National Diabetes Foot Care Audit
Hospital Admissions Report 2014-2016

NHS Digital

England and Wales
14 July 2014 to 8 April 2016

Information and technology
for better health and care

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Contents

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Introduction

The National Diabetes Foot Care Audit (NDFA) collects information about the care received by people with active diabetic foot disease and the structures set up to deliver foot care services in England and Wales. Data is recorded on patient assessment and clinical outcome for each new ulcer episode.

The NDFA is part of the National Diabetes Audit programme (NDA), commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP).

For this report, patients in the NDFA have been linked to hospital admissions data in England[1] and Wales[2], allowing analysis of hospital inpatient activity during the 6 months following first expert assessment by the specialist foot care service.

The report includes: **all hospital admissions**, **foot disease admissions**, **length of stay**, **revascularisation** and **amputation**.

Notes: **1**. Hospital Episode Statistics (HES). **2**. Patient Episode Database for Wales (PEDW).

Prepared in collaboration with:

HQIP
Healthcare Quality Improvement Partnership

NHS Digital

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Why is diabetic foot care important?[1]

- In 2014-15 the annual cost of diabetic foot disease to the NHS in England was estimated at around £1 billion, in addition to the personal/social costs of reduced mobility and sickness absence.
- More than 64,000 people with diabetes in England and Wales[2] are thought to have foot ulcers at any given time.
- Only around three in five people with diabetes who have had a diabetic foot ulcer survive for five years.
- Treatment for diabetic foot disease may involve amputation. There are around 7,000 leg, foot or toe amputations in people with diabetes in England each year.
- The risk of lower extremity amputation for people with diabetes is more than 20 times that of people without diabetes.
- Only around half of people who have lost a leg because of diabetes survive for two years.

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

Why is this report important?

Findings and recommendations in this report will support the audit question: **Are the outcomes of diabetic foot disease optimised**?

For the first time, NDFA patients have been linked to hospital admissions data, allowing a detailed review of associations between diabetic foot ulceration and subsequent hospital care.

Information is presented on the following areas:

- **Hospital admissions**, including:
  - All hospital admissions, for any reason
  - Foot disease-related hospital admissions[1]
- **Revascularisation** (restoration of blood circulation)
  - Where vascular bypass or angioplasty procedures were undertaken during the patient's hospital visit
- **Lower limb amputation** undertaken during the patient's hospital stay including:
  - Minor amputation, below the ankle
  - Major amputation, above the ankle

All hospital admissions and treatments included in this report occurred within 6 months of the person being seen for their first foot ulcer recorded in the NDFA.

Notes: **1**. Where an episode of care predominantly for inpatient management of diabetic foot disease was recorded at any point during the patient's admission.

What have we learnt so far?

Since inception in 2014, the NDFA has firmly established the relationship between time to first expert assessment, ulcer severity and healing outcomes[1].

Time to first expert assessment

Short waits ≤ 2 days

- 50% had a severe ulcer
- 48% healed at 12 weeks
- 68% healed at 24 weeks

Long waits >2 months

- 58% had a severe ulcer
- 32% healed at 12 weeks
- 54% healed at 24 weeks

Better — Worse

Are similar patterns evident in the hospital admissions data?

Ulcer severity

Less severe

- 62% seen within 2 weeks[2]
- 60% healed at 12 weeks
- 74% healed at 24 weeks

Severe

- 58% seen within 2 weeks[2]
- 35% healed at 12 weeks
- 56% healed at 24 weeks

Better — Worse

Notes: **1**. National Diabetes Foot Care Audit - 2014-2016. **2**. Excluding self-referral. Previously unpublished.

Key findings

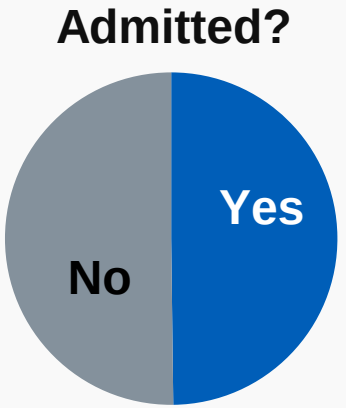
Summary

Key findings

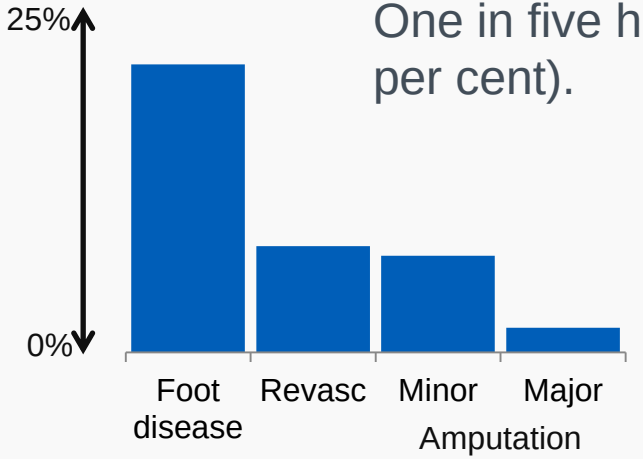
- **Hospital admissions**
  - Almost half of all people with a new diabetic foot ulcer had at least one admission within 6 months of their earliest expert assessment recorded in the audit.
- **Ulcer severity**
  - Those with **severe** ulcers at first expert assessment were more likely to have a hospital admission within six months, and to have admissions involving foot disease, revascularisation and amputation, than people with less severe ulcers.
- **Bed days**
  - In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied 95,000 hospital bed days. Low NDFA case ascertainment suggests the total NHS figure is much higher**.**
- **Length of stay**
  - The median length of hospital stays where foot disease, revascularisation or amputation were identified was over 7 days, rising to 15 days for vascular bypass and 25 days for major amputations.

Key findings – Hospital admissions

Q. How often are people with a foot ulcer admitted to hospital?



Almost half of people with diabetic foot disease had a hospital admission within 6 months of first expert assessment for foot disease (50 per cent).



One in five had a foot disease-related admission (21 per cent).

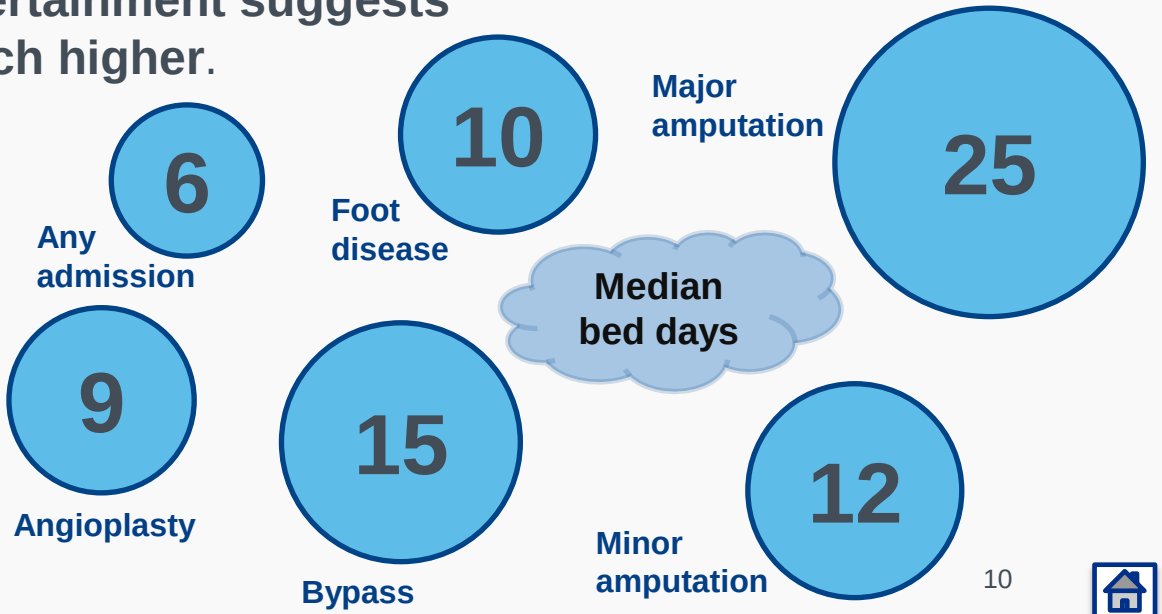
Those with severe ulcers at first expert assessment were more likely to have all types of hospital admission. **This highlights the importance of early expert assessment of new diabetic foot ulcers, as the NDFA has shown that this is associated with lower ulcer severity.**

Key findings – Bed days and length of stay

Q. How long do people with a foot ulcer stay in hospital?

In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 95,000 hospital bed days. **Low NDFA case ascertainment suggests the total NHS figure is much higher**.

Median length of hospital stay where foot disease, revascularisation or amputation were identified was over 7 days, rising to 15 days for bypass and 25 days for major amputations.



Recommendation

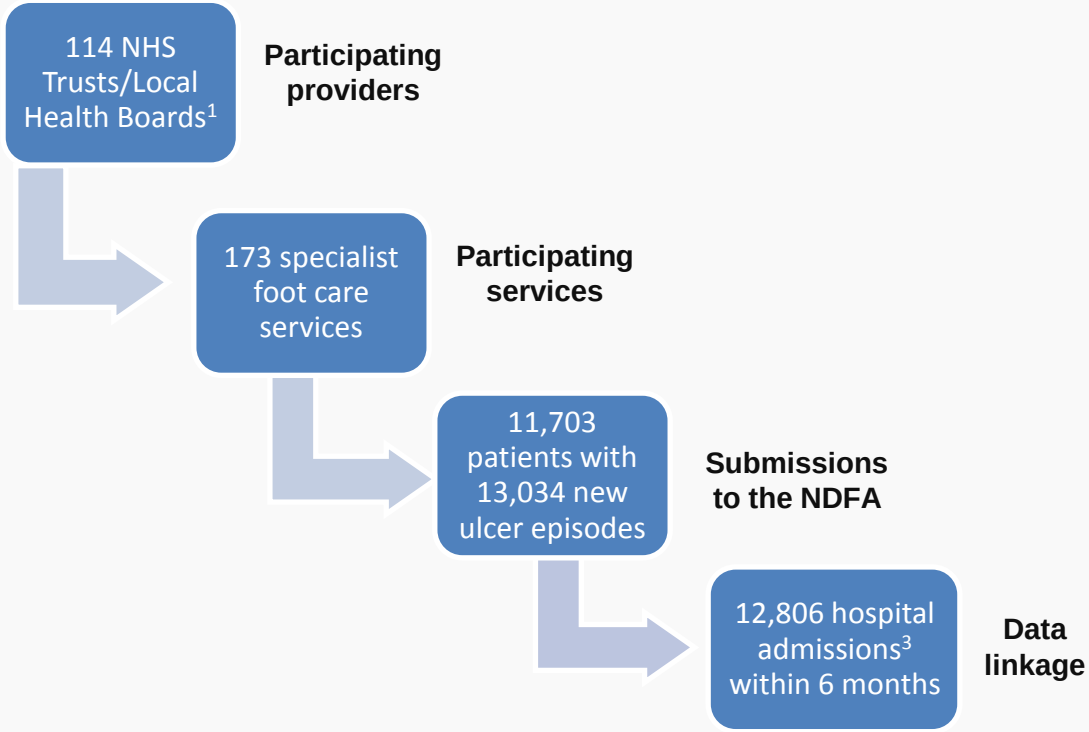
For commissioners and healthcare professionals

- Reduce the number of severe diabetic foot ulcers, their consequences for the patient and hospital bed days by ensuring local pathways minimise the time taken to see an expert multidisciplinary foot treatment team.

Participation

Summary

Participation: Data collection



Cohort

The 2014-2016 NDFA report covers patients in England and Wales with ulcers that underwent first expert assessment by a specialist foot care service in the 21 months between 14 July 2014 and 8 April 2016[2].

- 107 NHS Trusts in England and 7 Local Health Boards (LHBs) in Wales participated in the audit.
- Patients seen at 155 specialist foot care services in England and 18 in Wales were included in the audit.
- In this report each patient is represented by the ulcer with the earliest first expert assessment date recorded in the audit.

Notes: **1**. See Glossary: Health Care Providers. **2**. The first NDFA report covered the first 9 months of the 2014-2016 cohort (14 July 2014 to 10 April 2015). **3**. Supplied by Hospital Episode Statistics (HES) and Patient Episode Database for Wales (PEDW).

Participation: Case ascertainment

The NDFA has collected information on 11,703 people with diabetic foot ulcers over 21 months, a rate of 6,742 people per year.

Establishing NDFA case ascertainment is difficult because there are no national data on foot ulcer incidence. Two methods have been tried; both suggest case ascertainment of 10 to 20 per cent:

1) A comparison of amputation incidence in the NDA suggests that NDFA case ascertainment is around 10 per cent for major amputations and 18 per cent for minor amputations[1].
2) Studies have estimated that around 64,000 people in England and Wales have a diabetic foot ulcer at any one time[2], meaning that NDFA case ascertainment is around 10 per cent.

Findings

- Case ascertainment for NDFA is likely to be around 10 to 20 per cent.

Whilst the NDFA is an unique and invaluable dataset, probable low case ascertainment should be considered when interpreting NDFA findings

- The patients submitted to the NDFA **may not be representative** of the entire population of people with diabetic ulcers. For example, submission rates may vary geographically and some sub-groups may be over- or under-represented.
- Counts in the NDFA are likely to significantly **underestimate** the true figures (i.e. numbers of people, ulcers, hospital admissions, procedures and bed days collected will be lower in NDFA).

Notes: **1**. See Appendix 3: Case ascertainment. **2**. Incidence methodology taken from Kerr, M (2017) and adapted to include the Welsh diabetic population (population figures taken from the 2016 Quality Outcome Framework).

1. All hospital admissions

Results and Findings

All hospital admissions: Overview

Audit question: What proportion of people with a new foot ulcer have a hospital admission in the 6 months following first expert assessment?

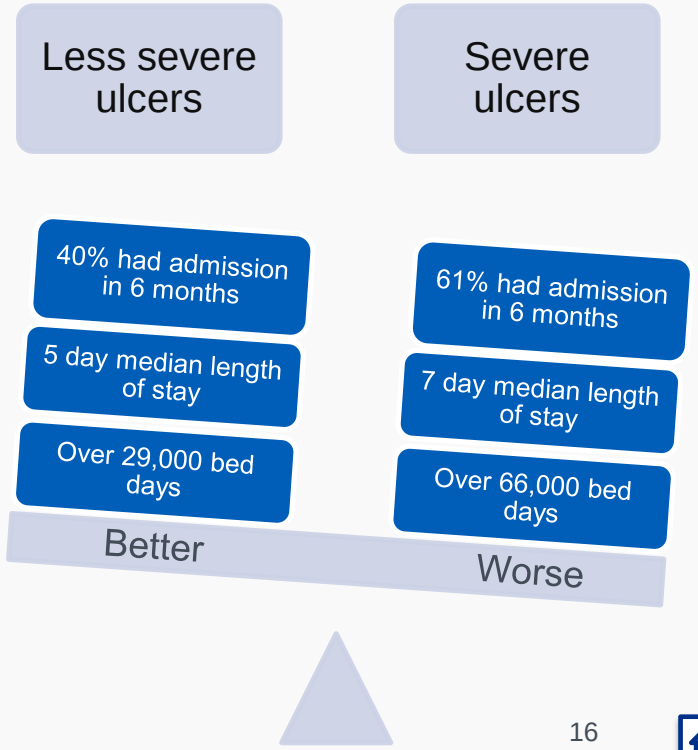
Patients with diabetic foot ulcers are frequently admitted to hospital. Common reasons are:

- Severe infection of the diabetic foot ulcer requiring intravenous antibiotics, wound debridement and amputations
- Cardiovascular disease (heart attack, heart failure, stroke, compromised lower limb blood supply)

Why is this important?

- Management of diabetic foot disease should, as far as possible, be an outpatient activity.
- A hospital admission can be indicative of a more severe instance of diabetic foot disease.
- Diabetic foot disease is costly to those affected and the NHS. Potentially avoidable hospital admission is a major component of these costs.

Findings



All hospital admissions: Ulcer severity

Table 1.1: All hospital admissions[1] within 6 months of first expert assessment[2], by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Any admission?[1]	All ulcers (11,703 patients)		Less severe ulcer[3] (6,270 patients)			Severe ulcer[3] (5,433 patients)		
	Number	Per cent	Number	Per cent		Number	Per cent	
Not admitted	5,878	50.2	3,764	60.0	*	2,114	38.9	*
One or more admission	5,825	49.8	2,506	40.0	*	3,319	61.1	*

Findings

- Half of people with diabetic foot ulcers had a hospital admission within 6 months of first expert assessment (50 per cent).
- People with more **severe** (SINBAD ≥3) foot ulcers are more likely to have a hospital admission within 6 months of first expert assessment than people with less severe foot ulcers (61 vs 40 per cent).

These findings emphasise the importance of prompt expert assessment, which is associated with lower ulcer severity and better outcomes.

Notes: ***** = *statistically significant at the 0.05 level (Less severe vs Severe).* **n** = *not statistically significant (Less severe vs Severe).*
1. Admitted to hospital for any reason. **2**. From first assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics.

All hospital admissions: Reason for admission

Table 1.2: All hospital admissions within 6 months of first expert assessment[1], by main reason for admission, NDFA patients, England and Wales, 2014-2016

Main reason for admission[2]	Hospital admissions[3] (12,776)	
	Number	Per cent
• Diseases of the circulatory system (including **heart disease**, **heart failure**, myocardial infarction (**heart attack**), **atherosclerosis**, **peripheral vascular disease**, **embolism** and **thrombosis**, **stricture of artery**, **angina**, **stroke**)	2,080	16.3
• Diseases of the skin and subcutaneous tissue (including **ulceration**, **cellulitis**)	1,642	12.9
• Endocrine, nutritional and metabolic diseases (including **diabetes mellitus**, **diabetic ketoacidosis**, **hypoglycaemia**)	1,610	12.6
• Diseases of the musculoskeletal system and connective tissue (including **osteomyelitis**)	1,405	11.0
• Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1,126	8.8
• Diseases of the eye and adnexa (including **diabetic eye disease**)	879	6.9
• Diseases of the genitourinary system (including **renal failure**)	738	5.8
• Injury, poisoning and certain other consequences of external causes	717	5.6
• Other	2,579	20.2

Findings

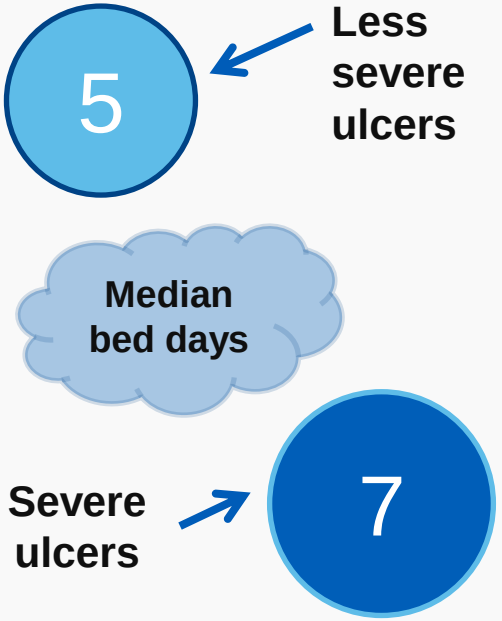
- People with diabetic foot ulcers are admitted to hospital for a wide range of conditions.

Notes:
1. From first assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment.
2. Primary diagnosis on the first episode of each hospital admission.
3. Excludes admissions where no diagnosis has been recorded for the first episode.

All hospital admissions: Bed days

Table 1.3: All hospital admissions[1] within 6 months of first expert assessment[2]: bed days, by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Ulcer severity[3]	All ulcers (11,703 patients)				
	Number of patients	Number of hospital admissions	Number of bed days[4]	Length of stay[5]	
				Median	Mean
Less severe ulcer	6,270	5,088	29,814	5.0	11.2
Severe ulcer	5,433	7,718	66,084	7.0	13.6
All ulcers	**11,703**	**12,806**	**95,898**	**6.0**	**12.7**



Findings

- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 95,000 hospital bed days. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher.**

Notes: **1**. Admitted to hospital for any reason. **2**. First assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics. **4.** Only includes bed days within the 6 months following first expert assessment. Excludes day cases. **5**. The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases.

2. Foot disease admissions

Results and Findings

Foot disease admissions: Overview

Audit question: What proportion of people with diabetic foot ulcers have foot disease-related hospital admissions in the 6 months following first expert assessment?

Inpatient management of diabetic foot disease can involve various conditions and procedures[1].

Why is this important?

- Management of diabetic foot disease should as far as possible be an outpatient activity, not requiring a hospital stay.
- People with diabetic foot disease are at increased risk of life threatening cardiovascular diseases.
- Diabetic foot disease is costly to those affected and the NHS. Potentially avoidable admission is a major component of these costs.

Key findings

- One in five (21 per cent) people with diabetic foot ulcers had a foot disease-related hospital admission within 6 months of first expert assessment.
- People with more **severe** foot ulcers (SINBAD ≥3) were three times as likely to have a foot disease-related admission than people with less severe foot ulcers (34 vs 10 per cent).
- People with diabetic foot ulcers recorded in the NDFA had over 46,000 hospital bed days relating to a foot disease-related admission that occurred within 6 months of first expert assessment. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher**.

Notes: **1**. For further details of the classification of admissions as predominantly for the inpatient management of diabetic foot disease, see Glossary: Foot disease-related admissions.

Foot disease admissions: Summary

Table 2.1: Foot disease admissions[1] within 6 months of first expert assessment[2], by foot disease type[1], NDFA patients, England and Wales, 2014-2016

Foot disease type[1, 3]	All ulcers (11,703 patients)		
	Patients[3]		Admissions[3]
	n	%	n
Any foot disease procedure/diagnosis	**2,485**	**21.2**	**4,012**
• Debridement of a foot/leg wound	266	2.3	299
• Minor and major amputation of lower limb	988	8.4	1,133
• Diabetes mellitus with peripheral circulatory complications	904	7.7	1,161
• Ulcer of the lower limb	683	5.8	988
• Decubitus ulcer	11	0.1	13
• Cellulitis	375	3.2	474
• Osteomyelitis	466	4.0	609
• Gangrene	89	0.8	96
• Atherosclerosis	269	2.3	316
• Bacteraemia, septicaemia, septic shock, sepsis syndrome	74	0.6	77

Findings

- One in five (21 per cent) people with diabetic foot ulcers had a foot disease-related hospital admission within 6 months of first expert assessment.
- Lower limb amputation, circulatory complications and ulceration were the most common foot disease procedures/diagnoses.

Notes: **1**. Foot disease identified at any point during the admission. See Glossary: Foot disease-related admissions. **2**. First assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment. **3**. A single patient may have multiple admissions where foot disease was identified.

Foot disease admissions: Ulcer severity

Table 2.2: Foot disease admissions[1] within 6 months of first expert assessment[2], by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Foot disease admission?[1]	All ulcers (11,703 patients)		Less severe ulcer[3] (6,270 patients)			Severe ulcer[3] (5,433 patients)		
	Number	Per cent	Number	Per cent		Number	Per cent	
Not admitted	9,218	78.8	5,612	89.5	*	3,606	66.4	*
One or more admission	2,485	21.2	658	10.5	*	1,827	33.6	*

These findings emphasise the importance of prompt expert assessment, which is associated with lower ulcer severity and better outcomes.

Findings

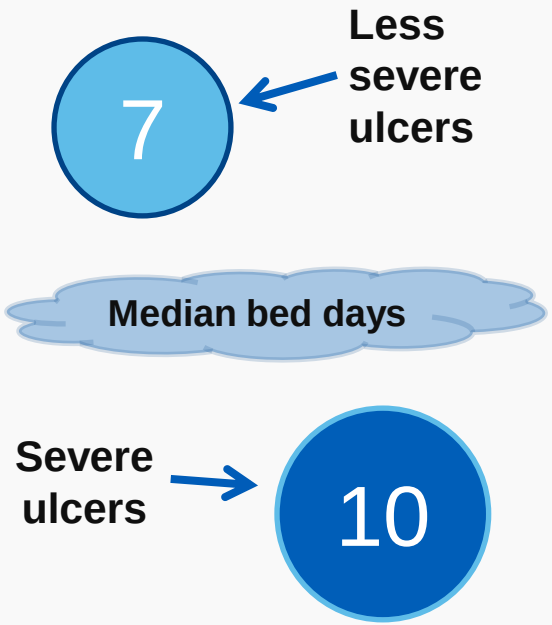
- People with more **severe** foot ulcers (SINBAD ≥3) were three times as likely to have a foot disease-related admission than people with less severe foot ulcers (34 vs 10 per cent).

Notes: ***** = *statistically significant at the 0.05 level (Less severe vs Severe)*. **n** = *not statistically significant (Less severe vs Severe)*.
1. Foot disease identified at any point during the admission. See Glossary: Foot disease-related admissions.
2. First assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics.

Foot disease admissions: Bed days

Table 2.3: Foot disease admissions[1] within 6 months of first expert assessment[2]: bed days, by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Ulcer severity[3]	All ulcers (11,703 patients)				
	Number of patients	Number of hospital admissions	Number of bed days[4]	Length of stay[5]	
				Median	Mean
Less severe ulcer	6,270	1,021	9,338	7.0	13.0
Severe ulcer	5,433	2,991	37,554	10.0	17.1
All ulcers	**11,703**	**4,012**	**46,892**	**10.0**	**16.1**



Findings

- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 46,000 hospital bed days with foot disease-related admissions. **Low NDFA case ascertainment suggests the total NHS figure is much higher**.

Notes: **1**. Foot disease identified at any point during the admission. See Glossary: Foot disease-related admissions. **2**. First assessment by the specialist foot care service in the NDFA 2014-16. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics. **4**.Only includes bed days within the 6 months following first expert assessment. Excludes day cases. **5**.The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases.

3. Revascularisation

Results and Findings

Revascularisation: Overview

Audit question:

What proportion of people with diabetic foot ulcers have a revascularisation procedure undertaken in the 6 months following first expert assessment?

Why is this important?

Patients with diabetic foot ulcers sometimes require revascularisation surgery to restore blood flow in tissue where it has become so restricted that the tissue is dying or will not heal. The main types of revascularisation are: **Angioplasty** (opening up blocked or partially blocked arteries) and **vascular bypass** (re-routing blood around a blocked section of artery). See Glossary: Revascularisation procedures for further details.

Revascularisation procedures are expensive and are costly to those affected and to the NHS. Like all surgery, there are risks associated with revascularisation and long hospital stays and periods of rehabilitation can ensue.

Key findings

- 8 per cent of people with diabetic foot ulcers had a revascularisation procedure within 6 months of first expert assessment.
- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 14,000 hospital bed days for admissions with revascularisation. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher**.
- People with severe ulcers (SINBAD ≥3) were around three times as likely to have revascularisation undertaken within 6 months than people with less severe foot ulcers (12 vs 4 per cent).

Revascularisation: Summary

Table 3.1: Revascularisation[1] undertaken within 6 months of first expert assessment[2], by revascularisation type[3],
NDFA patients, England and Wales, 2014-2016

Revascularisation type[1, 3]	All ulcers (11,703 patients)			
	Patients[3]		Admissions[3]	Procedures[3]
	Number	Per cent	Number	Number
Any revascularisation	**913**	**7.8**	**1,021**	**1,306**
… Angioplasty	814	7.0	881	1,052
… Open procedures	101	0.9	102	119
… Bypass	121	1.0	122	135

Findings

- 8 per cent of people with diabetic foot ulcers had a revascularisation procedure within 6 months of first expert assessment.
- The majority of revascularisation procedures were angioplasty (81 per cent).

Notes:
1. See Glossary: Revascularisation procedures.
2. From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the revascularisation procedure. Includes admissions that were ongoing at first expert assessment. **3**. A single patient may have multiple revascularisation admissions/procedures.

Revascularisation: Ulcer severity

Table 3.2: Revascularisation[1] undertaken within 6 months of first expert assessment[2], by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Revascularisation undertaken?[1, 4]	All ulcers (11,703 patients)		Less severe ulcer[3] (6,270 patients)			Severe ulcer[3] (5,433 patients)		
	Number[4]	Per cent	Number[4]	Per cent		Number[4]	Per cent	
Not admitted	10,790	92.2	6,022	96.0	*	4,768	87.8	*
One or more admission	913	7.8	248	4.0	*	665	12.2	*
… angioplasty	*814*	*7.0*	*223*	*3.6*	*	*591*	*10.9*	*
… open procedure	*101*	*0.9*	*28*	*0.4*	*	*73*	*1.3*	*
… bypass	*121*	*1.0*	*33*	*0.5*	*	*88*	*1.6*	*

Findings

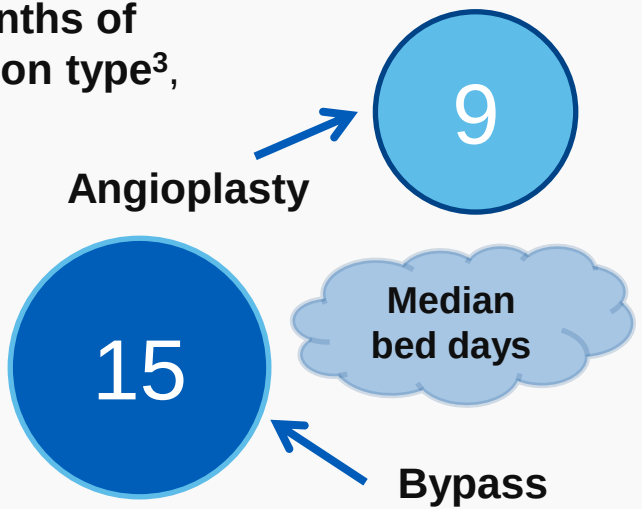
- People with **severe** ulcers (SINBAD ≥3) were around three times as likely to have a revascularisation procedure within 6 months of expert assessment than people with less severe foot ulcers (12 vs 4 per cent).

Notes: ***** = *statistically significant at the 0.05 level (Less severe vs Severe).* **n** = *not statistically significant (Less severe vs Severe).*
1. See Glossary: Revascularisation procedures. **2**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the revascularisation procedure. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics. **4**. A single patient may have multiple instances of revascularisation.

Revascularisation: Bed days

Table 3.3: Revascularisation admissions[1] within 6 months of first expert assessment[2]: bed days, by revascularisation type[3], NDFA patients, England and Wales, 2014-2016

Revascularisation type[1,3]	Number of hospital admissions	Number of bed days[4]	Length of stay[5]	
			Median	Mean
Angioplasty only	836	10,946	9.0	17.3
Open procedure only	43	735	9.0	18.3
Bypass only	70	1,208	15.0	17.7
Any revascularisation	**1,021**	**14,576**	**10.0**	**18.0**



Findings:

- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 14,000 hospital bed days for admissions where revascularisation was performed. **Low NDFA case ascertainment suggests the total NHS figure is much higher**.
- The median length of stay of those having bypasses was almost a week longer than those having angioplasty.

Notes: **1**. See Glossary: Revascularisation procedures. **2**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the revascularisation procedure. Includes admissions that were ongoing at first expert assessment. **3**. A single patient may have multiple revascularisation admissions/procedures. **4.** Only includes bed days within the 6 months following first expert assessment. Excludes day cases. **5**. The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases.

4. Lower limb amputation

Results and Findings

Lower limb amputation: Overview

Audit question:

What proportion of people with diabetic foot ulcers have a lower limb amputation undertaken in the 6 months following first expert assessment?

Why is this important?

Lower limb amputation is a type of operation that involves the surgical excision of bone and soft tissue in order to remove some part of the leg.

Minor amputation (below the ankle) is one of a number of potential treatments for diabetic foot ulcers. Major amputation (above the ankle) is carried out when all other treatments have failed.

Undergoing major amputation is a life-changing event for the patient, with significant physical and psychological effects. Long hospital stays and periods of rehabilitation can ensue, at considerable expense to the NHS and to the patient.

Key findings

- 8 per cent of people with diabetic foot ulcers had lower limb amputation undertaken within 6 months of their first expert assessment by the specialist foot care service.
- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 19,000 hospital bed days for admissions where amputation was performed. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher**.
- Patients with severe (SINBAD ≥3) ulcers were three times as likely to have an amputation undertaken than those with less severe ulcers (14 per cent vs 4 per cent). **This finding emphasises the importance of prompt expert assessment, which the NDFA has shown is associated with lower ulcer severity and better outcomes.**

Lower limb amputation: Summary

Table 4.1: Lower limb amputation[1] undertaken within 6 months of first expert assessment[2], by amputation type[3], NDFA patients, England and Wales, 2014-2016

Amputation type[1, 3]	All ulcers (11,703 patients)			
	Patients[3]		Admissions[3]	Procedures[3]
	Number	Per cent	Number	Number
Any amputation	**973**	**8.3**	**1,102**	**1,224**
… Minor (below the ankle)	831	7.1	924	999
… Major (above the ankle)	211	1.8	215	225

Findings

- 8 per cent of people with diabetic foot ulcers had an amputation within 6 months of first expert assessment. 2 per cent had major amputations.
- Over 1,200 amputation procedures were undertaken, including 225 major amputations. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher.**

Notes: **1**. See Glossary: Amputation procedures. **2**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the amputation procedure. Includes admissions that were ongoing at first expert assessment. **3**. A single patient may have multiple instances of amputation, which may include both minor and major amputations.

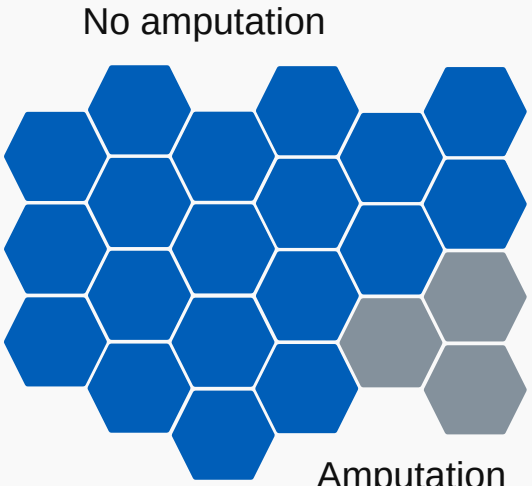
Lower limb amputation: Ulcer severity

Table 4.2: Lower limb amputation[1] undertaken within 6 months of first expert assessment[2], by ulcer severity[3], NDFA patients, England and Wales, 2014-2016

Amputation undertaken? [1, 4]	Less severe ulcer[3] (6,270 patients)			Severe ulcer[3] (5,433 patients)		
	Number	Per cent		Number	Per cent	
No amputation undertaken	6,041	96.3	*	4,689	86.3	*
One or more amputation undertaken	229	3.7	*	744	13.7	*
… Minor (below the ankle)	199	3.2	*	632	11.6	*
… Major (above the ankle)	48	0.8	*	163	3.0	*

Findings

- People with **severe** ulcers (SINBAD ≥3) were three times as likely to have an amputation undertaken as people with less severe foot ulcers (14 vs 4 per cent). **These findings emphasise the importance of prompt expert assessment, which the NDFA has shown is associated with lower ulcer severity and better outcomes.**



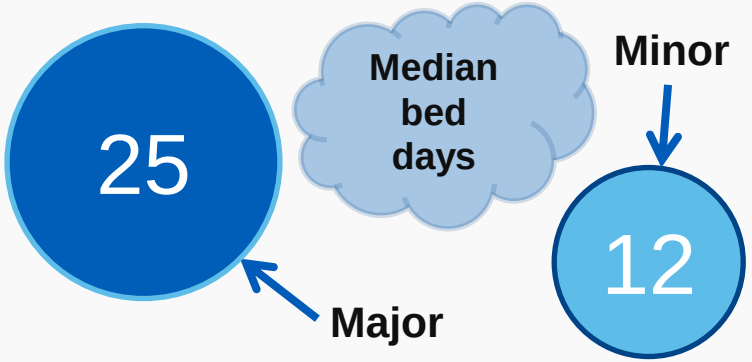
Severe ulcer

Notes: ***** = *statistically significant at the 0.05 level (Less severe vs Severe).* **n** = *not statistically significant (Less severe vs Severe).*
1. See Glossary: Amputation procedures. **2.** From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the amputation procedure. Includes admissions that were ongoing at first expert assessment. **3**. Ulcer severity at first expert assessment. See Glossary: Ulcer characteristics. **4**. A single patient may have multiple instances of amputation, which may include both minor and major amputations.

Lower limb amputation: Bed days

Table 4.3: Lower limb amputation[1] undertaken within 6 months of first expert assessment[2]: bed days, by amputation type[3], NDFA patients, England and Wales, 2014-2016

Amputation type[1, 3]	Number of hospital admissions	Number of bed days[4]	Length of stay[5]	
			Median	Mean
Any amputation	**1,102**	**19,579**	**14.0**	**21.6**
… Minor only (below the ankle)	887	12,789	12.0	18.1
… Major only (above the ankle)	178	5,319	25.0	32.3



Findings:

- In the six months following their first expert assessment, people with diabetic foot ulcers recorded in the NDFA occupied more than 19,000 hospital bed days for admissions where amputation was performed. **Low NDFA case ascertainment suggests the total NHS figure could be as much as ten times higher.**
- The median length of stay of those having **major** amputation only was 25 days, over twice as long as those having **minor** amputation only (12 days).

Notes: **1**. See Glossary: Amputation procedures. **2**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the date of the amputation procedure. Includes admissions that were ongoing at first expert assessment. **3**. A single patient may have multiple instances of amputation, which may include both minor and major amputations. **4**. Only includes bed days within the 6 months following first expert assessment. Excludes day cases. **5**. The entire hospital stay is included, including time after the 6 month cut-off and prior to the first assessment, where applicable. Excludes day cases.

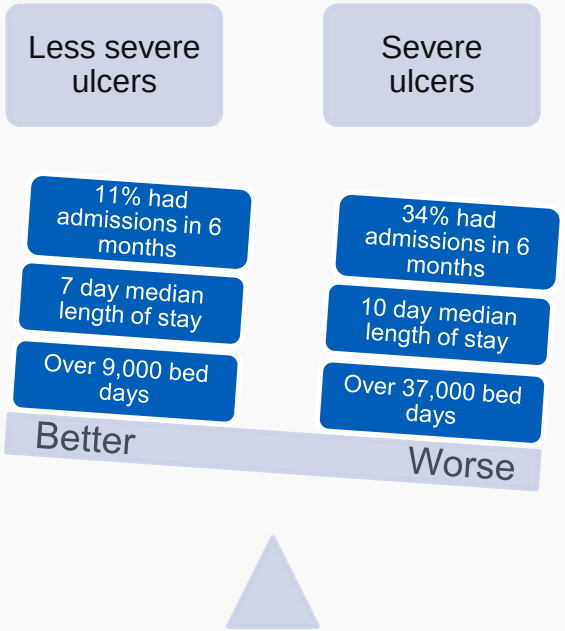
5. Clinical comment

Findings and Recommendations

Clinical comment: Recommendation

There is a clear association between ulcer severity at first expert assessment and likelihood of admission for inpatient foot disease management. Earlier NDFA reports suggest that there is appreciable variation between services in the prevalence of severe ulcers and that ulcer severity is associated with the length of time before expert assessment.

Foot disease admissions



Recommendation

- Reduce the number of severe diabetic foot ulcers, and their consequences for the patient and hospital bed days by ensuring local pathways minimise the time taken to see an expert multidisciplinary foot treatment team.

6. Appendix

Results and Findings

Appendix 1: Length of stay (table)

Table A1.1: Hospital admissions within 6 months of first expert assessment[1]: length of stay[2], by admission type[3], NDFA patients, England and Wales, 2014-2016

Admission type[1, 3]	Length of stay (days)					
	Minimum	Lower quartile[4]	Median[4]	Upper quartile[4]	Maximum	Mean
All admissions	**0**	**2.0**	**6.0**	**15.0**	**2,577**	**12.7**
… with foot disease	0	4.0	10.0	20.0	215	16.1
… with angioplasty	0	2.0	9.0	20.0	324	17.3
… with open procedures	1	4.5	9.0	16.0	143	18.3
… with bypass	1	7.0	15.0	21.0	69	17.7
… with minor amputation	0	5.0	12.0	22.0	324	18.1
… with major amputation	2	14.3	25.0	40.8	187	32.3

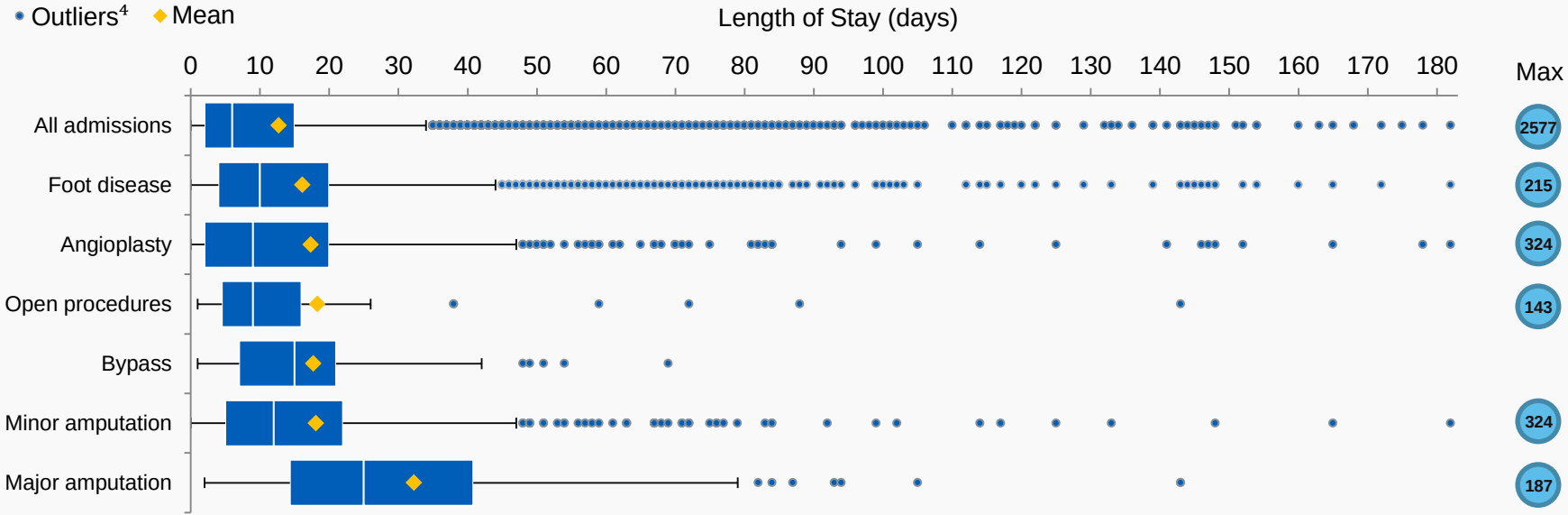
Findings

- A quarter of admissions which involved major amputation lasted 40 days or longer.
- A quarter of admissions for any reason lasted over 2 weeks.

Notes: **1**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the start of the hospital admission/date of procedure. **2**. Calculation of length of stay excludes day case admissions. The entire hospital stay is included, including days after the 6 month cut-off and prior to the first assessment, where applicable. **3**. See Glossary for explanation of terms. **4**. See Glossary: Statistical terms for explanation of terms.

Appendix 2: Length of stay (Chart)

Chart A2.1: Hospital admissions within 6 months of first expert assessment[1]: length of stay[2], by admission type[3], NDFA patients, England and Wales, 2014-2016



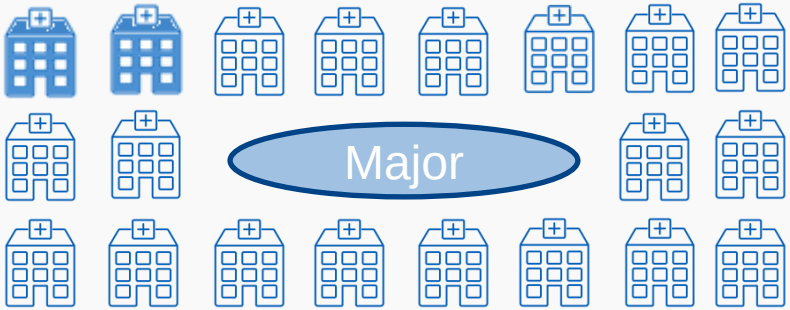
Notes: **1**. From first assessment by the specialist foot care service in the NDFA 2014-16 to the start of the hospital admission/date of procedure. **2**. Calculation of length of stay excludes day case admissions. The entire hospital stay is included, including days after the 6 month cut-off and prior to the first assessment, where applicable. **3**. See Glossary for explanation of terms, including Statistical terms covering chart interpretation. **4**. Outliers defined as outside the interquartile range by more than 1.5 times the interquartile range.

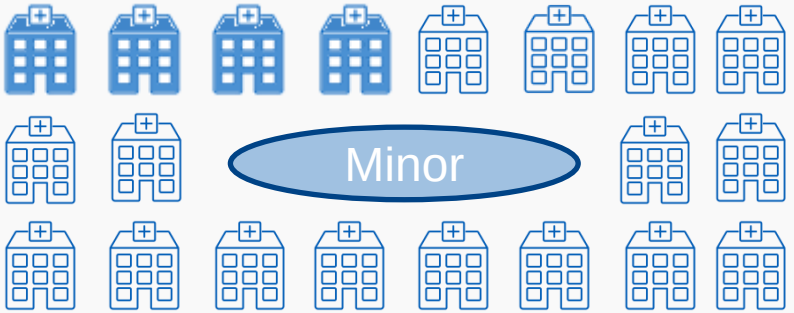
Appendix 3: Case ascertainment and the NDA

The National NDA found **1,520** people with diabetes[1] that were admitted to hospital in England and Wales for a major amputation[2] in 2015-16.

Using the same criteria, **153** of 11,703 NDFA patients were admitted to hospital for a major amputation[2] in 2015-16.

Based on the above figures, people in the NDFA make up approximately[3] **10 per cent** of all people with diabetes that had major amputations in 2015-16.





The NDA found **3,448** people with diabetes[1] that were admitted to hospital in England and Wales for a minor amputation[2] in 2015-16.

Using the same criteria, **631** of 11,703 NDFA patients were admitted to hospital to have a minor amputation[2] in 2015-16.

Based on the above figures, people in the NDFA comprised approximately[3] **18 per cent** of all people with diabetes that had minor amputations in 2015-16.

Notes: **1**. National Diabetes Audit, 2015-2016, Report 2a (2017), slide 19. The NDA reported amputation incidence rates in 2015-16 for people with diabetes recorded in the NDA 2014-15. 57.3 per cent of GP practices participated in NDA 2014-15 (2016), slide 9. **2**. To match the NDA methodology, amputations must have taken place in the first episode of the hospital admission, including ordinary and day case admissions only. **3**. NDFA case ascertainment might be over-estimated because the numerator (NDFA patients having amputations) may include people not in the denominator (people in the NDA having amputations). At present this issue cannot be quantified due to constraints on how the NDA data can be utilised.

Glossary

Information and definitions

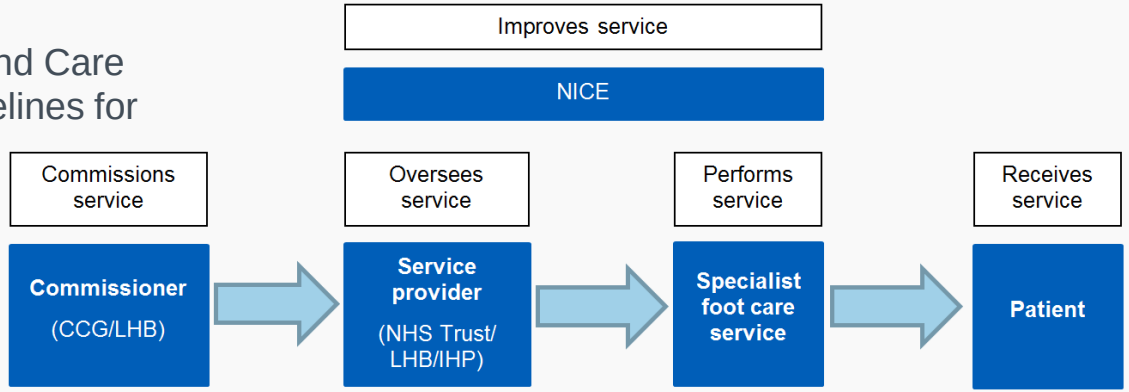
Glossary: Health Care Providers

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

Hospitals are generally part of **NHS Trusts** in England and **Local Health Board**s (LHBs) in Wales. These **providers** are the parent organisation to the foot care service. They also submit data about all the inpatient and outpatient care they have given to their patients to HES[1] and PEDW[2] respectively. Independent healthcare providers (IHPs) also do this.

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

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



Notes: **1**. Hospital Episode Statistics (HES). **2**. Patient Episode Database for Wales (PEDW).

Glossary: Ulcer characteristics

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

- **Site (on hindfoot)** – Ulcer penetrates the hindfoot (rear of the foot).
- **Ischaemia** – Impaired circulation in the foot.
- **Neuropathy** – Loss of protective sensation in the foot.
- **Bacterial infection** – Signs of bacterial infection of the foot (e.g. redness, swelling, heat, discharge).
- **Area (≥ 1cm^2)** – Ulcer covers a large surface area (1cm^2 or more).
- **Depth (to tendon or bone)** – Ulcer penetrates to tendon or bone.

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

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

Glossary: Foot disease-related admissions

Diabetic foot disease is defined as a foot affected by ulceration that is associated with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes[1].

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

To identify foot disease-related admissions, all episodes of hospital care have been searched for the following **clinical procedures** or **diagnoses** predominantly associated with inpatient management of diabetes related foot disease[2]:

Foot disease clinical diagnoses

- Diabetes mellitus with peripheral circulatory complications
- Ulcer of the lower limb
- Decubitus ulcer
- Cellulitis
- Osteomyelitis
- Gangrene
- Atherosclerosis

Foot disease clinical procedures

- Debridement of a foot/leg wound
- Minor and major amputation of lower limb

For reporting purposes, the foot disease may be identified at any point during the hospital admission. Single patients may have more than one admission and/or foot disease type.

Notes: **1**. Alexiadou, K and Doupis, J (2012).
2. Public Health England (2017). Patients may have other conditions which are contributing factors towards their hospital stay.

Glossary: Revascularisation procedures

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

Revascularisation describes the types of operations that restore blood flow[1]. Most revascularisation procedures can be grouped into two types:

1) **Angioplasty**, which involves inserting a balloon where blood flow is restricted and then inflating it to widen the blood vessel. It is usually a relatively non-invasive procedure.
2) **Vascular bypass**, which involves making a blood vessel graft which reconnects arteries or veins so blood can flow around, or bypass, the blood vessels which are restricted or blocked. It is generally a more complex procedure than an angioplasty.

Open procedures are another type of revascularisation, such as endarterectomy, which involve opening the artery and cleaning the away the deposits which are causing the blockage.

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

Notes: **1**. The revascularisation coding used in the report was supplied by the National Vascular Registry.

Glossary: Amputation procedures

Amputation, or surgical removal, of part of the foot or leg may be required when a diabetic foot ulcer cannot otherwise be successfully treated. When this is the case then an operation is needed to surgically excise bone and soft tissue in order to allow healing.

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

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

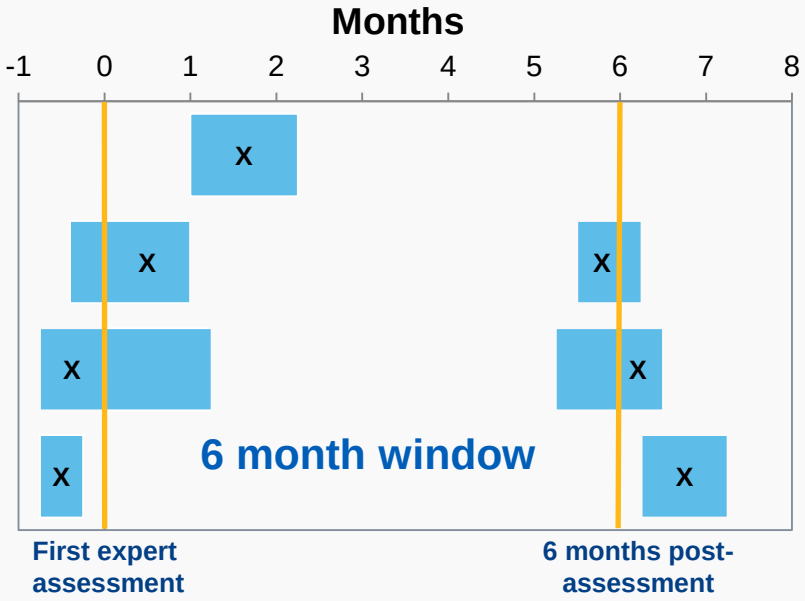
For reporting purposes, amputation must occur within 6 months of first expert assessment by the specialist foot care service. Any one patient may have more than one amputation-related admission and/or amputation procedure.

Glossary: Which admissions are included?

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

- **Foot disease** admissions, where foot disease is identified at any point during the hospital admission, including outside the 6 month window (Stories **A**, **B**, and **C** below, where event X is the start of the episode of care where foot disease is identified). This ensures that all admissions where foot disease is a significant factor are included.
- **Revascularisation** and **amputation** admissions, where the related procedures occur within the 6 month window (Stories **A** and **B** below, where event X is the relevant procedure date). Using this criteria ensures that the currency used for analysis (procedures undertaken within 6 months) is simple and easy to understand.

Story	Admission included?			
	All admissions	Where event X is…		
		Foot disease	Revascul-arisation	Amput-ation
A. Admission and event X occurs within 6 month window	**Yes**	**Yes**	**Yes**	**Yes**
B. Admission overlaps with 6 month window, event X occurs within 6 month window	**Yes**	**Yes**	**Yes**	**Yes**
C. Admission overlaps with 6 month window, event X occurs outside 6 month window	**Yes**	**Yes**	*No*	*No*
D. Admission and event X outside 6 month window	*No*	*No*	*No*	*No*

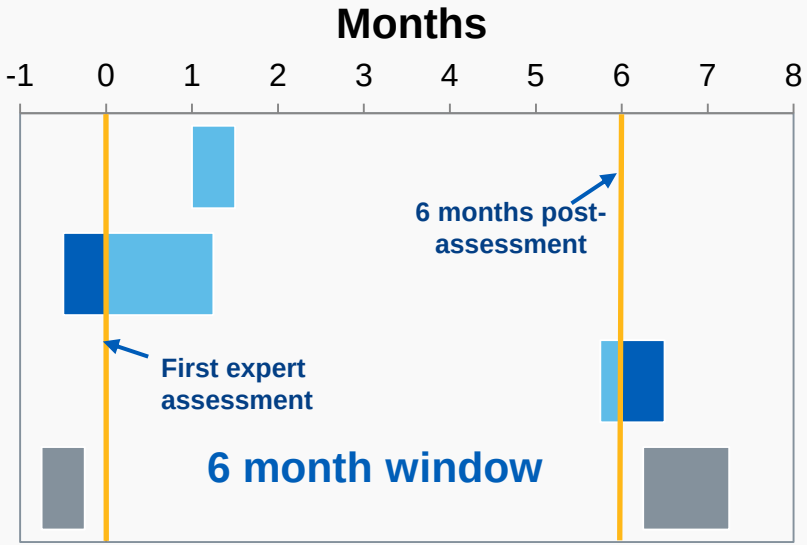


Glossary: Length of stay and bed days

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

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

Story	Admission included?
Admitted and discharged within 6 month window	Yes
Admission overlaps with assessment, concluded within 6 months	Yes
Admission overlaps with end of 6 month window	Yes
Admitted and discharged outside 6 month window	No



Key	Length of stay counted?	Bed days counted?
	Yes	Yes
	Yes	No
	No	No

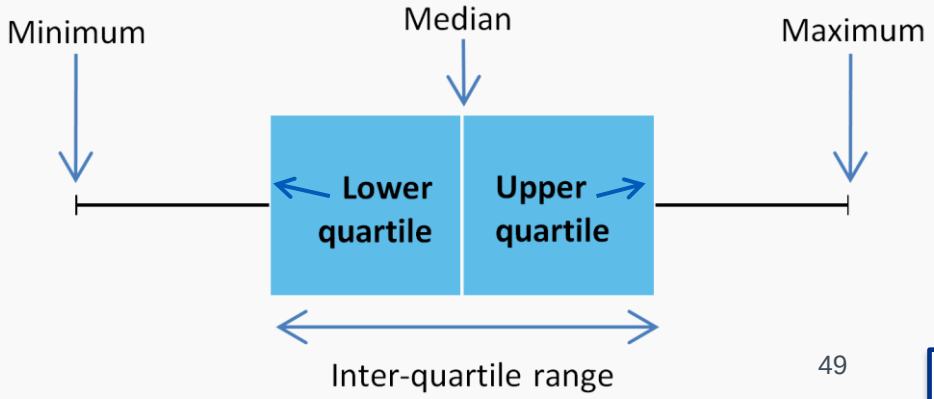
Glossary: Statistical terms

Statistical significance: Where a difference is flagged as **significant at 0.05 level**, there is no more than a 5 per cent probability that the result is due to chance.

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

- The **median** is the middle value in the ranked list.
- The **lower quartile** is the middle value of the lower half of the ranked list.
- The **upper quartile** is the middle value of the upper half of the ranked list.
- The **interquartile range** represents values between the lower and upper quartiles – the middle 50 per cent of the values in the ranked list.
- The interquartile range, along with minimum and maximum values, can be plotted on a **box and whisker plot** – see example right.
- The **mean** is the average of the values in the list. The mean may be higher or lower than the median, depending on the extent and direction in which the data is skewed (e.g. by very large values).

Box and whisker plot



Further information

Audit references

Further information

- For more information on the National Diabetes Foot Care Audit please visit the NDFA webpage at http://content.digital.nhs.uk/footcare.
- For further information about this report, please contact NHS Digital's Contact Centre on 0300 303 5678 or email enquiries@nhsdigital.nhs.uk.

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- **National Diabetes Audit - 2013-2014 and 2014-2015: Report 1, Care Processes and Treatment Targets** (2016): https://digital.nhs.uk/catalogue/PUB19900
- **National Vascular Registry 2016 Annual Report** (2016): https://www.vsqip.org.uk/reports/2016-annual-report
- **Patient Episode Database for Wales** (PEDW): http://www.publichealthwalesobservatory.wales.nhs.uk/PEDW
- **Public Health England** (2017) Diabetes: http://fingertips.phe.org.uk/profile/diabetes-ft
- **Quality Outcomes Framework** (2016): https://www.diabetes.org.uk/Professionals/Position-statements-reports/Statistics/Diabetes-prevalence-2016

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William Jeffcoate	Consultant Diabetologist, Nottingham University Hospitals NHS Trust, and Clinical Lead, NDFA
Bob Young	Consultant Diabetologist and Specialist Clinical Lead, NDA
Roger Gadsby	NDA GP Clinical Lead
Andrew Askey	NDA GP Clinical Lead (Co-chair)
Emma Barron	Head of Health Intelligence, National Cardiovascular Intelligence Network (NCVIN), PHE
Sue Brown	Patient representative
Scott Cawley	National Diabetic Foot Co-ordinator for Wales
Sophie Colling	NDA Project Support Officer, Diabetes UK
Laura Fargher	NDA Engagement Manager, Diabetes UK
Catherine Gooday	FDUK & Principal Diabetes Podiatrist, Norfolk & Norwich University Hospital
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Corinne Wykes	Patient representative
Arthur Yelland	Senior Information Analyst, NHS Digital

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NHS Digital is the trading name of the Health and Social Care Information Centre. It is the trusted source of authoritative data and information relating to health and care. NHS Digital managed the publication of the 2014-2016 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.

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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.

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