Structures Survey is collected from CCGs and LHBs. The deadline for submissions for inclusion in this report was 4 December 2015.

Participation

97 providers of foot care services submitted data for the first audit report on behalf of 129 specialist foot care teams. 5,015 patients with 5,215 first attendances for foot ulcer assessment were reported.

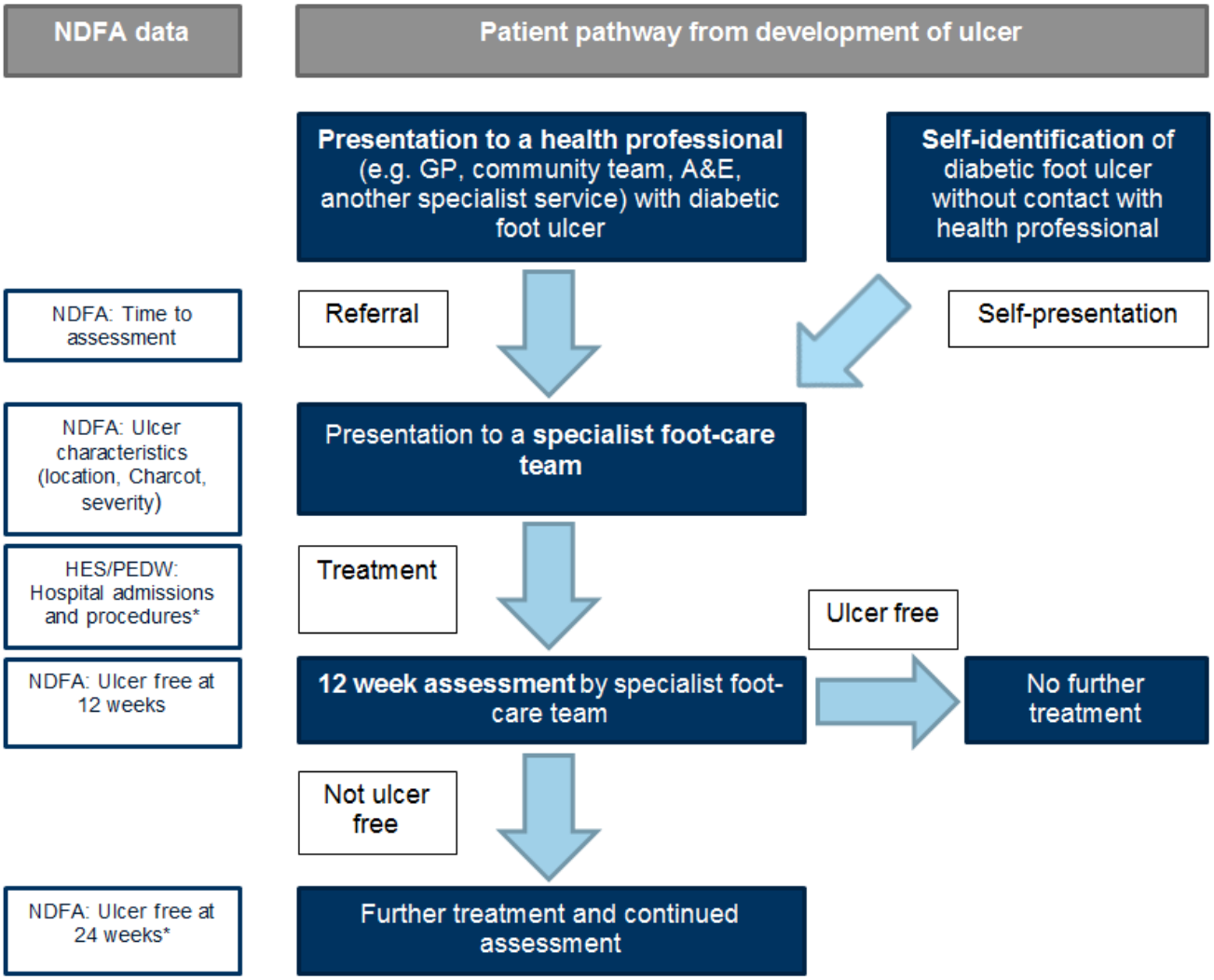


There is no definitive list of units eligible for the NDFA, so it is not possible to accurately assess provider participation. 60 per cent of CCGs and LHBs participated in the NDFA Structures Survey.

NDFA patient pathway from development of ulcer

The flowchart below (Figure 1) gives an overview of the patient pathway for diabetic foot ulcer patients from first presentation to a health professional until the 12 week assessment by the specialist foot care team. The related NDFA data items are shown on the left hand side of diagram.

Figure 1: Patient pathway from development of ulcer to 12 week assessment



* To be published in the 2017 NDFA report

Participation – Results and Findings

NDFA Structures Survey

Commissioners of care for diabetic foot disease were asked to complete answers online to three questions on the NICE specified structures of care provided in their area (see Appendix 2).

The audit received answers from 125 CCGs in England (59.8 per cent), four LHBs in Wales (57.1 per cent) and another four commissioning hubs representing unknown CCGs.

Key finding and recommendation

Audit finding: About 60 per cent of CCGs and LHBs participated in the NDFA Structures Survey**.**

Audit recommendation: All CCGs and LHBs are encouraged to make submissions to the NDFA Structures Survey.

NDFA processes and outcomes collection

All organisations that provide a diabetic foot ulcer treatment service are eligible for inclusion in the NDFA processes and outcomes collection. 129 foot care services submitted data for the first audit report representing 97 service providers (see Table 1). Additional foot care services registered with the audit but they did not submit data prior to the collection deadline (31 July 2015). Due to the varied nature of specialist foot care services and how these are commissioned and run, it is difficult to determine the exact percentage of eligible providers that have registered or made a submission.

Recommendation

Audit recommendation: All foot care services are encouraged to register and make submissions to the audit.

Table 1: Registration and participation in the audit by country, England and Wales, 2014-2015

	Foot care services*		Service providers^	
Country	Registered[#]	Participated	Registered[#]	Participated
England	202	112	119	90
Wales	19	17	7	7
England and Wales	221	129	126	97

* Individual foot care services that treat people with diabetic foot ulcers.
^ NHS trusts in England and local health boards (LHB) in Wales.
[#] Registered to submit data to the NDFA.

A full list of participating NHS trusts, LHBs, independent healthcare providers (IHPs) and their foot care services can be found in Appendix 3. A map showing participating service providers by the distribution of their foot care services is provided in Appendix 4.

Jargon buster

Foot care services are individual specialist services that treat people with diabetic foot ulcers. This includes community and hospital based organisations, as well as any GP practice that provides a specialist diabetic foot treatment service.

Service providers are the foot care service's parent organisation. This is typically an NHS trust in England, a local health board (LHB) in Wales or an independent healthcare provider (IHP). A single service provider may be responsible for multiple foot care services.

Commissioners decide what health services are needed and ensure that they are provided. 209 Clinical Commissioning Groups (CCGs) in England and seven local health boards (LHBs) in Wales are responsible for commissioning healthcare services.

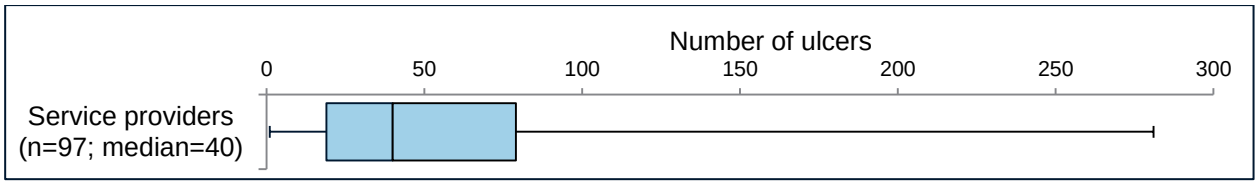
NDFA submissions

The audit collected data when the patient first presented to the specialist service for a new episode of diabetic foot ulceration. This might be their first encounter with the foot care service or a later attendance after a period of having been ulcer free.

5,215 attendances between 14 July 2014 and 10 April 2015 were recorded in the audit, for 5,015 patients. The large majority of patients (96.3 per cent) had only one episode of foot ulceration recorded during the audit period, with the remainder (3.7 per cent) having two or three ulcer episodes reported.

Per service provider, the mean number of ulcers for which data were recorded was 53.8, with a median of 40. The overall distribution of such ulcers is shown in the box and whisker plot below (Figure 2), where the middle 50 per cent, or interquartile range, is represented by the box. More than a quarter of service providers recorded fewer than 20 attendances each, whilst the 21 largest submitters were responsible for over half of all attendances in the audit. As this was the first year of the NDFA, it should be noted that providers began participating throughout the audit period, and as such, the duration of participation could vary by up to nine months between providers.

Figure 2: Distribution of ulcer numbers submitted by service providers, England and Wales, 2014-2015



The geographic distribution of audit submissions is shown in Table 2 below. England is split into Strategic Clinical Networks (SCN) and Wales is reported as a whole. The area with the highest number of submissions (South West SCN with 700) reported nine times as many ulcers as the lowest submitting area (Thames Valley SCN).

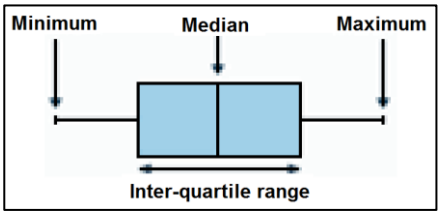


Table 2: Participation in the audit by country/network, England and Wales, 2014-2015

Country / Network^	Number of service providers submitting data to the audit	Number of foot care services submitting data to the audit	Number of ulcers
Cheshire and Merseyside	3	3	169
East Midlands	8	8	562
East of England	11	15	486
Greater Manchester, Lancashire and South Cumbria	9	15	573
London	10	12	439
Northern England	8	11	464
South East Coast	11	11	317
South West	9	10	700
Thames Valley	2	3	77
Wessex	2	2	118
West Midlands	7	8	342
Yorkshire and the Humber	10	14	638
England	**90**	**112**	**4,885**
Wales	**7**	**17**	**330**
England and Wales	**97**	**129**	**5,215**

^Service providers and associated foot care services in England are mapped to Strategic Clinical Networks (SCNs) using the service provider's postcode.

Case ascertainment

The annual incidence of diabetic foot ulceration has been estimated at 2.2 per cent[8], which suggests that NDFA case ascertainment in the first nine months from the launch was approximately 10 per cent[9].

Linkage to the core National Diabetes Audit

By linking to the core National Diabetes Audit (NDA), the NDFA is able to include and analyse NDA data without placing an additional collection burden on service providers. NDFA patients were linked to the latest three NDA core cohorts (2012-13, 2013-14 and 2014-15) using NHS number, with the latest data items used for the NDFA analysis. A full list of the NDA data items included is provided in Appendix 6.

Key finding

Audit finding: 90 per cent of individuals recorded with a foot ulcer on the NDFA had core data registered on the National Diabetes Audit.

In total, 4,522 (90.2 per cent) NDFA patients could be linked to the NDA, leaving 493 (9.8 per cent) that could not be linked[10].

Table 3: Number of new ulcer presentations included in the audit, England and Wales, 2014-2015

	All NDFA[i]	NDFA[i] linked to NDA[ii] data	
	Number	Number	Per cent
People	5,015	4,522	90.2
Ulcers	5,215	4,699	90.1

[i] People with diabetes presenting with a foot ulcer.
[ii] All people with diabetes.

[8] Abbott CA, Carrington AL, Ashe H, et al. The North-West Diabetes Foot Care Study: incidence of, and risk factors for, new diabetic foot ulceration in a community-based cohort. *Diabet Med* 2002; 19: 377–84.
[9] Using diabetes prevalence figures collected by the Quality and Outcomes Framework (QOF) and published on https://www.diabetes.org.uk/About_us/What-we-say/Statistics/2015-as-published-2016/ (accessed 21 January 2016), then adjusted for the 9 month NDFA collection period.
[10] Although the NDA is a national collection, coverage is not complete, standing at 70.7 per cent for 2012-13, 57.1 per cent for 2013-14 and 57.3 per cent for 2014-15. Consequently not all NDFA patients could be linked to the NDA.

Characteristics of people with diabetes presenting with foot ulcers – Results and Findings

Linkage to NDA was used to investigate differences between people in the NDFA cohort and the diabetes population as a whole.

In comparison to the wider population of people with diabetes, the audit found that people presenting with a foot ulcer are:

- More likely to have Type 1 diabetes (13.0 per cent in NDFA compared to 8.6 per cent in NDA).
- More likely to be male (69.6 per cent compared to 55.7 per cent).
- Older on average (67.3 years compared to 63.6 years), particularly those with Type 1 diabetes (55.7 years compared to 42.9 years).
- Likely to have had diabetes for longer (an average of 15.0 years compared to 8.6 years), particularly those with Type 1 diabetes (26.5 years compared to 17.6 years).
- Less likely to be from an Asian or black ethnic background (For Type 2 diabetes: White NDFA 69.0 per cent, NDA 60.8 per cent; Asian NDFA 2.8 per cent, NDA 9.9 per cent; Black NDFA 2.7 per cent, NDA 4.2 per cent).
- More likely to be from the most deprived fifth of the population (26 per cent compared to 22.9 per cent).
- Slightly heavier on average (average BMI of 31.1 kg/m2 compared to 30.8 kg/m2),
- More likely to be a current or past smoker where diabetes is Type 1 (43.5 per cent compared to 33.1 per cent).
- Less likely to have achieved their NICE recommended treatment targets for HbA1c during the previous year (44.1 per cent compared to 64.1 per cent).

Further details on the above findings can be found in Appendix 9.

Perspectives from people with diabetes

The importance of early expert assessment:

"Having regular foot checks since diagnosis of Type 1 diabetes 44 years ago has meant that any problems with my feet have been noticed early and not led to further problems. In recent years when calluses have formed under my feet, causing my feet to become very sensitive, it has been really helpful to get expert advice on how to care for this condition".

Structure - Results and Findings

Service provision and commissioners

The NDFA Structures Survey asked commissioners of care for diabetic foot disease (CCGs in England and LHBs in Wales) whether the following NICE recommended structures of care were in place in their area:

- A training scheme ensuring healthcare professionals have the necessary competence to undertake routine foot examinations[11] during annual diabetes reviews.
- An established referral pathway for patients identified as higher risk during annual foot examination into a designated foot protection service[12].
- An established referral pathway for patients with new, deteriorating or recurrent foot disease to expert assessment within, when necessary, 24 hours[13].

Caution is advised when interpreting these results; less than 60 per cent of commissioners participated (see Participation on page 15), so this is not a comprehensive national picture. The proportion of 'don't know', blank and conflicting responses also makes interpretation difficult. This may suggest confusion amongst commissioners in relation to services that manage diabetic foot disease. 51 of the 133 participating organisations (38.3 per cent) were unable to give a definitive response (yes or no) to one or more of the NDFA Structures Survey questions.

Key finding and recommendation

Audit finding: Almost 40 per cent of participating organisations were unable to give a definitive response (yes or no) to one or more of the NDFA Structures Survey questions.

Audit recommendation: Commissioners should improve their understanding of locally commissioned services that manage diabetic foot disease.

The results of the NDFA Structures Survey are summarised in Table 4 below.

Table 4: Number of CCG and LHB responses to the NDFA Structures Survey

	Foot care service					
	Training for routine diabetic foot examinations		Foot protection service Pathway		Pathway for assessment within 24 hrs	
Service provided?	Number	Per cent	Number	Per cent	Number	Per cent
Yes	76	57.1	103	77.4	72	54.1
No	25	18.8	13	9.8	33	24.8
Don't know	27	20.3	8	6.0	12	9.0
Conflicting responses	5	3.8	5	3.8	2	1.5
No response	0	0.0	4	3.0	14	10.5
Total	**133**		**133**		**133**	

82 of the 133 (61.7 per cent) participating organisations were able to give definitive responses (yes or no) for each of the three questions. Table 4 shows the number and proportion of the 82 organisations answering 'yes' to having 0, 1, 2 or 3 of the NICE recommended diabetic foot care services.

[11] NICE (2015) Diabetic foot problems: prevention and management: Implementation, http://www.nice.org.uk/guidance/ng19/chapter/Implementation-getting-started 1.3.3-1.3.7
[12] NICE (2015) Diabetic foot problems: prevention and management, www.nice.org.uk/guidance/ng19 1.2.1
[13] Ibid 1.4.1

Table 5: Foot care service provision among responders answering all three questions

	Answered 'Yes' to …								Total
	0 questions		1 question		2 questions		3 questions		
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	
Organisations	4	4.9	8	9.8	25	30.5	45	54.9	82

Table 5 shows that only 45 (54.9 per cent) of the 82 complete responders had all three pathways in place.

Figure 14 in Appendix 5 shows the geographical distribution of responses from the 82 commissioners which answered each of the NDFA Structures Survey questions, with the locations of service providers that participated in the Audit highlighted in Figure 13 in Appendix 4.

Key finding and recommendation

Audit finding: Of the sites that responded definitively to the NDFA Structures Survey, more than 40 per cent of fully responding localities do not have all three of the basic NICE recommended systems for preventing and managing diabetic foot disease.

Audit recommendation: Commissioners should ensure that NICE recommended diabetic foot care teams and pathways are in place.

Processes – Results and Findings

Foot risk assessment

Current NICE guidance is to undertake foot assessments annually, with more frequent assessments for those assessed as being at a moderate or high risk of developing a diabetic foot problem[14].

Linkage to NDA was used to investigate the proportion of people in the NDFA cohort that had undergone a foot assessment in the preceding NDA collection period (January 2013 to March 2014)[15].

Table 6 shows that people with diabetes presenting with a foot ulcer are just as likely to have had a NICE recommended annual foot check in the preceding year as other people with diabetes (84.9 per cent in both groups).

Key finding and recommendation

Key finding: People with diabetes presenting with a foot ulcer are just as likely as to have had a NICE recommended routine foot check in the preceding year as other people with diabetes (85 per cent in both groups).

Audit recommendation: People with diabetes should ensure that they have their feet checked at least once a year by a professional.

Table 6: Foot risk assessment recorded in the NDA, January 2013 – March 2014, England and Wales, NDFA patients first seen in 2014-2015

Annual foot risk assessment undertaken	All diabetes (N=2,683)			Type 1 (N=374)			Type 2 and other (N=2,309)		
	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]
	Number	Per cent	Per cent	Number	Per cent	Per cent	Number	Per cent	Per cent
	2,277	84.9	84.9	308	**82.4**	**70.7**	1,969	85.3	86.2

^ Where the values in a row in the table are **bolded**, the difference between the comparable NDFA and NDA percentages are statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

[14] NICE recommended care processes http://pathways.nice.org.uk/pathways/foot-care-for-people-with-diabetes.
[15] The January 2013 to March 2014 NDA cohort was used to ensure that NDA recorded foot reviews took place prior to the NDFA attendance

Ulcer characteristics and time to first assessment

Index and multiple ulcers

As part of the data collection for the NDFA, details of the patient's index (most severe) ulcer were recorded. Patients could present with a single index ulcer or with multiple ulcers of equal severity on one or both feet.

Table 7 shows that the majority of patients (88.8 per cent) presented with a single index ulcer. This was almost eight times as many as those who presented with multiple foot ulcers (11.2 per cent).

Table 7: Location of index (most severe) ulcer, England and Wales, 2014-2015†^

Ulcer type	All diabetes (N=5,215)		Type 1 (N=610) †		Type 2 and other (N=4,089) †	
	Number	Per cent	Number	Per cent	Number	Per cent
Index ulcer (single foot)	4,632	88.8	539	88.4	3,643	89.1
Multiple ulcers (either foot)*	583	11.2	71	11.6	446	10.9

* Includes where index ulcer recorded on both right and left foot.

^ Where the percentages in a row in the table are **bolded**, the difference between the Type 1 and Type 2 percentages is statistically significant (ρ <0.05).

† Not all ulcers could be matched to a diabetes type, so the sum of Type 1 and Type 2 ulcers does not equal the total for all diabetes.

Charcot foot disease

Information on Charcot foot disease was collected to examine the impact of Charcot on the healing of associated ulcers. The returned data is summarised in Table 8 below.

Table 8: Current or previous Charcot foot disease, England and Wales, 2014-2015†^

Charcot status		All diabetes (N=5,215)		Type 1 (N=610) †		Type 2 and other (N=4,089) †	
		Number	Per cent	Number	Per cent	Number	Per cent
No Charcot		3,957	75.9	437	**71.6**	3,098	**75.8**
Possible Charcot foot		80	1.5	18	**3.0**	56	**1.4**
Single ulcer	Active Charcot foot on index ulcer foot	43	0.8	8	1.3	34	0.8
	Inactive Charcot foot on index ulcer foot	152	2.9	29	**4.8**	107	**2.6**
	Active Charcot foot on other foot only	14	0.3	1	0.2	12	0.3
	Inactive Charcot foot on other foot only	46	0.9	13	**2.1**	28	**0.7**
Multiple ulcers	Active Charcot foot, involving one or both feet	5	0.1	0	0.0	5	0.1
	Inactive Charcot foot only, involving one or both feet	23	0.4	3	0.5	19	0.5
Not recorded		895	17.2	101	16.6	730	17.9

^ Where the percentages in a row in the table are **bolded**, the difference between the Type 1 and Type 2 percentages is statistically significant (ρ <0.05).

† Not all ulcers could be matched to a diabetes type, so the sum of Type 1 and Type 2 ulcers does not equal the total for all diabetes.

Table 8 shows that approximately 1 in 14 patients (7.0 per cent) presenting with a diabetic foot ulcer have Charcot neuroarthropathy, with a slightly higher prevalence amongst people with Type 1 diabetes. It also suggests that the chance of the presenting ulcer being on the Charcot foot is around three times greater than it being on the non-Charcot foot.

More generally, the audit found that only a small percentage of all ulcer cases had active (0.8 per cent) or inactive (2.9 per cent) Charcot foot disease present on their index foot. As only a few foot ulcer patients are affected, the usefulness of continuing to collect Charcot data will be considered for future foot care audit collections.

Key finding

Audit finding: Few patients present with a foot ulcer and concurrent Charcot foot disease on the same foot.

Ulcer severity

The audit recorded the severity of the patient's index ulcer using the SINBAD scoring system (see Appendix 7). An ulcer can score between 0 (least severe) and 6 (most severe). Ulcers with a SINBAD score of 3 or above are considered to be severe.

Table 9 below shows the number and proportion of ulcers that had each of the six elements of the SINBAD severity score[16]. More than 80 per cent of ulcerated feet had loss of protective sensation (neuropathy), while the other elements affected between one fifth and one half of NDFA patients.

Table 9: SINBAD score for ulcers, England and Wales, 2014-2015†^

SINBAD element	All diabetes (N=5,215)		Type 1 (N=610) †		Type 2 and other (N=4,089)†	
	Number	Per cent	Number	Per cent	Number	Per cent
Site	948	18.2	128	21.0	730	17.9
Ischaemia	1,882	36.1	180	**29.5**	1,512	**37.0**
Neuropathy	4,309	82.6	534	**87.5**	3,344	**81.8**
Bacterial infection	2,272	43.6	297	**48.7**	1,741	**42.6**
Area	2,538	48.7	332	**54.4**	1,947	**47.6**
Depth	924	17.7	107	17.5	716	17.5
SINBAD score >=3 *	2,411	46.2	313	**51.3**	1,842	**45.0**

† Not all ulcers could be matched to a diabetes type, so the sum of Type 1 and Type 2 ulcers does not equal all diabetes attendances.
^ Where the percentages in a row in the table are **bolded**, the difference between the Type 1 and Type 2 percentages is statistically significant (ρ <0.05).
* An ulcer with a SINBAD score of 3 or above is classed as severe.

Table 9 also shows that patients with Type 1 diabetes were more likely to present with more severe ulcers than those with Type 2 diabetes (51.3 per cent compared to 45.0 per cent). When broken down by the individual elements, patients with Type 1 diabetes had higher rates of Neuropathy, Bacterial infection and larger surface areas (Area), although rates of Ischaemia are lower.

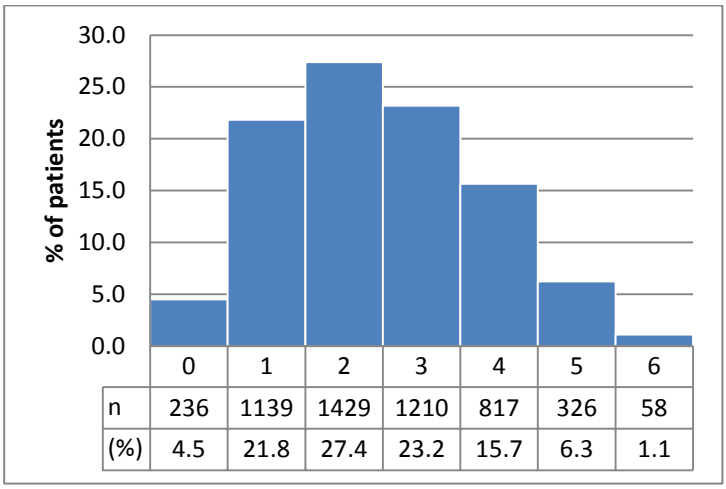
Key finding

Audit finding: The proportion of new foot ulcers that are severe is higher in Type1 than in Type 2 diabetes patients.

Figure 3 below shows the distribution of SINBAD scores in foot ulcer patients. Only 236 (4.5 per cent) of the 5,215 ulcers had the least severe SINBAD score of 0. 46.2 per cent of ulcers were in the severe category, with a SINBAD score of 3 or more, with just 1.1 per cent assessed at the maximum severity with a score of 6.

[16] Loss of protective sensation (Neuropathy), impaired circulation (Ischaemia) and penetration of the hind-foot (Site) are considered potential indicators of delayed healing of the ulcer, rather than measures of severity.

Figure 3: Distribution of overall SINBAD scores for foot ulcers, England and Wales, 2014-2015



	0	1	2	3	4	5	6
n	236	1139	1429	1210	817	326	58
(%)	4.5	21.8	27.4	23.2	15.7	6.3	1.1

Time to first assessment

The audit collected data on the interval between first presentation to a health professional and first assessment by the multi-disciplinary foot team. Current NICE guidance recommends that people with diabetes with an active foot problem should be referred to the multidisciplinary foot care service or foot protection service within one working day and triaged within one further working day[17]. The audit results are summarised in Figure 4 below.

Figure 4: Interval between first presentation to a health professional and first assessment by the multi-disciplinary foot team, England and Wales, 2014-2015

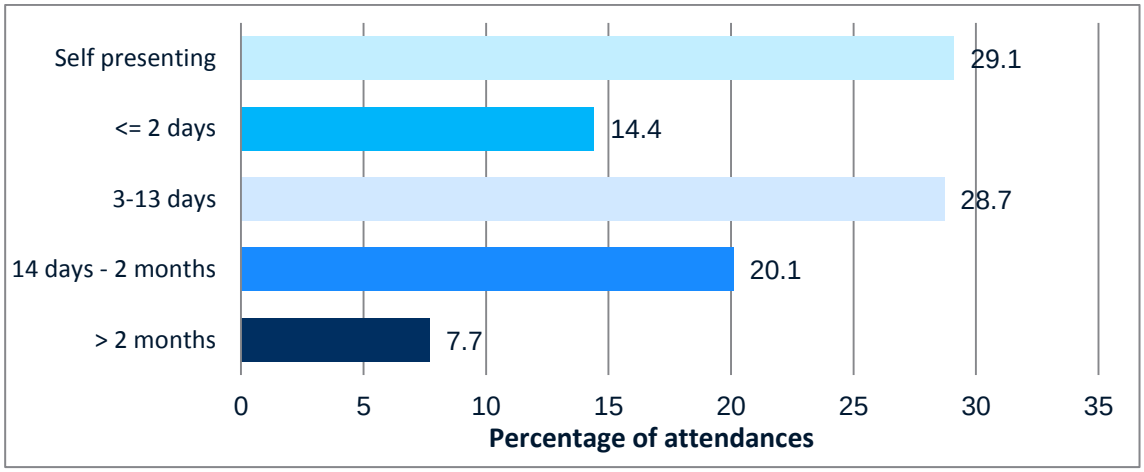


Figure 4 shows that almost one third of ulcer cases were self-presented (29.1 per cent). Of the remainder, only a minority (14.4 per cent of all cases) were seen within the NICE standard of two days. The delay for many was very long. If self-presenting patients are excluded, almost two fifths of patients (39.2 per cent) were not seen by the foot care service until two weeks after the first healthcare contact for their ulcer.

Key finding and recommendation

Audit finding: Almost 30 per cent of patients self-presented.

Audit finding: Almost two fifths of patients who did not self-present were not seen by the foot care service until two weeks after the first healthcare contact for their ulcer.

Audit recommendation: All healthcare professionals should be aware of the need for prompt expert assessment of newly occurring foot ulcers in people with diabetes and should know how this assessment can be arranged.

[17] NICE guidelines – Diabetic foot problems: prevention and management. Recommendation 1.4.2 http://www.nice.org.uk/guidance/ng19

Time to first assessment and ulcer severity

Table 10 shows that people who presented with severe ulcers are more likely to wait for two or more weeks for assessment by an expert than those with less severe ulcers (32.9 per cent compared to 23.5 per cent). The results also show that a lower proportion of severe ulcers are self-presented (21.3 per cent compared to 35.7 per cent).

Table 10: Interval between first presentation to a health professional and first assessment by the multi-disciplinary foot team by SINBAD score, England and Wales, 2014-2015^

Time to presentation	SINBAD < 3 (N=2,804)		SINBAD >=3 (N=2,411)	
	Number	Per cent	Number	Per cent
Self-presenting	1,002	**35.7**	514	**21.3**
<= 2 days	380	13.6	370	15.3
3-13 days	764	**27.2**	734	**30.4**
14 days - 2 months	496	**17.7**	553	**22.9**
> 2 months	162	**5.8**	240	**10.0**

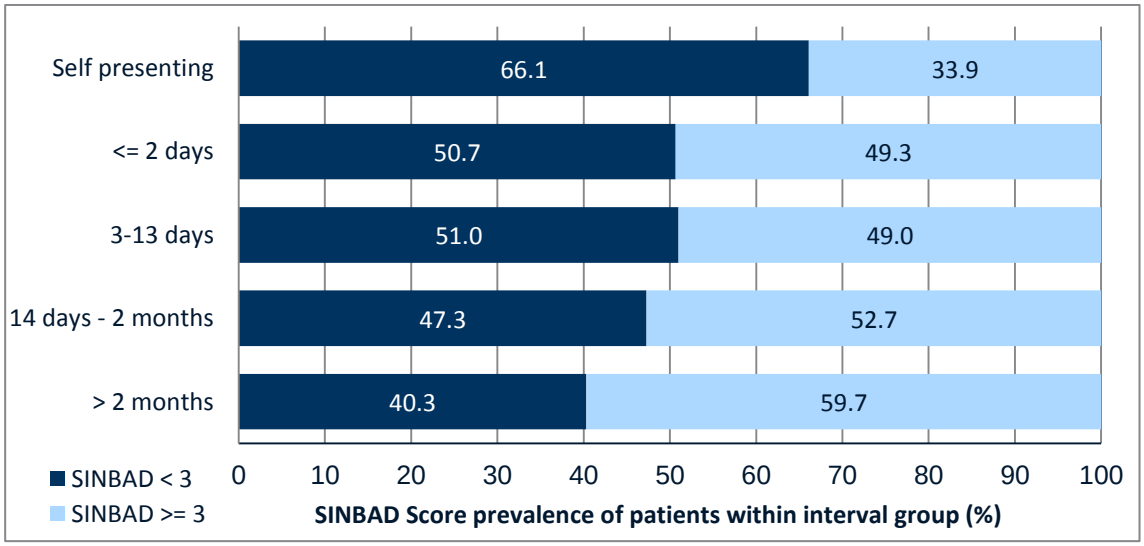
^ Less severe ulcers have a SINBAD score <3. Severe ulcers have a SINBAD score >=3.
Where the percentages in a row in the table are **bolded**, the difference between SINBAD groups is statistically significant (ρ <0.05).

Figure 5 shows that the proportion of severe ulcers tends to increase amongst patients with a longer interval to first presentation (from 33.9 per cent where self-presenting compared to 59.7 per cent with a wait of two or more months). The results also show that a smaller proportion of ulcers are graded severe in people who are self-presenting (33.9 per cent compared to 49.0 per cent and above for all other categories).

Key finding

Audit finding: People who are first seen by the diabetic foot care team after 2 or more months are more likely to present with severe foot ulcers.

Figure 5: Interval to first presentation by SINBAD score, England and Wales, 2014-2015^



^ Less severe ulcers have a SINBAD score <3. Severe ulcers have a SINBAD score >=3.

Foot protection service referral pathway and ulcer severity

Table 11 below shows the relationship between ulcer severity (SINBAD) score at presentation and commissioning organisations with or without a pathway for referral to a foot protection service. To undertake this analysis, NDFA patients were assigned to their latest available responsible CCG or LHB in the NDA and then linked to that organisation's Structures Survey response. As only 2,629 of the 5,215 NDFA attendances (50.4 per cent) could be linked to a participating CCG or LHB with a definitive response to this question (yes or no), caution is advised when interpreting this data.

Table 11: SINBAD score† band for patients, linked to organisations with / without a pathway for referral to a foot protection service^

	SINBAD score < 3		SINBAD >=3		Total
Organisation response:	Number	Per cent	Number	Per cent	Number
Yes	1,451	56.4	1,122	43.6	2,573
No	26	46.4	30	53.6	56

^ Less severe ulcers have a SINBAD score <3. Severe ulcers have a SINBAD score >=3.
Where the values in a column in the table are **bolded**, the difference between the two percentages is statistically significant (p <0.05).
†A lower SINBAD score has been shown to be associated with a more favourable outcome[18].

Of all patients linked to a commissioner with a definite response, 2,573 (97.9 per cent) were associated with an organisation with a referral pathway to a foot protection service, leaving just 56 patients (2.1 per cent) treated by an organisation that did not provide this service. The small sample size of the latter group makes comparison problematic, and no significant differences can be observed.

Perspectives from people with diabetes

The importance of early treatment:

"I had the fourth toe on my left foot amputated last year. I had been being seen by a local chiropodist who referred me to my GP when he noticed potential infection in the foot. I got an appointment almost immediately and the GP prescribed some antibiotics and arranged another appointment at the hospital with a specialist in two weeks. I had surgery very quickly which was successful. I now see a specialist team for diabetes foot care once a week.

They have been able to spot potentially dangerous ulcers early and treat them effectively, also giving me specialist shoes on prescription to prevent ulcers forming. This has likely prevented further problems. The podiatry services in my local area are very good, kind and caring, especially the specialist team which have just been recently set up - previously podiatry services were very poor".

[18] Ince P, Abbas ZG, Lutale JK, et al. Use of the SINBAD classification system and score in comparing outcome of foot ulcer management on three continents. *Diabetes Care*. 2008;31:964-7.

Audit Outcomes – Being 'Ulcer Free' at 12 Weeks – Results and Findings

This section looks at whether or not the patient was alive and ulcer free at 12 weeks following their first foot ulcer assessment by the treatment team[19]. Being 'ulcer free' includes those patients who have had surgery (including major and minor amputation), provided all wounds have healed.

The audit collected the patient status at 12 weeks following first expert assessment[20]. The results are summarised in Table 12 below.

Table 12: Outcome at 12 weeks after first expert assessment, England and Wales, 2014-2015†^

12 week outcome	All diabetes (N=5,215)		Type 1 (N=610) †		Type 2 and other (N=4,089) †	
	Number	Per cent*	Number	Per cent*	Number	Per cent*
No foot ulcer	2,302	49.2	260	46.9	1,799	49.1
Foot ulcer present	2,373	50.8	294	53.1	1,864	50.9
Deceased	119		6		96	
Unknown outcome	421		50		330	

^ Where the percentages in a row in the table are **bolded**, the difference between the Type 1 and Type 2 percentages is statistically significant ($p < 0.05$).
† Not all ulcers could be matched to a diabetes type, so the sum of Type 1 and Type 2 ulcers does not equal the total for all diabetes.
* Per cent of cases where ulcer status is recorded for those alive at 12 weeks.

8.1 per cent of ulcers had no 12 week status recorded. In a further 2.3 per cent of cases the patient had died before the 12 week assessment was undertaken. This very high short term mortality is not inconsistent with the known high one year and five year mortality rates in people with diabetic foot ulcers[21], although the number of patients in the NDFA to date, are insufficient to make this a reliable 12 week mortality estimate.

Of the remainder, 12 week outcomes were evenly split between patients that were ulcer free at 12 weeks (49.2 per cent) and those that still had foot ulceration (50.8 per cent). There was no difference in outcomes between patients with Type 1 and Type 2 diabetes.

Key finding

Audit finding: One half of patients were ulcer free at the 12 week assessment.

[19] The interval between the cohort end date (10 April 2015) and the submission deadline (31 July 2015) was insufficient for outcomes at 24 weeks to be reported. Outcomes at 24 weeks will form part of future NDFA reports.
[20] 'Ulcer' applies to any persisting wound including those following surgical treatment (i.e. amputation or surgical revascularisation). Being ulcer free will include those who have undergone surgery but in whom all wounds have healed.
[21] Brownrigg JR et al. The association of ulceration of the foot with cardiovascular and all-cause mortality in patients with diabetes: a meta-analysis. *Diabetologia* 2012; 55: 2906-12.

Being ulcer free at 12 weeks and referral pathway for assessment within 24 hours

Table 13 below shows the relationship between observed 12 week healing outcomes and whether commissioning organisations reported having a pathway for referral for assessment within 24 hours. Only 38.6 per cent of NDFA cases were from localities where commissioners had returned answers to this structure survey question, so caution should be advised when interpreting this table.

Table 13: Observed 12 week healing outcome for patients, linked to organisations with / without a pathway for referral for assessment within 24 hours

	Active ulcer		No ulcer		Total
Organisation response	Number	Per cent	Number	Per cent	Number
Yes	792	53.5	688	46.5	1,480
No	295	55.6	236	44.4	531

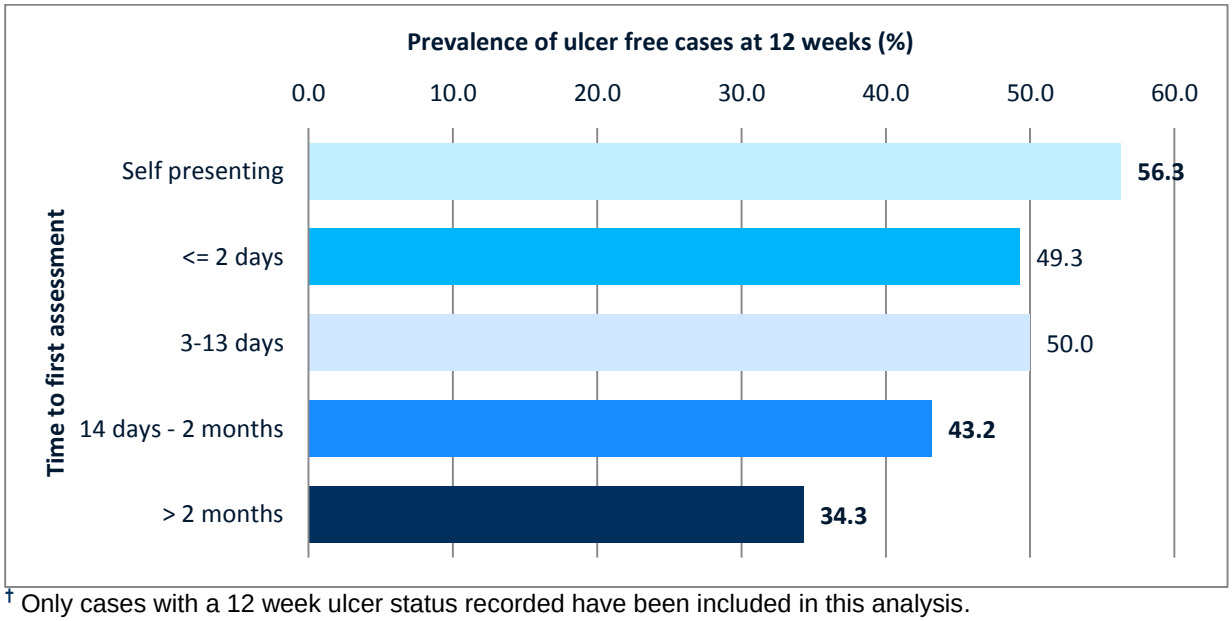
^Where the values in a column in the table are **bolded**, the difference between the two percentages is statistically significant (p <0.05).

The proportion of patient attendances with active or no ulcer at 12 weeks was similar for patients from commissioners with a referral pathway for urgent assessment as for those from commissioners without such a referral pathway.

Being ulcer free at 12 weeks and time to first assessment

Figure 6 shows the proportion of ulcer free 12 week outcomes split by time to first assessment by a specialist foot care service.

Figure 6: Time to first specialist assessment and outcomes at 12 weeks, England and Wales, 2014-2015†^



† Only cases with a 12 week ulcer status recorded have been included in this analysis.

^ Where the percentages to the right of the bar are **bolded**, the difference between the interval group and the comparison group (<= 2 days) is statistically significant (ρ <0.05).

Figure 6 shows that the ulcer healing rate decreases as the interval to first presentation lengthens. There is a significant difference between the healing rate of those that were seen within two weeks (49.8 per cent for <=2 days and 3-13 days combined) compared to that of both those who were not seen for longer than two months (34.3 per cent), and those who were seen between 14 days and two months (43.2 per cent).

Key finding and recommendations

Audit finding: Patients seen by the specialist foot care service within two weeks of first assessment by a professional have higher rates of ulcer healing than those seen later.

Audit recommendation: Patients are encouraged to seek professional advice as soon as they notice any problems with their feet.

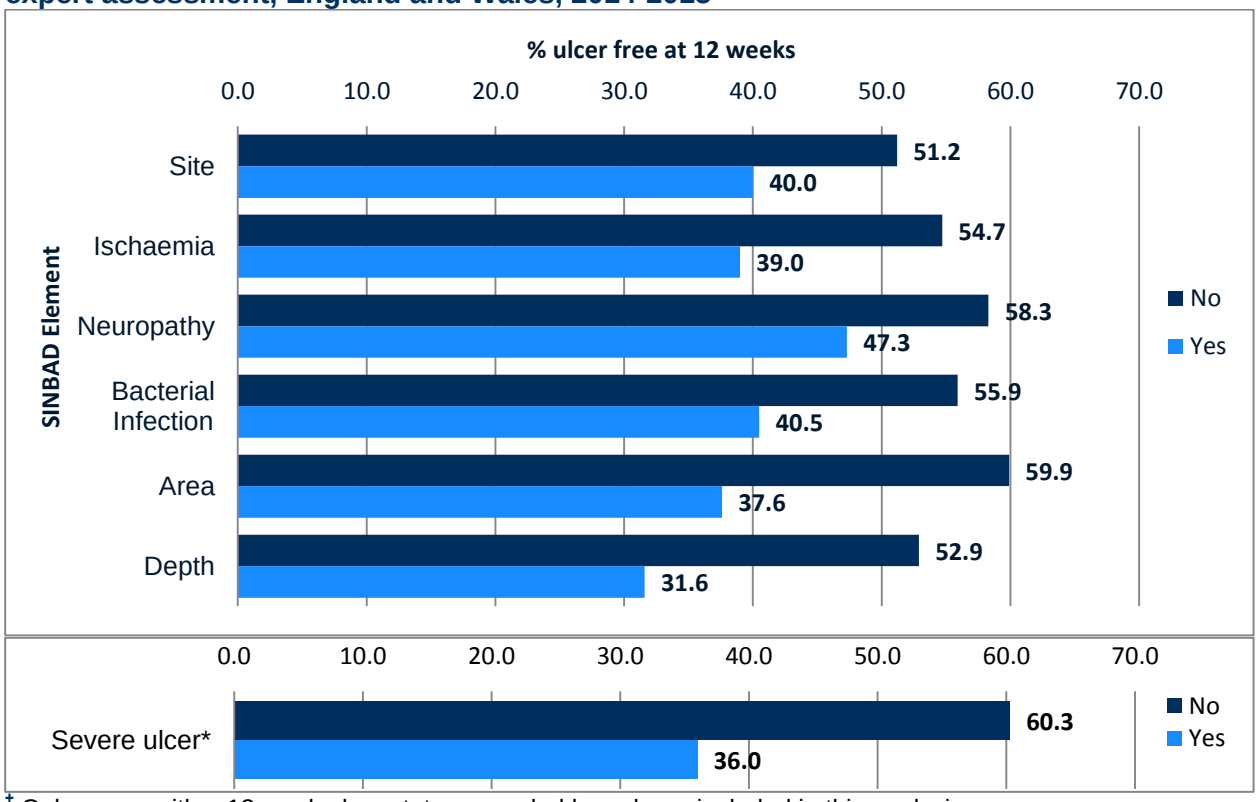
Audit recommendation: All healthcare professionals should be aware of the need for prompt expert assessment of newly occurring foot ulcers in people with diabetes and should know how this assessment can be arranged.

There was no observable difference between the healing rates of those that were seen within two days (49.3 per cent) and those seen between three and 13 days after presentation (50.0 per cent).

Being ulcer free at 12 weeks and ulcer severity

Figure 7 shows the proportion of ulcer free outcomes for ulcers with or without each SINBAD element.

Figure 7: SINBAD score for the index ulcer and ulcer free outcomes at 12 weeks after first expert assessment, England and Wales, 2014-2015†^



† Only cases with a 12 week ulcer status recorded have been included in this analysis.

^ Where the percentages to the right of the bar are **emboldened**, the difference between the healing rates where the SINBAD element is or isn't present, is statistically significant (ρ <0.05).

* An ulcer with a SINBAD score of three or above is classed as severe.

Figure 7 shows that every element of the SINBAD assessment is associated with a reduced likelihood of healing at 12 weeks, although we do not know how many of the associations are independent. Area greater than 1cm^2 (Area) and depth to tendon or bone (Depth) were the two elements most predictive of non-healing at 12 weeks.

Key findings

Audit finding: Patients presenting with more severe ulcer cases are almost twice as likely not to be ulcer free at 12 weeks after first expert assessment.

Audit finding: Every SINBAD element is associated with reduced healing at 12 weeks.

After 12 weeks, patients that presented with more severe ulcers (SINBAD score >= 3) are almost twice as likely still to have foot ulcers as patients with less severe ulcers (60.3 per cent compared to 36.0 per cent).

Perspectives from people with diabetes

The importance of early treatment:

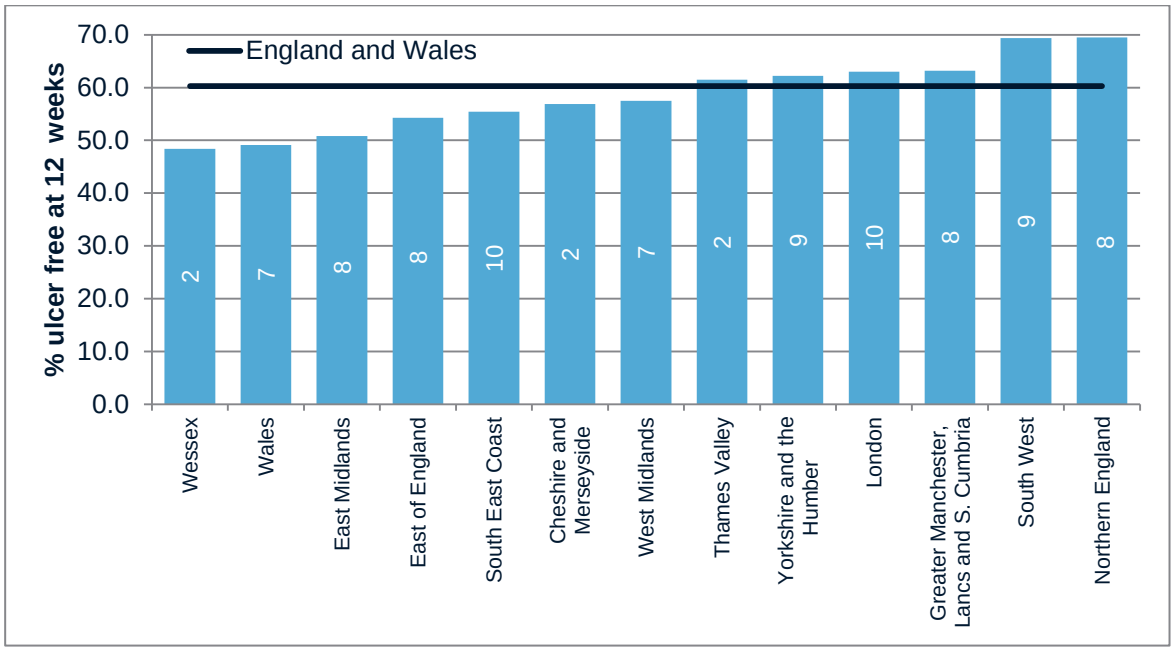
"I am fortunate to live in an area that has wonderful secondary care diabetes facilities. So when I had problems in 2002 resulting in amputations over eight years the Multi-Disciplinary Team were on hand to give me excellent expert medical care across many disciplines with input from me. This has resulted in me only losing five toes rather than a foot. I continue to have regular checks and am now stable without any further surgery since 2010. The outcome could have been a lot different without swift intervention".

Being ulcer free at 12 weeks and variation between providers

There is considerable variation in the observed 12 week healing rates between different service providers (see Figures 8 and 9). For example, at SCN level, the 12 week healing rate for severe ulcers (SINBAD score >= 3) ranged from less than one fifth (19.7 per cent) in Cheshire and Merseyside to almost one half (47.8 per cent) in the South West.

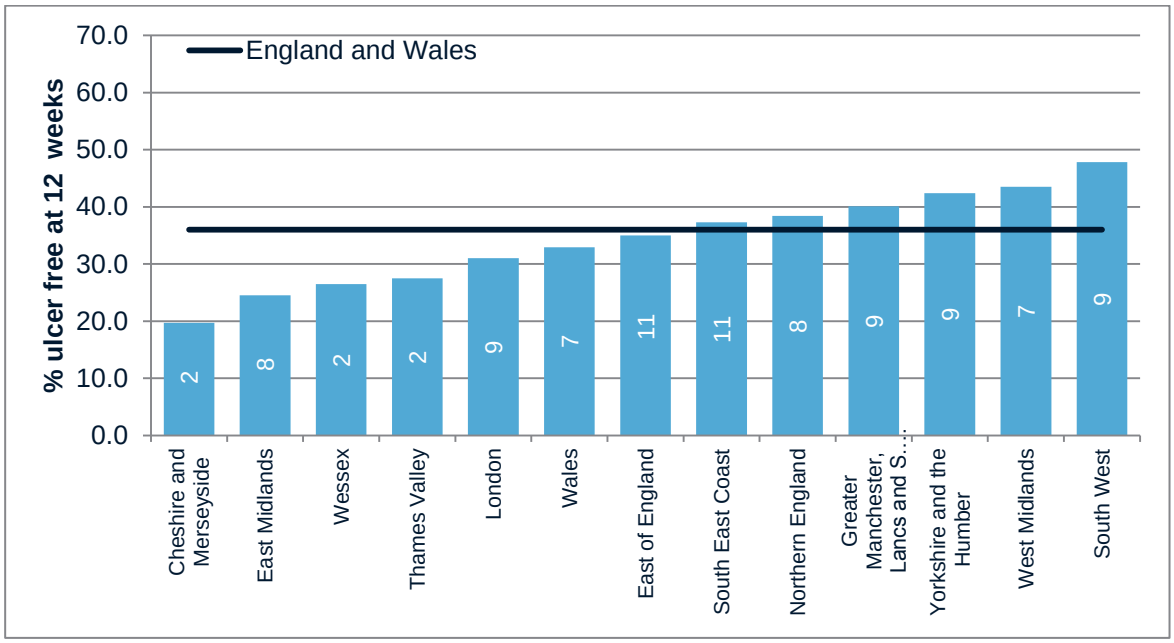
Caution should be applied when reviewing these figures: results have not been case-mix adjusted (although factors including age have not been observed to explain the outcome, see discussion on page 33), case ascertainment is low (approximately 10 per cent) and there are regional variations in the quality and quantity of data supplied to the NDFA.

Figure 8: Observed 12 week healing rate for less severe ulcers (SINBAD score <3), by strategic clinical network, England and Wales, 2014-2015^



^ The number of participating service providers within the SCN is shown each bar.

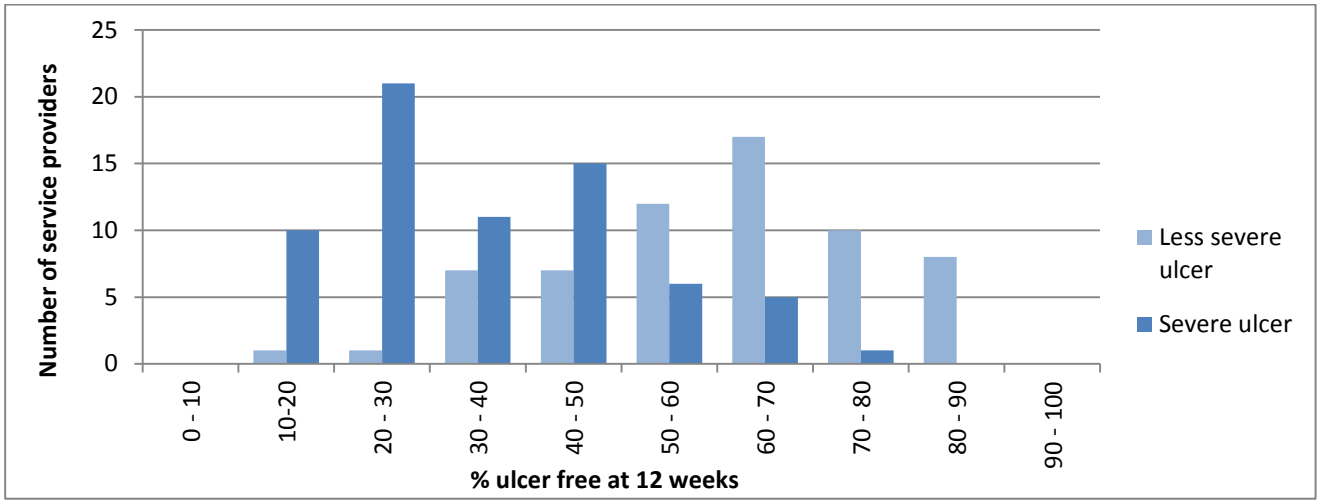
Figure 9: Observed 12 week healing rate for severe ulcers (SINBAD score >=3), by strategic clinical network, England and Wales, 2014-2015^



^ The number of participating service providers within the SCN is shown each bar.

Figure 10 below shows the variation in observed healing rates for individual service providers (NHS trusts, LHBs and IHPs). Caution is again advised when interpreting these figures, particularly due to the small numbers submitted by most service providers. Results have again been split by the severity of the ulcer.

Figure 10: Observed 12 week healing rates for service providers, split by ulcer severity, England and Wales, 2014-2015^



^ Less severe ulcers have a SINBAD score <3. Severe ulcers have a SINBAD score >=3.

The mean 12 week healing rate for service providers was 59.8 per cent for less severe ulcers and 35.2 per cent for severe ulcers. The medians for less severe and severe ulcers were 61.8 and 33.3 respectively. The overall distribution of healing rates is shown in the box and whisker plots below (Figures 11 and 12). The inter-quartile ranges of 48.5 to 71.9 per cent for less severe ulcers and 24.4 to 45.7 per cent for severe ulcers demonstrates considerable variation within the middle 50 per cent of service providers.

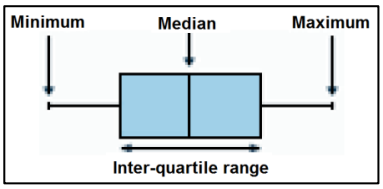
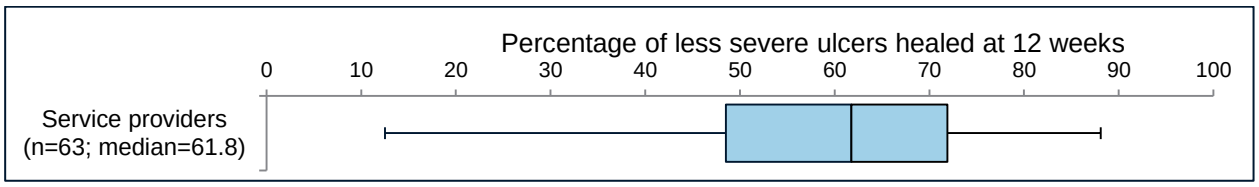
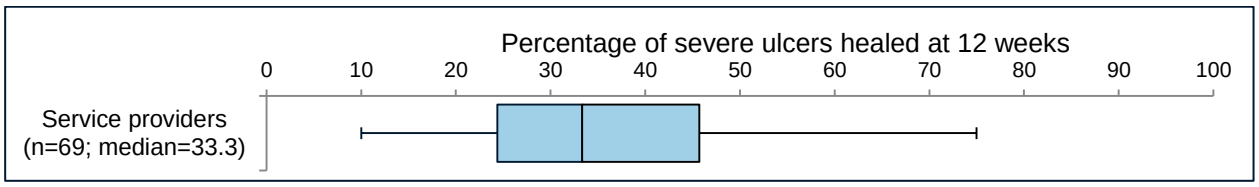


Figure 11: Range of observed healing rates for less severe ulcers by service providers, England and Wales, 2014-2015^



^ An ulcer with a SINBAD score of 3 or above is classed as severe.

Figure 12: Range of observed healing rates for severe ulcers by service providers, England and Wales, 2014-2015^



^ An ulcer with a SINBAD score of 3 or above is classed as severe.

Being ulcer free at 12 weeks and regression modelling

To help explain the variation in observed 12 week healing between providers, associations between patient characteristics and 12 week healing outcomes were investigated using a statistical model. Full details can be found in Appendix 8.

Age, ethnicity, BMI, social deprivation, duration of diabetes and diabetes type were found not to be significant in predicting the 12 week healing. Based on these results, we would not expect a service to have a poorer outcome simply due to serving an older or more deprived population.

Individual SINBAD measures, presence of Charcot foot disease, time to assessment, sex and smoking status were all significant factors, with SINBAD and Charcot having the greatest impact. This suggests that the presence of Charcot disease or any of the SINBAD elements is expected to lead to worse outcomes.

Due to the low number of applicable cases (4,200), low case ascertainment (around 10 per cent) and variations in the quality and quantity of data submitted, caution should be applied when reviewing these findings. As data quality and coverage improve in future audits, we expect the model quality to also improve. We anticipate that this will allow us to assess service-level (NHS trust and LHB) 12 week healing rates in future reports.

Discussion and future plans

This is the first report from the National Diabetes Foot Care Audit (NDFA). It will now be continuous and provide annual measurement to support improvement in the outcomes of diabetic foot disease. There are two overriding objectives. The first is to determine the nature of geographical or service based variation in the outcome of diabetic foot ulcers throughout England and Wales. The second is to explore whether explanations for variation can be found from differences in the structures and processes of care in different centres.

Although some information on clinical outcomes from this initial audit is not yet available, the preliminary findings are of considerable interest. They confirm an association between ulcer severity at presentation to the expert team and the time taken to reach that team and they demonstrate an association between both ulcer severity and longer time to expert assessment and a reduced chance that the person will be ulcer-free at 12 weeks. To that end they endorse current NICE guidance regarding prompt referral of all newly occurring ulcers for expert assessment.

It is estimated that some 45,000 people would have presented with new ulcers in England and Wales during these first nine months of the audit and the details of just over 10 per cent of this total were included. This can be regarded as a very satisfactory result because it was inevitable that uptake by clinical centres would be gradual due to participation requiring some change in clinic routine (to accommodate individual patient consent). In addition, each centre had to secure its own local Caldicott Guardian approval for participation and this also introduced considerable delay. But by the end of the nine month inclusion period, cases were being registered by a total of 129 clinical teams representing 97 (77 per cent) of the 126 care providers (NHS Trusts and LHBs) registered with the audit.

It was possible to match 90 per cent of the selected cases with data held on the master NDA register and it is apparent that they were largely representative of the total population of people with diabetes in terms of demographics and characteristics of their disease. The registered ulcers also demonstrated the expected spread of severity from the least to most severe and the median time to healing was that predicted, with only 50 per cent of the surviving population being ulcer-free at three months. There was a clear relationship between presenting ulcer severity and likelihood of healing at three months.

40 per cent of localities were unable to respond to the short questionnaire on the structure of care available for diabetic foot disease in their area and only 60 per cent of those that responded were able to provide answers to all three questions. It follows that the attempt to assess links between the care structure and clinical outcome (healing by 12 weeks) had to be limited to the responses that had been received. No difference in outcome was observed between those providers who stated that there either was or was not a structured pathway for referral of foot ulcers. It is concerning that there appears to be a lack of awareness about the basic provision of foot care services for a condition with such a major impact on patients and the NHS.

Data on the time elapsing between first presentation to a health care professional and first expert assessment revealed quite marked variation, and was greater than 14 days in a quarter of cases. The time elapsed before first expert assessment was also associated both with greater ulcer severity and with reduced healing at 12 weeks and these observations lend force to current guidance that all new ulcers should be promptly assessed by an expert service. This first year of NDFA suggests, however, that in addition to these generic factors there is a quite marked variation in the rate of healing at 12 weeks between care providers in England (grouped by strategic clinical networks, SCNs) and Wales. When larger numbers are available next year, these data will require confirmation and may need to be adjusted for

case-mix as well as the variation in numbers of cases submitted by individual centres in each SCN.

Next year, details on all clinical outcomes (including whether the person is ulcer-free at 6 months, hospital admissions, ulcer recurrence and the incidence on minor and major amputations) will also be available and so it will be possible to explore linkage between all outcomes and both the structures and processes of care as well as to undertake more meaningful comparison between care providers. Ultimately, the quality promise of the NDFA is to help local health services eliminate variation, reduce healing times and thereby improve overall outcome by encouraging the adoption of good practice which is itself defined by the evidence generated from observations of routine clinical care in participating centres.

Further information

For more information on the National Diabetes Foot Care Audit or access to the Service Level Analysis, please visit the NDFA webpage at http://www.hscic.gov.uk/ndfa.

For further information about this report, please contact the Health and Social Care Information Centre's Contact Centre on 0300 303 5678 or email enquiries@hscic.gov.uk.

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Appendix 1: Methodology

The following section gives more detailed information on the methodology used in the NDFA report, looking at data collection, data linkage, report terminology and data analysis.

Data collection

NDFA Structures Survey

Commissioners of care for diabetic foot disease (CCGs in England and LHBs in Wales) were asked to complete a questionnaire on the structure of foot care services. Answers were collected in an online survey tool[22]. The survey was open from 22 October 2015 until 4 December 2015.

The three survey questions are provided in Appendix 2. Each question had the following options: 'Yes', 'No' or 'Don't know'. Commissioners could answer some, none or all of the questions in the survey.

There could be multiple responses from the same commissioner. If these answers directly conflicted with each other ('Yes' and 'No') then the organisation was listed as a 'conflicted response'. If a definitive answer was submitted in tandem with an uncertain response or responses (e.g. 'Yes' and 'Don't know'), then the definitive response ('Yes' or 'No') was taken.

Responses under closed organisations were mapped to their successor organisations and answers from commissioning hubs were mapped to the CCGs they represent.

NDFA presentation and outcomes

Data on diabetic foot care presentation and outcomes was collected by specialist diabetes foot care teams and entered into the HSCIC Clinical Audit Platform (CAP). Data was collected on the ulcer characteristics of the worst ulcer on the patient's first assessment for a new episode of diabetic foot ulceration. An encounter with the foot care service was considered to be a 'first assessment' if it was either the patient's first encounter with the foot care service or if it was a repeat encounter, but the first following a period in which the patient was completely free of foot ulcers. A patient could be recorded multiple times in the audit, under the same or different foot care services, for each first attendance after intervals of being foot ulcer free.

The following data items were collected[23]: date of assessment, interval from the first presentation to a healthcare professional and assessment by the foot care service, the location of the ulcer, Charcot status and the SINBAD components (see Appendix 7) at first assessment. Follow up information regarding the patients' foot ulcer status at 12 and 24 weeks was also collected.

The information in this report relates to patients who attended the first assessment of their foot ulcer at a participating service between 14 July 2014 and 10 April 2015. The data was extracted on 7 August 2015.

[22] Survey Monkey: https://www.surveymonkey.com/

[23] NDFA Data Collection Form: http://www.hscic.gov.uk/media/14737/NDFA-Data-Collection-Form/pdf/NDFA_Data_Collection_Form_V2.1_FINAL.pdf

The NDFA is a consented audit. Patients were provided with information about the audit[24] and completed a form giving consent to the use of their data[25]. Only data relating to consented patients was collected through the electronic system.

Linkage to other sources

By linking to other datasets, the NDFA is able to analyse supplementary data without placing an additional collection burden on service providers.

National Diabetes Audit

NDFA data was linked to the core National Diabetes Audit (NDA). A full list of the NDA data items is provided in Appendix 6. Each NDA cohort is fifteen months long, beginning in January (for example January 2014 to March 2015). NDFA patients were linked to the latest three NDA core cohorts (2012-13, 2013-14 and 2014-15) using NHS number. Earlier NDA data was not included, as the information would be less relevant.

NDA coverage is not complete[26], so not all NDFA patients could be linked. 4,522 (90.2 per cent) of NDFA patients were linked to the NDA, leaving 493 (9.8 per cent) NDFA patients with no NDA record. Of those that were matched to NDA, 3,391 (75.0 per cent) were linked to NDA 2014-15 data, 235 (5.2 per cent) to NDA 2013-14 data and 896 (19.8 per cent) to NDA 2012-13 data.

When comparing NDFA and NDA data, it should be noted that the information in the linked NDA data may not necessarily reflect the patient's condition at the point of first attendance for foot ulceration. For example, the NDA collects the latest date care process and treatment target assessment within the NDA audit period[27]. To ensure foot reviews and treatment targets took place prior to the NDFA attendances, NDFA patients were linked to an earlier NDA audit year to confirm whether these took place between January 2013 and March 2014[28].

Hospital Episode Statistics and Patient Episode Database for Wales

Diabetic foot ulceration may require admission to hospital. The timing of Hospital Episode Statistics (HES) and Patient Episode Database for Wales (PEDW) data availability for the audit period means that analysis of hospital admissions and lower limb amputations could not be included in the first NDFA report, but is planned for subsequent reports.

[24] NDFA Patient Information Leaflet: http://www.hscic.gov.uk/media/14739/NDFA-Patient-Information-Leaflet/pdf/NDFA_Patient_Information_Leaflet_v1.pdf

[25] NDFA Consent Form: http://www.hscic.gov.uk/media/14736/NDFA-Consent-Form/pdf/NDFA_consent_form_v1.0.pdf

[26] For example, participation for 2014-15 was around 57.3 per cent. HSCIC (2016) National Diabetes Audit - 2013-2014 and 2014-2015: Report 1, Care Processes and Treatment Targets http://www.hscic.gov.uk/catalogue/PUB19900/nati-diab-rep1-audi-2013-15.pdf

[27] For the latest available NDA data, Jan-2014 to Mar-2015, an NDFA patient might be linked to a record where their NDA processes took place after their foot ulcer first assessment (NDFA) with no information about whether one took place earlier in that year.

[28] The audit is therefore not directly comparing practice to the NICE guideline as the NDA recorded foot review may have taken place between five and 27 months prior to the patients' first foot ulcer attendance with the foot care team.

Terminology

Patients and ulcers

There were 5,015 patients recorded in the audit. A single patient may appear multiple times with different ulcers. For example, they may present at a foot care service with a diabetic foot ulcer and then later begin a new episode of treatment for a diabetic foot ulcer after a period in which they were ulcer free. In total there were 5,215 ulcers recorded in the audit.

The report refers to '**patients**' when counting each patient distinctly. This is primarily limited to descriptions of the characteristics of patients in the NDFA. The term '**people with diabetes**' is used to describe the wider NDA cohort, who may not be 'patients' at a given time. The report refers to '**ulcers**' or '**cases**' interchangeably when counting distinct NDFA attendances. If a patient has two ulcers in the audit they would be counted twice. This method of counting is used through the majority of the report.

Organisations

The NDFA Structures Survey focuses on the commissioners of foot care services: CCGs in England and LHBs in Wales.

The NFDA processes and outcomes audit focuses on the service providers: NHS trusts, LHB or independent health care providers (IHPs).

Commissioners decide what health services are needed and ensure that they are provided. 209 CCGs in England and seven LHBs in Wales are responsible for commissioning healthcare services.

Foot care services are individual specialist services that treat people with diabetic foot ulcers. This includes community and hospital based organisations, as well as any GP practice that provides a specialist diabetic foot treatment service.

Service providers are the foot care service's parent organisation. This is typically an NHS trust in England or a LHB in Wales. It may also be an IHP.

A single service provider may be responsible for multiple foot care services. For example, a single service provider responsible for three foot care services might run an integrated diabetes service at one hospital, see outpatients at a health centre and provide community podiatry in the locality. Providers registered as many foot care services with the audit as necessary to represent local service provision and organisation.

Analysis

Denominators

Most analysis in this report consists of descriptive statistics shown as tables or charts. Information is reported as counts and percentages and reported at national (England and Wales combined) level. Breakdowns in the local level reports are at service provider, CCG and SCN level.

For most of the analyses the denominator is either all cases collected in the NDFA (5,215) or patients linked to NDA (4,522). Some analyses require the recording of specific fields, so the base number of patients or ulcers is a sub-group of the NDFA or NDA-linked cohorts.

Deprivation and geography

Local measures of deprivation are not typically produced UK-wide, but on a country-by-country basis. Each country considers different factors and uses different calculation methods. In order to compare deprivation in England and Wales, deprivation quintiles have been assigned based on an equally weighted combination of the individual scores for the employment and income indices based on methodology designed by the Office for National Statistics (ONS)[29].

The deprivation measures are based on Lower Super Output Area (LSOA), a geographical breakdown of England and Wales into approximately 35,000 regions, each containing about 1,500 people[30]. Where necessary, the LSOA taken from the linked NDA data has been updated to reflect the redrawing of area boundaries in 2011.

To find the deprivation quintile associated with patients in the NDFA, their LSOA was taken as that which was recorded at the time of the NDA data collection, with the caveat that patients may have moved between the time of the NDA data collection and the time of their foot assessment attendance in the NDFA.

Observed and case-mix adjusted results

When provider level comparisons are made, '**observed**' results are those which are derived directly from the underlying data, with no attempt to adjust for differences between provider populations.

By contrast, '**case-mix adjustment**' uses a statistical model to adjust the results of a measure to account for differences in the underlying data. An example of this is, if adjustment were applied to account for the fact that some foot care services treat more severe foot ulcerations than others, and so they would be more likely to have poorer outcomes recorded against them. Case-mix adjustment has not been applied to this year's cohort (see Appendix 8).

[29] ONS (2013) Using Indices of Deprivation in the United Kingdom p.7 http://www.neighbourhood.statistics.gov.uk/HTMLDocs/images/UK%20wide%20guidance%20paper%20April%202013%20revision_tcm97-129456.pdf

[30] ONS: Super Output Area (SOA) http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/census/super-output-areas--soas-/index.html

Appendix 2: NDFA Structures Survey

Please answer the following 3 questions about the structure of care for diabetic foot disease for your CCG or LHB area:

1. **Training for Routine Diabetic Foot Examinations**
    - Is there a training programme designed to ensure that all responsible health care professionals have the necessary competence to undertake foot risk examinations as part of routine annual diabetes review?

2. **Foot Protection Service* Pathway**
    - 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 and these require contractual standards, relating to:
        - waiting times;
        - re-call and review processes;
        - referral thresholds and pathways into and back from the Multidisciplinary Foot Care Team or Service (MDFT or MDFS)

      **Foot Protection Service means a service which is usually podiatry-led and community based, that provides a recall and review system, patient education, callus/nail/skin management and offloading and the provision of advice and/or provision of appropriate care for people with diabetes who have feet at increased risk of ulceration.*

3. **New Foot Disease Pathway**
    - 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?

Additional information to be captured:
- Name of CCG area
- Contact name, role and email address

Appendix 3: Participating foot care services

Services that submitted cases for the first audit report.

England

Trust	Service name
Cheshire and Merseyside	
Countess of Chester Hospital NHS Foundation Trust	Countess of Chester Hospital
Royal Liverpool and Broadgreen University Hospitals NHS Trust	The Royal Liverpool and Broadgreen University Hospitals NHS Trust
St Helens and Knowsley Hospitals NHS Trust	Diabetes Centre, St Helens Hospital
East Midlands	
Derby Teaching Hospitals NHS Foundation Trust	Royal Derby Hospital Diabetic Foot Clinic
Derbyshire Community Health Services NHS Foundation Trust	Buxton Hospital High Peaks and Dales Podiatry
Kettering General Hospital NHS Foundation Trust	Northamptonshire Healthcare FT - Kettering Team
Northampton General Hospital NHS Trust	Northamptonshire Healthcare Foundation Trust - Podiatry
Nottingham University Hospitals NHS Trust	Nottingham University Hospitals Diabetes Foot Clinic Service
Sherwood Forest Hospitals NHS Foundation Trust	Kings Mill Hospital Podiatry
United Lincolnshire Hospitals NHS Trust	Lincoln County Hospital - Podiatry
University Hospitals of Leicester NHS Trust	UHL Multidisciplinary Diabetic Foot Clinic
East of England	
Bedford Hospital NHS Trust	Bedford Hospital Diabetes Foot Service
Cambridge University Hospitals NHS Foundation Trust	Addenbrooke's Hospital
East and North Hertfordshire NHS Trust	MDT Foot Clinic at Hertford County Hospital
	MDT Foot Clinic at Queen Elizabeth II Hospital
	MDT Foot Clinic at The Lister Hospital
East Coast Community Healthcare C.I.C.	East Coast Community Healthcare CIC
Hertfordshire Community NHS Trust	Hertfordshire Podiatry Service
Norfolk and Norwich University Hospitals NHS Foundation Trust	Norfolk and Norwich University Hospital
Provide	Provide - Podiatry
South Essex Partnership University NHS Foundation Trust	SEPT Community Podiatry (Luton and South Beds), including Luton and Dunstable Hospital
	South East and South West Essex Community Services
	West Essex Community Podiatry Service
The Queen Elizabeth Hospital, King's Lynn, NHS Foundation Trust	The Queen Elizabeth Hospital
West Hertfordshire Hospitals NHS Trust	West Hertfordshire Hospitals NHS Trust Acute Diabetes Foot Service
West Suffolk NHS Foundation Trust	West Suffolk Hospital

Greater Manchester, Lancashire and South Cumbria	
Bolton NHS Foundation Trust	Diabetes Centre, Bolton NHS Foundation Trust
Central Manchester University Hospitals NHS Foundation Trust	Manchester Royal Infirmary
Lancashire Care NHS Foundation Trust	Greater Preston Community Podiatry Service
Lancashire Teaching Hospitals NHS Foundation Trust	Chorley and South Ribble District Hospital
Pennine Acute Hospitals NHS Trust	Fairfield General Hospital
	North Manchester General Hospital
Pennine Care NHS Foundation Trust	Bury Community Services - Podiatry
	Heywood Middleton and Rochdale Community Services - Podiatry
	Oldham Community Services - Podiatry
	Trafford Community Services - Podiatry
Salford Royal NHS Foundation Trust	Salford Royal NHS Foundation Trust
Southport and Ormskirk Hospital NHS Trust	North Sefton High Risk Podiatry
	Southport and Formby District General Hospital
	West Lancs High Risk Podiatry
Stockport NHS Foundation Trust	Stockport FT Podiatry
London	
Croydon Health Services NHS Trust	Croydon Health Services NHS Trust - Podiatry
Healthshare Ltd	Healthshare Community Podiatry Services
Imperial College Healthcare NHS Trust	Imperial College Healthcare NHS Trust
King's College Hospital NHS Foundation Trust	Kings College Hospital, Diabetic Foot Clinic, Denmark Hill
Lewisham and Greenwich NHS Trust	University Hospital Lewisham
London North West Healthcare NHS Trust	Brent Integrated Diabetes Foot Service
	Ealing Hospital
	Northwick Park Hospital Podiatry Clinic
North Middlesex University Hospital NHS Trust	North Middlesex University Hospital
Royal Free London NHS Foundation Trust	Acute Foot Multidisciplinary Team, Royal Free Hospital
The Whittington Hospital NHS Trust	Whittington Hospital - Podiatry
University College London Hospitals NHS Foundation Trust	UCLH Podiatry
Northern England	
City Hospitals Sunderland NHS Foundation Trust	City Hospitals Sunderland Diabetes Foot Clinic
County Durham and Darlington NHS Foundation Trust	County Durham and Darlington Foundation Trust - Podiatry
Gateshead Health NHS Foundation Trust	QE Diabetic Services at Trinity Square
North Tees and Hartlepool NHS Foundation Trust	North Tees and Hartlepool NHS Trust
Northumbria Healthcare NHS Foundation Trust	Northumbria Community Podiatry
	Northumbria Diabetes Specialist Podiatry
South Tees Hospitals NHS Foundation Trust	The James Cook University Hospital Diabetes Care Centre
South Tyneside NHS Foundation Trust	Gateshead Community Podiatry Team
	South Tyneside Community Podiatry Team
	South Tyneside Inpatient Podiatry Team
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	Newcastle Upon Tyne Hospitals Podiatry Department

South East Coast	
Ashford and St Peter's Hospitals NHS Foundation Trust	Ashford and St Peter's NHS Foundation Trust
CSH Surrey	CSH Surrey
Dartford and Gravesham NHS Trust	Darent Valley Hospital Diabetes Foot MDT
East Kent Hospitals University NHS Foundation Trust	QEQM Hospital, Kent and Canterbury Hospital and William Harvey Hospital
East Sussex Healthcare NHS Trust	East Sussex Healthcare NHS Trust - Podiatry
First Community Health and Care CIC	First Community Health and Care Podiatry Service
Frimley Health NHS Foundation Trust	Frimley Park Hospital
Maidstone and Tunbridge Wells NHS Trust	Maidstone Hospital, Tunbridge Wells Hospital
Medway NHS Foundation Trust	Inpatient and Outpatient Specialist Podiatry Service
Royal Surrey County Hospital NHS Foundation Trust	Royal Surrey County Hospital
Western Sussex Hospitals NHS Foundation Trust	Western Sussex Hospitals - Podiatry
South West	
Dorset County Hospital NHS Foundation Trust	Dorset Healthcare University NHS Foundation Trust - Nail Surgery and Biomechanics
Gloucestershire Care Services NHS Trust	Gloucestershire Podiatry Service
Great Western Hospitals NHS Foundation Trust	Great Western Hospital
	Great Western Hospitals Foundation NHS Trust - Community Podiatry
Northern Devon Healthcare NHS Trust	Northern Devon Healthcare NHS Trust
Royal Devon and Exeter NHS Foundation Trust	Royal Devon and Exeter Hospital
Salisbury NHS Foundation Trust	Salisbury District Hospital
Torbay and Southern Devon Health and Care NHS Trust	Torbay and Southern Devon Health and Care NHS Trust
University Hospitals Bristol NHS Foundation Trust	Bristol Royal Infirmary - Podiatry
Wye Valley NHS Trust	Diabetic Foot Clinic
Thames Valley	
Buckinghamshire Healthcare NHS Trust	Stoke Mandeville - Podiatry
	Wycombe Hospital - Podiatry
Royal Berkshire NHS Foundation Trust	Royal Berkshire Hospital MDFT
Wessex	
Poole Hospital NHS Foundation Trust	Poole Hospital
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	Bournemouth Diabetes and Endocrine Centre
West Midlands	
Birmingham Community Healthcare NHS Trust	Birmingham Community Healthcare NHS Trust Podiatry Service
Heart of England NHS Foundation Trust	Heartlands Hospital Diabetic Foot Clinic
	Solihull Hospital
Sandwell and West Birmingham Hospitals NHS Trust	Sandwell and City Hospitals
South Warwickshire NHS Foundation Trust	Warwick Hospital
Staffordshire and Stoke on Trent Partnership NHS Trust	Staffordshire and Stoke on Trent Partnership Trust
University Hospitals Coventry and Warwickshire NHS Trust	Wisdem Diabetes Outpatient Foot Clinic
Worcestershire Health and Care NHS Trust	Worcestershire NHS Podiatry Service

Yorkshire and the Humber	
Bradford District Care NHS Foundation Trust	Bradford Foot Care, Diabetes Unit
Calderdale and Huddersfield NHS Foundation Trust	Calderdale Royal Hospital and Huddersfield Royal Infirmary
Harrogate and District NHS Foundation Trust	Harrogate Hospital
Humber NHS Foundation Trust	Hull and East Yorkshire Hospitals
Leeds Teaching Hospitals NHS Trust	Leeds - Podiatry
Mid Yorkshire Hospitals NHS Trust	Pinderfields Hospital
	Pontefract Hospital
Northern Lincolnshire and Goole NHS Foundation Trust	Diana Princess of Wales Hospital
	Scunthorpe General Hospital
Sheffield Teaching Hospitals NHS Foundation Trust	Northern General Hospital, Sheffield
	Royal Hallamshire Hospital - Podiatry
The Rotherham NHS Foundation Trust	Rotherham General Hospital
York Teaching Hospital NHS Foundation Trust	Podiatry Services - Scarborough Locality
	Podiatry Services - York and Selby Locality

Wales

Local Health Board	Service name
Abertawe Bro Morgannwg University LHB	Morriston Hospital Diabetes Centre Podiatry Department
	Neath Port Talbot Hospital Podiatry Department
	Princess of Wales Hospital Diabetes Centre
Aneurin Bevan University LHB	Podiatry and Orthotics Services
Betsi Cadwaladr University LHB	Wrexham Maelor Hospital
	Ysbyty Glan Clwyd
	Ysbyty Gwynedd
Cardiff and Vale University LHB	Cardiff Royal Infirmary - Podiatry
	St Davids Community Hospital - Podiatry
	The Barry Hospital
	University Hospital Llandough - Podiatry
	University Hospital of Wales - Podiatry
Cwm Taf University LHB	Prince Charles Hospital and Royal Glamorgan Hospital
Hywel Dda University LHB	Bronglais General Hospital
	Prince Philip Hospital
	Withybush General Hospital
Powys Teaching LHB	Powys Teaching Health Board - Podiatry

Additional services participating in the audit by 18 January 2016.

England

Trust	Service name
Cheshire and Merseyside	
Aintree University Hospital NHS Foundation Trust	Aintree Hospital NHS Foundation Trust - Podiatry
East Cheshire NHS Trust	Macclesfield District General Hospital - Podiatry
Warrington and Halton Hospitals NHS Foundation Trust	Diabetic Foot Clinic

Trust	Service name
East of England	
Cambridgeshire Community Services NHS Trust	Podiatry Department Oak Tree Health Centre
Ipswich Hospital NHS Trust	The Ipswich Hospital Diabetic Foot Clinic
Greater Manchester, Lancashire and South Cumbria	
Stockport NHS Foundation Trust	Tameside and Glossop Integrated Diabetes Service
London	
Lewisham and Greenwich NHS Trust	Oxleas NHS Foundation Trust - Podiatry
North East London NHS Foundation Trust	Chadwell Heath Health Centre
	Harold Hill Health Centre
	Harold Wood – Long Term Conditions Centre
	Porters Avenue
	Queens Hospital
	South Hornchurch Health Centre
South West	
North Somerset Community Partnership Community Interest Company	North Somerset Community Partnership Podiatry Service
Sirona Care and Health	Podiatry - Patchway Clinic
	Podiatry - St Martins Outpatient Clinic
Thames Valley	
Heatherwood and Wexham Park Hospitals NHS Foundation Trust	Wexham Park Hospital Multidisciplinary Foot Care Team
Oxford University Hospitals NHS Trust	Diabetic Foot Clinic, OCDEM
West Midlands	
The Dudley Group NHS Foundation Trust	Dudley Diabetes Foot Care Services
Yorkshire and the Humber	
Mid Yorkshire Hospitals NHS Trust	Dewsbury Hospital

Wales

Local Health Board	Service name
Hywel Dda University Local Health Board	Glangwili General Hospital

Appendix 4: Locations of participating foot care services

Figure 13 shows the geographic distribution of participating service providers across England and Wales, with each foot care service site highlighted in white.

Figure 13: Map of participating service providers, by foot care service, England and Wales, 2014-2015^

^ Multiple services within the same organisation may operate from the same site or from sites that are geographically close and these may not be distinguishable on the map. Service providers continue to join the audit, and sites that have only provided more recent data do not appear in this map.

Appendix 5: Participating commissioning organisations

Commissioning organisations (CCGs and LHBs) that participated in the NDFA Structures Survey[31].

Organisation Name	Participated in structures audit	Patients from this CCG / LHB were submitted to the audit
Unknown CCG / LHB		Yes[32]
NHS England London		
NHS Barking and Dagenham CCG	Yes	
NHS Barnet CCG	Yes	Yes
NHS Bexley CCG		Yes
NHS Brent CCG	Yes	Yes
NHS Bromley CCG		Yes
NHS Camden CCG		Yes
NHS Central London (Westminster) CCG	Yes	Yes
NHS City and Hackney CCG	Yes	Yes
NHS Croydon CCG	Yes	Yes
NHS Ealing CCG	Yes	Yes
NHS Enfield CCG	Yes	Yes
NHS Greenwich CCG		Yes
NHS Hammersmith and Fulham CCG	Yes	Yes
NHS Haringey CCG		Yes
NHS Harrow CCG		Yes
NHS Havering CCG		
NHS Hillingdon CCG	Yes	
NHS Hounslow CCG	Yes	Yes
NHS Islington CCG	Yes	Yes
NHS Kingston CCG	Yes	
NHS Lambeth CCG	Yes	Yes
NHS Lewisham CCG	Yes	Yes
NHS Merton CCG		
NHS Newham CCG	Yes	Yes
NHS Redbridge CCG	Yes	Yes
NHS Richmond CCG	Yes	Yes
NHS Southwark CCG		Yes
NHS Sutton CCG	Yes	Yes
NHS Tower Hamlets CCG	Yes	Yes
NHS Waltham Forest CCG	Yes	Yes
NHS Wandsworth CCG	Yes	Yes
NHS West London CCG	Yes	Yes

[31] Four specialist commissioning hubs also responded to the NDFA structures audit – West Midlands, Cheshire and Merseyside, Lancashire and Greater Manchester, and South Central Commissioning Hub.
[32] 493 (9.8 per cent) of the 5,015 patients submitted to the NDFA could not be linked to the NDA, and so could not be allocated to a CCG / LHB as the responsible commissioning organisation for their care.

NHS England Midlands and East (Central Midlands)		
NHS Bedfordshire CCG	Yes	Yes
NHS Corby CCG		Yes
NHS East and North Hertfordshire CCG	Yes	Yes
NHS East Leicestershire and Rutland CCG		Yes
NHS Herts Valleys CCG	Yes	Yes
NHS Leicester City CCG	Yes	Yes
NHS Lincolnshire East CCG		Yes
NHS Lincolnshire West CCG		Yes
NHS Luton CCG		Yes
NHS Milton Keynes CCG		Yes
NHS Nene CCG		Yes
NHS South Lincolnshire CCG	Yes	
NHS South West Lincolnshire CCG	Yes	Yes
NHS West Leicestershire CCG		Yes
NHS England Midlands and East (East)		
NHS Basildon and Brentwood CCG	Yes	Yes
NHS Cambridgeshire and Peterborough CCG	Yes	Yes
NHS Castle Point and Rochford CCG	Yes	Yes
NHS Great Yarmouth and Waveney CCG	Yes	Yes
NHS Ipswich and East Suffolk CCG		Yes
NHS Mid Essex CCG	Yes	Yes
NHS North East Essex CCG		
NHS North Norfolk CCG		Yes
NHS Norwich CCG	Yes	Yes
NHS South Norfolk CCG		Yes
NHS Southend CCG	Yes	Yes
NHS Thurrock CCG		Yes
NHS West Essex CCG	Yes	Yes
NHS West Norfolk CCG	Yes	Yes
NHS West Suffolk CCG		Yes
NHS England Midlands and East (North Midlands)		
NHS Cannock Chase CCG		Yes
NHS East Staffordshire CCG	Yes	Yes
NHS Erewash CCG		Yes
NHS Hardwick CCG	Yes	Yes
NHS Mansfield and Ashfield CCG	Yes	Yes
NHS Newark & Sherwood CCG		Yes
NHS North Derbyshire CCG	Yes	Yes
NHS North Staffordshire CCG	Yes	Yes
NHS Nottingham City CCG	Yes	Yes
NHS Nottingham North and East CCG	Yes	Yes
NHS Nottingham West CCG	Yes	Yes
NHS Rushcliffe CCG		Yes
NHS Shropshire CCG	Yes	Yes
NHS South East Staffordshire and Seisdon Peninsula CCG		Yes
NHS Southern Derbyshire CCG	Yes	Yes
NHS Stafford and Surrounds CCG		Yes

NHS Stoke on Trent CCG	Yes	Yes
NHS Telford and Wrekin CCG		Yes
NHS England Midlands and East (West Midlands)		
NHS Birmingham Crosscity CCG		Yes
NHS Birmingham South and Central CCG	Yes	Yes
NHS Coventry and Rugby CCG		Yes
NHS Dudley CCG	Yes	Yes
NHS Herefordshire CCG	Yes	Yes
NHS Redditch and Bromsgrove CCG		
NHS Sandwell and West Birmingham CCG		Yes
NHS Solihull CCG	Yes	Yes
NHS South Warwickshire CCG		Yes
NHS South Worcestershire CCG	Yes	Yes
NHS Walsall CCG	Yes	Yes
NHS Warwickshire North CCG	Yes	
NHS Wolverhampton CCG	Yes	
NHS Wyre Forest CCG		Yes
NHS England North (Cheshire and Merseyside)		
NHS Eastern Cheshire CCG		Yes
NHS Halton CCG	Yes	Yes
NHS Knowsley CCG	Yes	Yes
NHS Liverpool CCG	Yes	Yes
NHS South Cheshire CCG		
NHS South Sefton CCG	Yes	
NHS Southport and Formby CCG	Yes	Yes
NHS St Helens CCG		Yes
NHS Vale Royal CCG		Yes
NHS Warrington CCG	Yes	
NHS West Cheshire CCG	Yes	Yes
NHS Wirral CCG		
NHS England North (Cumbria and North East)		
NHS Cumbria CCG	Yes	Yes
NHS Darlington CCG	Yes	Yes
NHS Durham Dales, Easington and Sedgefield CCG	Yes	Yes
NHS Hartlepool and Stockton-On-Tees CCG		Yes
NHS Newcastle Gateshead CCG	Yes	Yes
NHS North Durham CCG	Yes	Yes
NHS North Tyneside CCG		Yes
NHS Northumberland CCG		Yes
NHS South Tees CCG	Yes	Yes
NHS South Tyneside CCG	Yes	Yes
NHS Sunderland CCG	Yes	Yes

NHS England North (Lancashire and Greater Manchester)		
NHS Blackburn with Darwen CCG	Yes	
NHS Blackpool CCG	Yes	Yes
NHS Bolton CCG	Yes	Yes
NHS Bury CCG	Yes	Yes
NHS Central Manchester CCG		Yes
NHS Chorley and South Ribble CCG		Yes
NHS East Lancashire CCG		Yes
NHS Fylde & Wyre CCG	Yes	Yes
NHS Greater Preston CCG		Yes
NHS Heywood, Middleton and Rochdale CCG	Yes	Yes
NHS Lancashire North CCG		
NHS North Manchester CCG	Yes	Yes
NHS Oldham CCG		Yes
NHS Salford CCG		Yes
NHS South Manchester CCG	Yes	Yes
NHS Stockport CCG		Yes
NHS Tameside and Glossop CCG		Yes
NHS Trafford CCG	Yes	Yes
NHS West Lancashire CCG	Yes	Yes
NHS Wigan Borough CCG		Yes
NHS England North (Yorkshire and Humber)		
NHS Airedale, Wharfedale and Craven CCG	Yes	Yes
NHS Barnsley CCG		Yes
NHS Bassetlaw CCG	Yes	
NHS Bradford City CCG		Yes
NHS Bradford Districts CCG	Yes	Yes
NHS Calderdale CCG	Yes	Yes
NHS Doncaster CCG	Yes	
NHS East Riding of Yorkshire CCG	Yes	Yes
NHS Greater Huddersfield CCG	Yes	Yes
NHS Hambleton, Richmondshire and Whitby CCG		Yes
NHS Harrogate and Rural District CCG	Yes	Yes
NHS Hull CCG	Yes	Yes
NHS Leeds North CCG		Yes
NHS Leeds South and East CCG	Yes	Yes
NHS Leeds West CCG	Yes	Yes
NHS North East Lincolnshire CCG	Yes	Yes
NHS North Kirklees CCG	Yes	Yes
NHS North Lincolnshire CCG		Yes
NHS Rotherham CCG		Yes
NHS Scarborough and Ryedale CCG		Yes
NHS Sheffield CCG	Yes	Yes
NHS Vale of York CCG	Yes	Yes
NHS Wakefield CCG	Yes	Yes

NHS England South (South Central)		
NHS Aylesbury Vale CCG	Yes	Yes
NHS Bath and North East Somerset CCG	Yes	
NHS Bracknell and Ascot CCG		Yes
NHS Chiltern CCG		Yes
NHS Gloucestershire CCG	Yes	Yes
NHS Newbury and District CCG		Yes
NHS North & West Reading CCG	Yes	Yes
NHS Oxfordshire CCG	Yes	Yes
NHS Slough CCG		Yes
NHS South Reading CCG		Yes
NHS Swindon CCG	Yes	Yes
NHS Wiltshire CCG		Yes
NHS Windsor, Ascot and Maidenhead CCG		
NHS Wokingham CCG		Yes
NHS England South (South East)		
NHS Ashford CCG		Yes
NHS Brighton and Hove CCG	Yes	
NHS Canterbury and Coastal CCG	Yes	Yes
NHS Coastal West Sussex CCG	Yes	Yes
NHS Crawley CCG		Yes
NHS Dartford, Gravesham and Swanley CCG	Yes	Yes
NHS East Surrey CCG		Yes
NHS Eastbourne, Hailsham and Seaford CCG	Yes	Yes
NHS Guildford and Waverley CCG	Yes	Yes
NHS Hastings and Rother CCG		Yes
NHS High Weald Lewes Havens CCG		Yes
NHS Horsham and Mid Sussex CCG		
NHS Medway CCG	Yes	Yes
NHS North West Surrey CCG		Yes
NHS South Kent Coast CCG	Yes	Yes
NHS Surrey Downs CCG	Yes	Yes
NHS Surrey Heath CCG		Yes
NHS Swale CCG	Yes	Yes
NHS Thanet CCG		Yes
NHS West Kent CCG		Yes
NHS England South (South West)		
NHS Bristol CCG	Yes	Yes
NHS Kernow CCG	Yes	
NHS North Somerset CCG	Yes	
NHS Northern, Eastern and Western Devon CCG	Yes	Yes
NHS Somerset CCG	Yes	Yes
NHS South Devon and Torbay CCG	Yes	Yes
NHS South Gloucestershire CCG	Yes	

NHS England South (Wessex)		
NHS Dorset CCG	Yes	Yes
NHS Fareham and Gosport CCG		
NHS Isle of Wight CCG		
NHS North East Hampshire and Farnham CCG		Yes
NHS North Hampshire CCG	Yes	Yes
NHS Portsmouth CCG		
NHS South Eastern Hampshire CCG		Yes
NHS Southampton CCG	Yes	
NHS West Hampshire CCG	Yes	Yes
NHS Wales		
Abertawe Bro Morgannwg University LHB	Yes	Yes
Aneurin Bevan University LHB	Yes	Yes
Betsi Cadwaladr University LHB		Yes
Cardiff and Vale University LHB	Yes	Yes
Cwm Taf University LHB		Yes
Hywel Dda University LHB	Yes	Yes
Powys Teaching LHB		Yes

Figure 14: Map of responsible commissioners and their participation in the structures survey, England and Wales, 2014-2015^

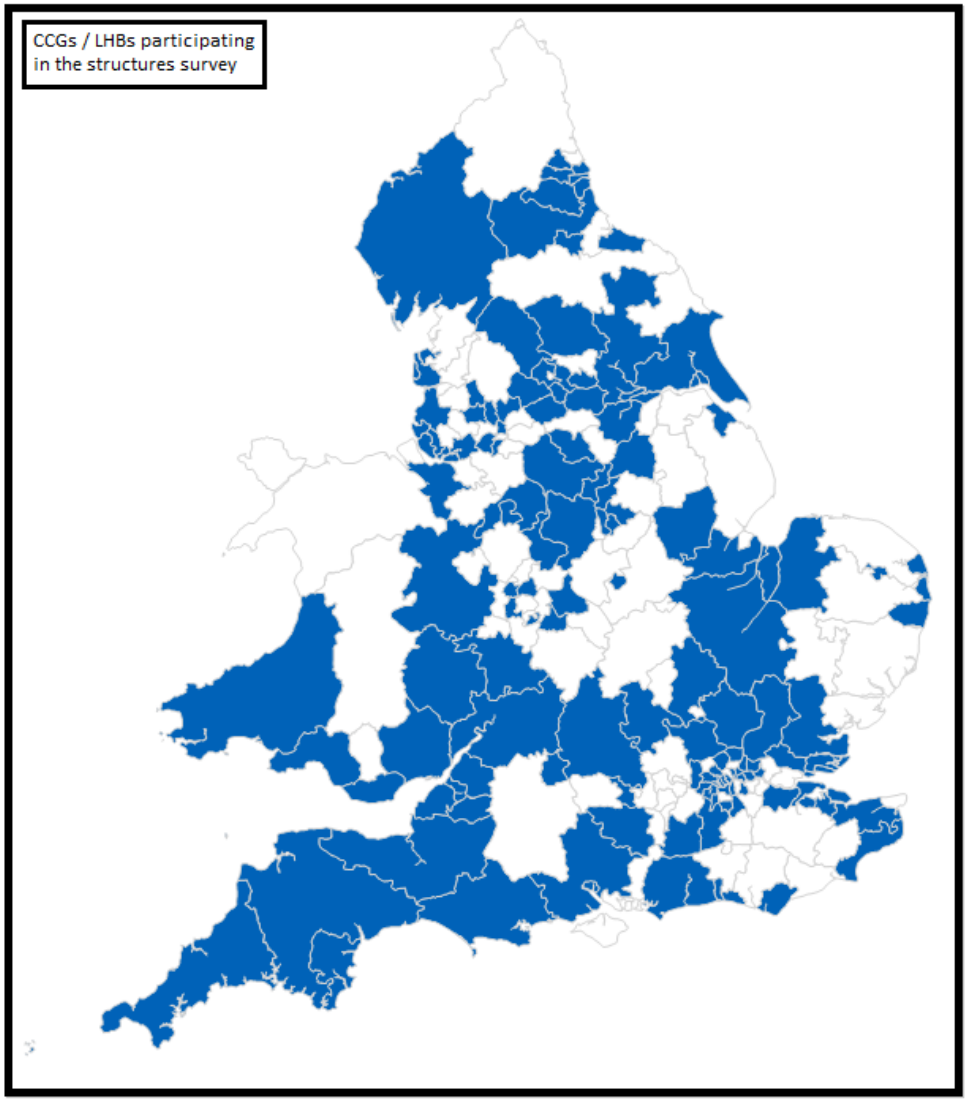
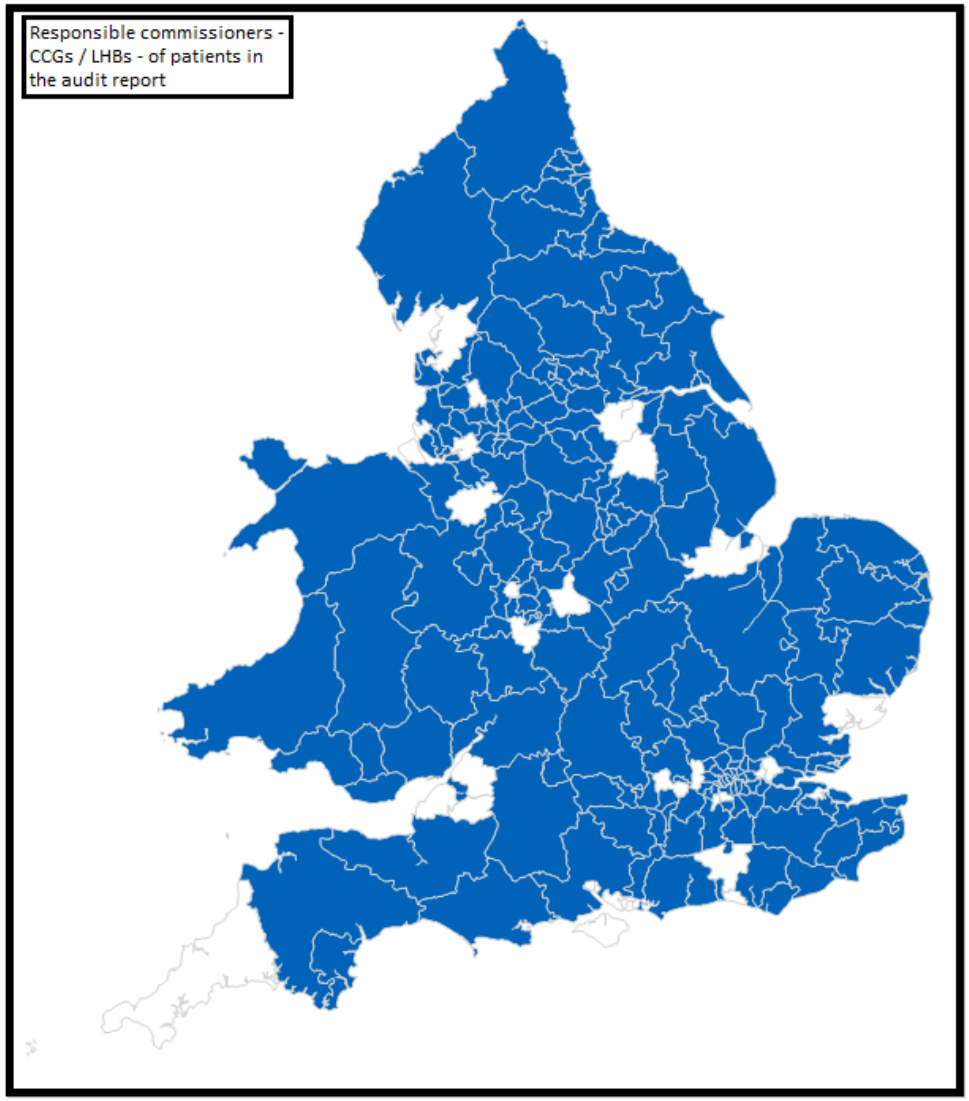


Figure 15: Map of responsible commissioners of patients submitted in the audit, England and Wales, 2014-2015†



^ Participating organisations may have answered any number (0-3) of the three survey questions.

† 493 patients could not be linked to the NDA and assigned to a commissioner.

Appendix 6: NDA data items collected via linkage

The following NDFA data items were collected from the NDA Core via linkage:

Data item
Age
Sex
LSOA
Ethnicity
Diabetes type
Year of diagnosis
BMI
Smoking history
Last foot exam
Last HbA1c
Last BP systolic
Last BP diastolic
Last cholesterol

Appendix 7: SINBAD scores

The audit recorded the severity of the patient's index ulcer using the yes/no scoring system SINBAD. The scoring system assesses six aspects of the ulcer –

- Site –Where index ulcer is found on the hindfoot (including the tarso-metatarsal joints and everything proximal to them below the ankle [Yes]. Or when it is sited elsewhere [No].
- Ischaemia - Where pulses are absent and/or there are other clinical signs of ischaemia [Yes]. Or where pulses are intact and there's no sign of ischaemia [No].
- Neuropathy – Where there is evidence of sensory loss using monofilament or touch or vibration or other stimulus used in routine clinical practice [Yes]. Or where there is no evidence of sensory loss [No].
- Bacterial infection – Where there are clinical signs of infection, such as redness, swelling, heat, discharge, etc. [Yes]. Or where there are no clinical signs of infection [No].
- Area – Where the index ulcer has an area of $1cm^2$ or more [Yes]. Or where the area is less than $1cm^2$ [No].
- Depth – Where the ulcer – assessed by eye or sterile probe – reaches tendon or bone [Yes]. Or where the ulcer does not penetrate that far [No].

For each ulcer, the more severe variant of each SINBAD aspect is scored with 1 and the less severe variant is scored with 0. An ulcer may have an overall SINBAD score between 0 (least severe) and 6 (most severe).

Appendix 8: Regression modelling of 12 week outcomes

Logistic regression has been used to investigate associations between the audit variables and 12 week healing outcomes.

Taken as a whole, the derived model did not predict with sufficient certainty whether an individual was likely to be ulcer free at 12 weeks (c-statistic[33] of 0.69). Therefore the performance of individual providers in the data is not explained by the demographics of the patients they have submitted.

This model will be reconsidered in later audit years when there will be more data available to inform the model. The audit will then look towards providing standardised healing ratios by organisations to indicate the relative performance of providers of diabetic foot care.

Regression model variables

Variables considered as possible explanatory factors for 12 week healing were age, sex, ethnicity, deprivation quintile, BMI, smoking status, diabetes type, diabetes duration, Charcot foot disease, each SINBAD component and time to assessment. The following were found to have a significant association with 12 week healing outcomes: sex, smoking status, Charcot foot disease, the SINBAD components and time to assessment (see Table 14 below).

Table 14: 12 week healing regression modelling variables, England and Wales, 2014-2015

Variable	Significant association with 12 week healing found?
Age	No
Sex	Yes
Ethnicity	No
Deprivation quintile	No
BMI	Excluded*
Smoking status	Yes
Diabetes type	No
Diabetes duration	Excluded*
Charcot foot disease	Yes
SINBAD components	Yes (all)
Time to assessment	Yes

* In early iterations of the model, BMI and then diabetes duration only showed a significant association to healing amongst patients for whom no value was recorded in the variable, and no differences between different recorded values. These variables were subsequently excluded from consideration for the final model.

[33] See explanatory note at the foot of Table 15.

Regression model outputs

Table 15 below shows the results from the regression model.

Table 15: Results from multivariate analysis of data for ulcer free outcomes at 12 weeks, England and Wales, 2014-2015^

	Number of observations used in model	4,200	
	Filters	Outcome: Survived at 12 weeks, Sex: Male, Female	
	Intercept	Estimate	95% CI Limits
		1.21	(0.98, 1.43)
	c-statistic *	0.69	
		Odds Ratio	95% CI Limits
Sex	Sex: Female vs. Male	1.199	(1.040, 1.384)
Time to assessment	Self-presenting reference category		
	<=2 days vs. Self-presenting	0.881	(0.717, 1.083)
	3-13 days vs. Self-presenting	0.909	(0.767, 1.076)
	14 days - 2 months vs. Self-presenting	0.716	(0.592, 0.865)
	> 2 months vs. Self-presenting	0.524	(0.399, 0.687)
Site	Yes vs. No	0.763	(0.640, 0.910)
Ischaemia	Yes vs. No	0.559	(0.487, 0.642)
Neuropathy	Yes vs. No	0.741	(0.623, 0.881)
Bacterial Infection	Yes vs. No	0.790	(0.685, 0.911)
Area	Yes vs. No	0.497	(0.433, 0.570)
Depth	Yes vs. No	0.613	(0.507, 0.742)
Charcot foot disease	Not present reference category		
	Present vs. Not present	0.578	(0.431, 0.775)
	Possible vs. Not present	1.204	(0.722, 2.008)
	Not recorded vs. Not present	1.191	(1.002, 1.416)
Smoking status	Current smoker vs Ex-smoker	0.751	(0.602, 0.938)
	Ex-smoker reference category		
	Never smoked vs Ex-smoker	0.887	(0.752, 1.045)
	Non-smoked, history unknown vs Ex-smoker	0.935	(0.669, 1.307)
	Unknown/Not recorded vs Ex-smoker	0.724	(0.607, 0.864)

^ Text shown in black indicates where there is a significant difference compared to the reference group ($\rho<0.05$). Text shown in grey indicates where there is not a significant difference compared to the reference group. Results are presented as odds ratios with 95% confidence intervals in brackets.

* c statistic: The probability that predicting the outcome is better than chance. Used to compare the goodness of fit of logistic regression models, values for this measure range 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 & Lemeshow, 2000)[34].

The odds ratios in Table 15 above illustrate how strongly each variable is associated with the outcome. An odds ratio of 1 would show that the variable has no bearing on how likely the outcome is. For example the odds ratio for 'Bacterial Infection' between 'Yes' and 'No' is 0.790; therefore someone with a bacterial infection is less likely to be ulcer free after 12 weeks than someone without such an infection.

[34] Hosmer DW, Lemeshow S. Applied Logistic Regression (2nd Edition). New York, NY: John Wiley & Sons; 2000

The further from one the ratio is, the stronger the association between it and the outcome. The odds ratio for ischemia is 0.559, so whether this is present or not is a stronger predictor of being ulcer free than whether a bacterial infection is present.

There is always a degree of uncertainty in the calculated odds ratio. This is described by the confidence intervals. If the confidence intervals are either side of 1 this indicates that the variable has no bearing on how likely the outcome is.

The odds ratio results from the regression model show that the presence of each the SINBAD elements is associated with poorer healing outcomes, with the effect most pronounced where ulcers were greater than 1cm^2 in area (Area) or where there were signs of impaired circulation (Ischaemia). Women tend to have better outcomes than men, as do ex-smokers compared to current smokers. Time to presentation is also shown to be significant, with intervals of 2 weeks or more associated with poorer outcomes than the reference category (self-presenters). This effect was most pronounced where the wait was two months or longer.

As noted above, the low c-statistic[35] of 0.69 indicates that the model is insufficient for use to calculate standardised healing ratios, though this will hopefully be achievable in later years as participation, case ascertainment and data quality improve.

[35] See explanatory note at the foot of Table 15.

Appendix 9: Characteristics of people in the NDFA

The following section compares the characteristics of people included in NDFA with the wider pool of diabetic patients in the NDA.

Diabetes type

Table 16 below shows that Type 1 diabetes is more prevalent (13.0 per cent) amongst those that present with a foot ulcer than in the diabetic population as a whole (8.6 per cent).

Table 16: Diabetes type of people with new ulcers compared to the total diabetic population, England and Wales, 2014-2015[^]

Diabetes type	NDFA[i] (N=4,522)		NDA 2014-15[ii] (N=1,894,887)		Difference
	Number	Per cent	Number	Per cent	%
Type 1	588	**13.0**	163,589	**8.6**	4.4
Type 2 and other	3,934	**87.0**	1,731,298	**91.4**	-4.4

^ Where the values in a row in the table are **bolded**, the difference between the two percentages is statistically significant (*p* <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Gender

Table 17 below shows that there is a higher proportion of men (69.6 per cent) in the NDFA cohort than in the total diabetic population (55.7 per cent), a difference of 13.9 percentage points.

Table 17: Gender of people with new ulcers compared to the total diabetic population, England and Wales, 2014-2015 †^

Gender	NDFA[i] (N=4,521)		NDA 2014-15[ii] (N=1,894,626)		Difference
	Number	Per cent	Number	Per cent	%
Male	3,148	**69.6**	1,055,533	**55.7**	13.9
Female	1,373	**30.4**	839,093	**44.3**	-13.9

† Not known/not recorded responses are not shown this table.
^ Where the values in a row in the table are **emboldened**, the difference between the two percentages is statistically significant (*p* <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Age

Table 18 below shows that the average age of people with diabetes who present with a foot ulcer (67.3 years) is higher than in the overall diabetic population (63.6 years). The difference is particularly pronounced in people with Type 1 diabetes.

Table 18: Average age recorded in NDA of people with new ulcers compared to the total diabetic population, by diabetes type, England and Wales, 2014-2015 †^

Diabetes type	NDFA[i]	NDA 2014-15[ii]	Difference
	Years	Years	Years
Type 1	**55.7**	**42.9**	12.8
Type 2 and other	**69.1**	**65.5**	3.6
All patients	**67.3**	**63.6**	3.8

^ Where the values in a row in the table are **emboldened** , the difference between the two numbers is statistically significant (*p* <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Duration of diabetes

Table 19 below shows that the average duration of diabetes for people who present with a foot ulcer is 6.4 years higher than in the diabetic population as a whole. The difference is more pronounced in people with Type 1 diabetes.

Table 19: Average duration of diabetes for people with new ulcers compared to the total diabetic population, by diabetes type, England and Wales, 2014-2015^

Diabetes type	NDFA[i]	NDA 2014-15[ii]	Difference
	Years	Years	Years
Type 1	**26.5**	**17.6**	8.9
Type 2 and other	**13.3**	**7.8**	5.5
All patients	**15.0**	**8.6**	6.4

^ Where the values in a row in the table are **emboldened** , the difference between the two numbers is statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Ethnicity

Table 20 below shows that there is a higher proportion of people of a white ethnic background amongst those that present with a diabetic foot ulcer (69.9 per cent) compared to the diabetes population as a whole (61.4 per cent).

Table 20: Ethnicity of people with new ulcers compared to the total diabetic population, by diabetes type, England and Wales, 2014-2015^

Ethnic group	All diabetes (N=4,522)			Type 1 (N=588)			Type 2 and other (N=3,934)		
	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]
	Number	Per cent	Per cent	Number	Per cent	Per cent	Number	Per cent	Per cent
White	3,159	**69.9**	**61.4**	443	**75.3**	**67.8**	2,716	**69.0**	**60.8**
Mixed	17	**0.4**	**0.9**	2	0.3	0.9	15	**0.4**	**0.9**
Asian	116	**2.6**	**9.4**	5	0.9	3.3	111	**2.8**	**9.9**
Black	116	**2.6**	**4.1**	10	**1.7**	**2.8**	106	**2.7**	**4.2**
Other	71	**1.6**	**2.6**	8	1.4	2.1	63	**1.6**	**2.6**
Not stated/not known	1,043	**23.1**	**21.7**	120	20.4	23.1	923	**23.5**	**21.6**

^ Where the values in a row in the table are **emboldened**, the difference between the comparable NDFA and NDA percentages are statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Deprivation

Table 21 below shows that there is a higher proportion of people in the most deprived fifth of the population amongst those that present with a diabetic foot ulcer (26.0 per cent) compared to the diabetic population as a whole (22.9 per cent). This suggests a positive correlation between deprivation severity and presentation with a diabetic foot ulcer. The effect is more pronounced for people with Type 1 diabetes (6.0 percentage points higher in NFDA patients) than for people with Type 2 diabetes (2.4 per cent percentage points higher).

Table 21: Deprivation quintile of people with new ulcers by diabetes type, England and Wales, 2014-2015[†^]

Deprivation quintile	All diabetes (N=4,522)			Type 1 (N=588)			Type 2 and other (N=3,934)		
	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]
	Number	Per cent	Per cent	Number	Per cent	Per cent	Number	Per cent	Per cent
Most deprived fifth	1,175	**26.0**	**22.9**	154	**26.2**	**19.6**	1,021	**26.0**	**23.3**
2nd most deprived fifth	932	**20.6**	**22.5**	105	17.9	20.8	827	**21.0**	**22.6**
3rd most deprived fifth	936	20.7	20.6	129	21.9	20.6	807	20.5	20.6
2nd least deprived fifth	831	18.4	18.4	111	18.9	20.0	720	18.3	18.2
Least deprived fifth	637	**14.1**	**15.6**	88	**15.0**	**19.0**	549	**14.0**	**15.3**

† The percentages for each year do not add up to 100 per cent as "Not known/not recorded" responses have not been included in this table.
^ Where the values in a row in the table are **emboldened** , the difference between the comparable NDFA and NDA percentages are statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Body mass index (BMI)

Table 22 shows that the average BMI of people who present with a foot ulcer (31.1 kg/m^2) is higher than in the diabetic population as a whole (30.8 kg/m^2), although the difference is small (0.3 kg/m^2). The difference is more pronounced for people with Type 1 diabetes.

Table 22: Average BMI of people with new ulcers compared to the total diabetic population, by diabetes type, England and Wales, 2014-2015[^]

Diabetes type	NDFA[i]	NDA 2014-15[ii]	Difference
	kg/m^2	kg/m^{2}l	kg/m^2
Type 1	**28.1**	**26.9**	1.3
Type 2 and other	**31.6**	**31.1**	0.5
All patients	**31.1**	**30.8**	0.3

^ Where the values in a row in the table are **emboldened** , the difference between the two numbers is statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

Smoking status

Table 23 below shows that the proportion of Type 1 patients that are current or ex-smokers is 10.4 percentage points higher than the equivalent NDA cohort. There is no significant difference for the equivalent group of people with Type 2 diabetes.

Table 23: Smoking status of people with new ulcers compared to the total diabetic population, by diabetes type, England and Wales, 2014-2015^

Smoking status	All diabetes (N=4,522)			Type 1 (N=588)			Type 2 and other (N=3,934)		
	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]	NDFA[i]		NDA[ii]
	Number	Per cent	Per cent	Number	Per cent	Per cent	Number	Per cent	Per cent
Current smoker	532	11.8	12.6	112	**19.0**	**15.4**	420	**10.7**	**12.3**
Ex-smoker	1,421	**31.4**	**30.0**	144	**24.5**	**17.7**	1,277	32.5	31.2
Non-smoker, history unknown	173	**3.8**	**1.1**	21	3.6	2.1	152	**3.9**	**1.0**
Never smoked	1,316	**29.1**	**38.2**	169	**28.7**	**36.6**	1,147	**29.2**	**38.3**
Not known	1,080	**23.9**	**18.2**	142	**24.1**	**28.2**	938	**23.8**	**17.2**

^ Where the values in a row in the table are **emboldened** , the difference between the comparable NDFA and NDA percentages are statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

NICE recommended treatment targets

NICE has defined treatment targets for HbA1c (glucose control), blood pressure and serum cholesterol. The targets are important because:

- Target HbA1c (≤58 mmol/mol) reduces the risk of all diabetic complications.
- Target blood pressure (≤140/80) reduces the risk of vascular complications and reduces the progression of eye disease and kidney failure.
- Target cholesterol (<5 mmol/L) reduces the risk of vascular complications.

Linkage to NDA was used to investigate the proportion of people in the NDFA cohort that had met the NICE treatment targets in the preceding NDA collection period (January 2013 to March 2014)[36].

Table 24 below shows that a lower proportion of people presenting with a diabetic foot ulcer met the HbA1c treatment target (44.1 per cent) compared to the wider diabetes population (64.1 per cent), a difference of 20.0 percentage points. The difference was less pronounced for the blood pressure target (71.2 per cent compared to 73.8 per cent). There was no significant difference for cholesterol, except for people with Type 2 where attainment was slightly higher in those presenting with a foot ulcer (80.2 per cent compared to 77.8 per cent).

Table 24: Treatment target achievement recorded in the NDA, January 2013 – March 2014, England and Wales, NDFA patients first seen in 2014-2015^

Treatment target	All diabetes		Type 1		Type 2 and other	
	NDFA[i]	NDA[ii]	NDFA[i]	NDA[ii]	NDFA[i]	NDA[ii]
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
HbA1c ≤58 mmol/mol	**44.1**	**64.1**	**19.3**	**29.4**	**47.8**	**66.8**
BP ≤140/80	**71.2**	**73.8**	**67.7**	**76.4**	71.7	73.6
Cholesterol <5 mmol/L	78.7	77.4	69.3	71.5	**80.2**	**77.8**
Met all treatment targets*	**28.9**	**39.9**	**11.6**	**18.6**	**31.4**	**41.4**

* HbA1c ≤58 mmol/mol, cholesterol < 5 mmol/L and the blood pressure target ≤ 140/80.
^ Where the values in a row in the table are **emboldened** , the difference between the comparable NDFA and NDA percentages are statistically significant (p <0.05).
[i] People with diabetes presenting with a foot ulcer. [ii] All people with diabetes.

[36] The January 2013 to March 2014 NDA cohort was used to ensure that NDA treatment target achievement took place prior to the NDFA attendance

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