

How good are we at managing disease of the foot in diabetes ?

William Jeffcoate
Foot Ulcer Trials Unit
Department of Diabetes and
Endocrinology
City Hospital, Nottingham

wjeffcoate@futu.co.uk



The problem:

2% of 225,000

4500
new foot ulcers
each year



Nottingham 2000-2003	Ulcer	12 month outcomes	
N	449		
Healed	65.5%		
Ulcer persists	12.5%		
Ipsilateral amputation	8.0%		
Death	8.0%		
Unknown	6.0%		

Nottingham 2000-2003	Ulcer	12 month outcomes	Person
N	449	N	449
Healed	65.5%	Ulcer free at 12 months	50.0%
Ulcer persists	12.5%	Any active ulcer	28.5%
Ipsilateral amputation	8.0%	Any amputation	10.7%
Death	8.0%	Death	16.7%
Unknown	6.0%	Unknown	6.0%

Impact ?

Impact on health care resources is enormous, but difficult to collate



Impact ?

Impact on health care resources is enormous, but difficult to collate

£1 billion (0.7% total health care budget) in UK

Smith et al (2004)
24,000 euros per admission



Impact ?

Impact on health care resources is enormous, but difficult to collate

Impact on the individual is almost unimaginable



**How good are we
at managing disease of
the foot in diabetes ?**

All amputations (major and minor) in diabetes expressed per 10³ at risk (diabetic) population.

Incidence	Year of study	Population	Identification	Reference
0.46	1994-6	Madrid Area 7	Single hospital records	Calle-Pascual
1.10	1995-7	Leicestershire, UK Urban and rural	Multiple	Canavan
1.47; 2.19	1992-7	Blacks; Europeans managed in one of four hospitals in London, UK	Case control study: multiple sources	Leggetter
1.81	1992-4	Rio de Janeiro City-wide	Multiple	Spichler
2.05	1995-7	Newcastle, UK City-wide	Multiple	Canavan
2.48	1993-4	Tayside, Scotland Community-wide	Diabetes register - multiple sources	Morris
3.61	1991	Netherlands total population	National database	Van Houtum
3.83	1996-7	Medicare claims USA	306 health referral regions	Wrobel
4.1; 7.4	?	Non-hispanic whites; Mexicans	Selected cohort study	Lavery
4.17	1995-7	Leeds, UK City-wide	Multiple	Canavan
4.46	1995-7	Middlesborough, UK Mainly urban	Multiple	Canavan
4.66	1990-1 1994-8	Leverkusen, Germany City-wide	Records of all regional hospitals	Trautner
4.99	1991	California total population*	State database	Van Houtum
6.6	1990, 1995	Rural Germany Two counties	All theatre records checked	Stiegler
7.2	1999	Four public hospitals in Louisiana, USA	Hospital records	Birke
11.3	1990s	Single VA centre: Seattle, USA	Male cohort	Adler
18.0	1980s	Oklahoma Indians	Selected cohort study	Lee
96.0	1998-9	Louisiana high risk group	Selected cohort study	Patout

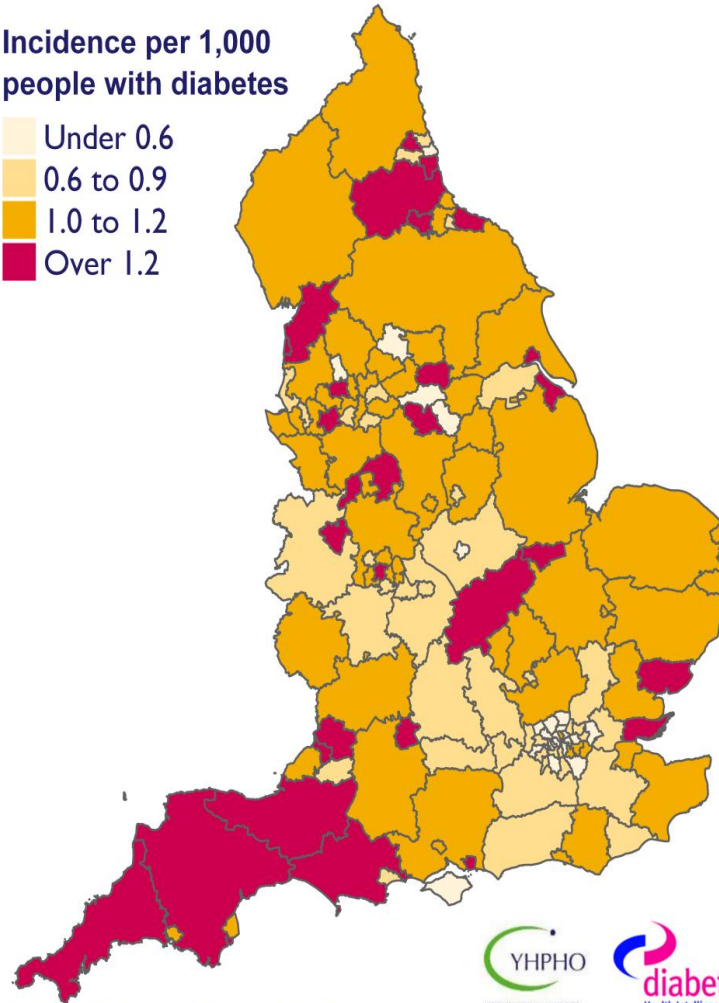
* excluding VA hospitals

LEA

Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012



Produced by YHPHO 2012

10 fold
variation
between
PCTs

Holman et al
Diabetologia
2012

How good are we at managing disease of the foot in diabetes ?

Do we need to know ?



How good are we at managing disease of the foot in diabetes ?

Do we need to know ?

Yes, we do.

And do we ?

No, we don't.



How good are we at managing disease of the foot in diabetes ?

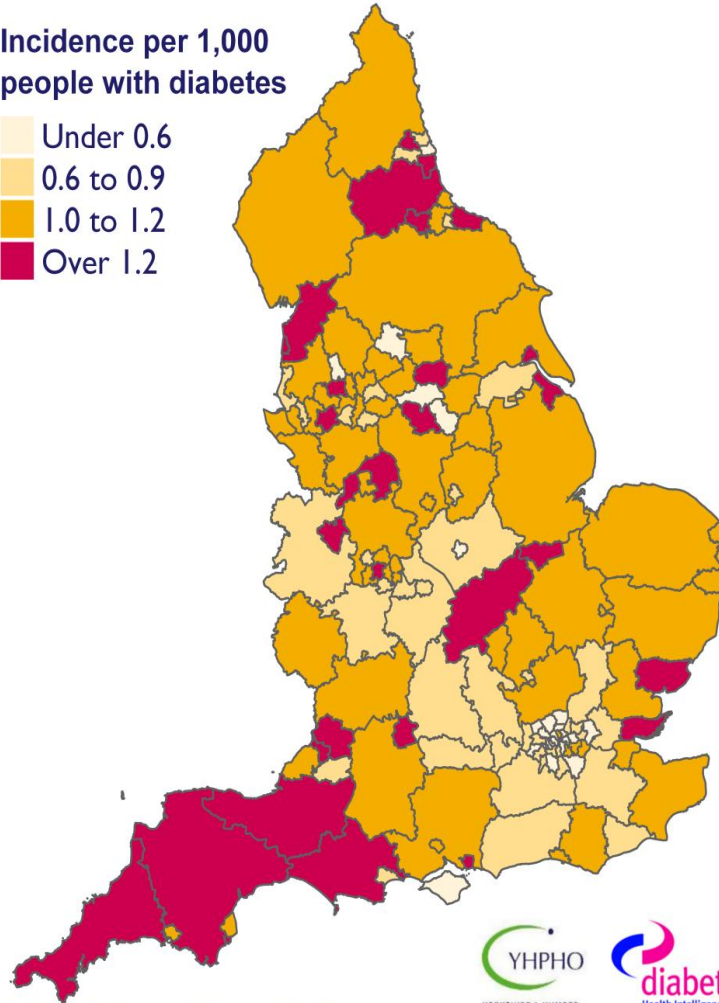
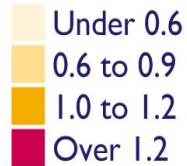
Two main issues:

- 1. What measure do we use ?**
- 2. The outcome measure
reflects the activity of many
people**

Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012



Produced by YHPHO 2012

10 fold
variation
between
PCTs

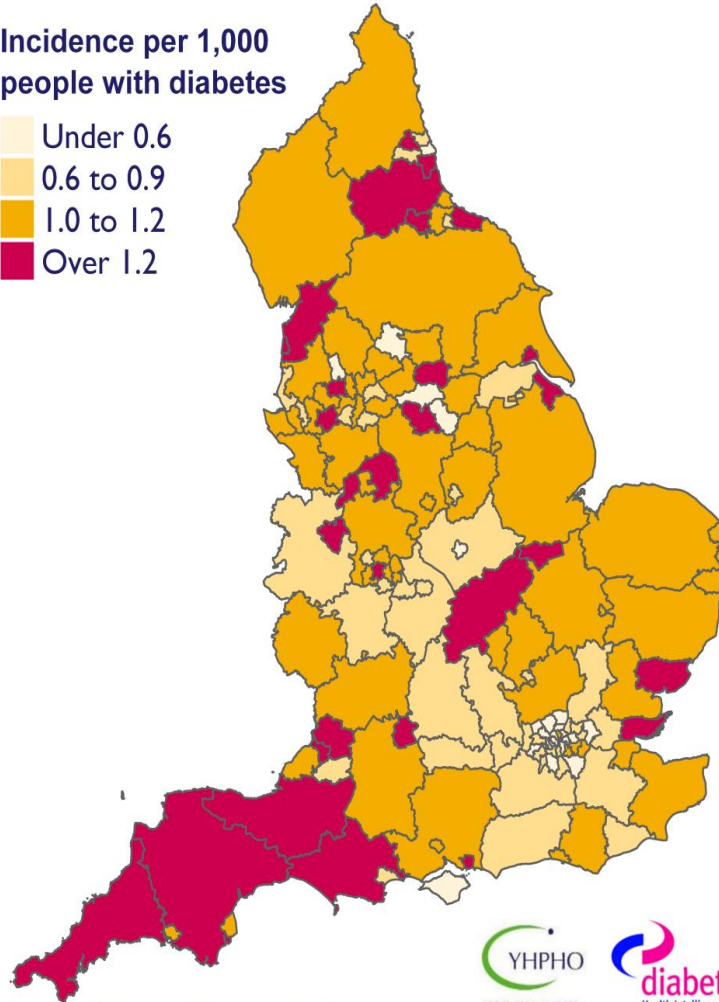
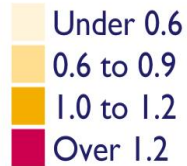
Social
deprivation

Ethnicity

Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012



Produced by YHPHO 2012

10 fold
variation
between
PCTs

Gallagher et
al (2014)
Distance
(LEA)

All amputations (major and minor) in diabetes expressed per 10³ at risk (diabetic) population.

Incidence	Year of study	Population	Identification	Reference
0.46	1994-6	Madrid Area 7	Single hospital records	Calle-Pascual
1.10	1995-7	Leicestershire, UK Urban and rural	Multiple	Canavan
1.47; 2.19	1992-7	Blacks; Europeans managed in one of four hospitals in London, UK	Case control study: multiple sources	Leggetter
1.81	1992-4	Rio de Janeiro City-wide	Multiple	Spichler
2.05	1995-7	Newcastle, UK City-wide	Multiple	Canavan
2.48	1993-4	Tayside, Scotland Community-wide	Diabetes register - multiple sources	Morris
3.61	1991	Netherlands total population	National database	Van Houtum
3.83	1996-7	Medicare claims USA	306 health referral regions	Wrobel
4.1; 7.4	?	Non-hispanic whites; Mexicans	Selected cohort study	Lavery
4.17	1995-7	Leeds, UK City-wide	Multiple	Canavan
4.46	1995-7	Middlesbrough, UK Mainly urban	Multiple	Canavan
4.66	1990-1 1994-8	Leverkusen, Germany City-wide	Records of all regional hospitals	Trautner
4.99	1991	California total population*	State database	Van Houtum
6.6	1990, 1995	Rural Germany Two counties	All theatre records checked	Stiegler
7.2	1999	Four public hospitals in Louisiana, USA	Hospital records	Birke
11.3	1990s	Single VA centre: Seattle, USA	Male cohort	Adler
18.0	1980s	Oklahoma Indians	Selected cohort study	Lee
96.0	1998-9	Louisiana high risk group	Selected cohort study	Patout

* excluding VA hospitals

Leicestershire

Newcastle

Leeds
Middlesbrough

*Canavan et al
2000*

All amputations (major and minor) in diabetes expressed per 10³ at risk (diabetic) population.

Incidence	Year of study	Population	Identification	Reference
0.46	1994-6	Madrid Area 7	Single hospital records	Calle-Pascual
1.10	1995-7	Leicestershire, UK Urban and rural	Multiple	Canavan
1.47; 2.19	1992-7	Blacks; Europeans managed in one of four hospitals in London, UK	Case control study: multiple sources	Leggetter
1.81	1992-4	Rio de Janeiro City-wide	Multiple	Spichler
2.05	1995-7	Newcastle, UK City-wide	Multiple	Canavan
2.48	1993-4	Tayside, Scotland Community-wide	Diabetes register - multiple sources	Morris
3.61	1991	Netherlands total population	National database	Van Houtum
3.83	1996-7	Medicare claims USA	306 health referral regions	Wrobel
4.1; 7.4	?	Non-hispanic whites; Mexicans	Selected cohort study	Lavery
4.17	1995-7	Leeds, UK City-wide	Multiple	Canavan
4.46	1995-7	Middlesbrough, UK Mainly urban	Multiple	Canavan
4.66	1990-1 1994-8	Leverkusen, Germany City-wide	Records of all regional hospitals	Trautner
4.99	1991	California total	State database	Van Houtum

Leicestershire

Newcastle

Leeds
Middlesbrough

“Variations in the clinical decisions made by vascular surgeons given the same patient are likely to explain at least a part of the observed geographical variation in rates of lower extremity amputation.”

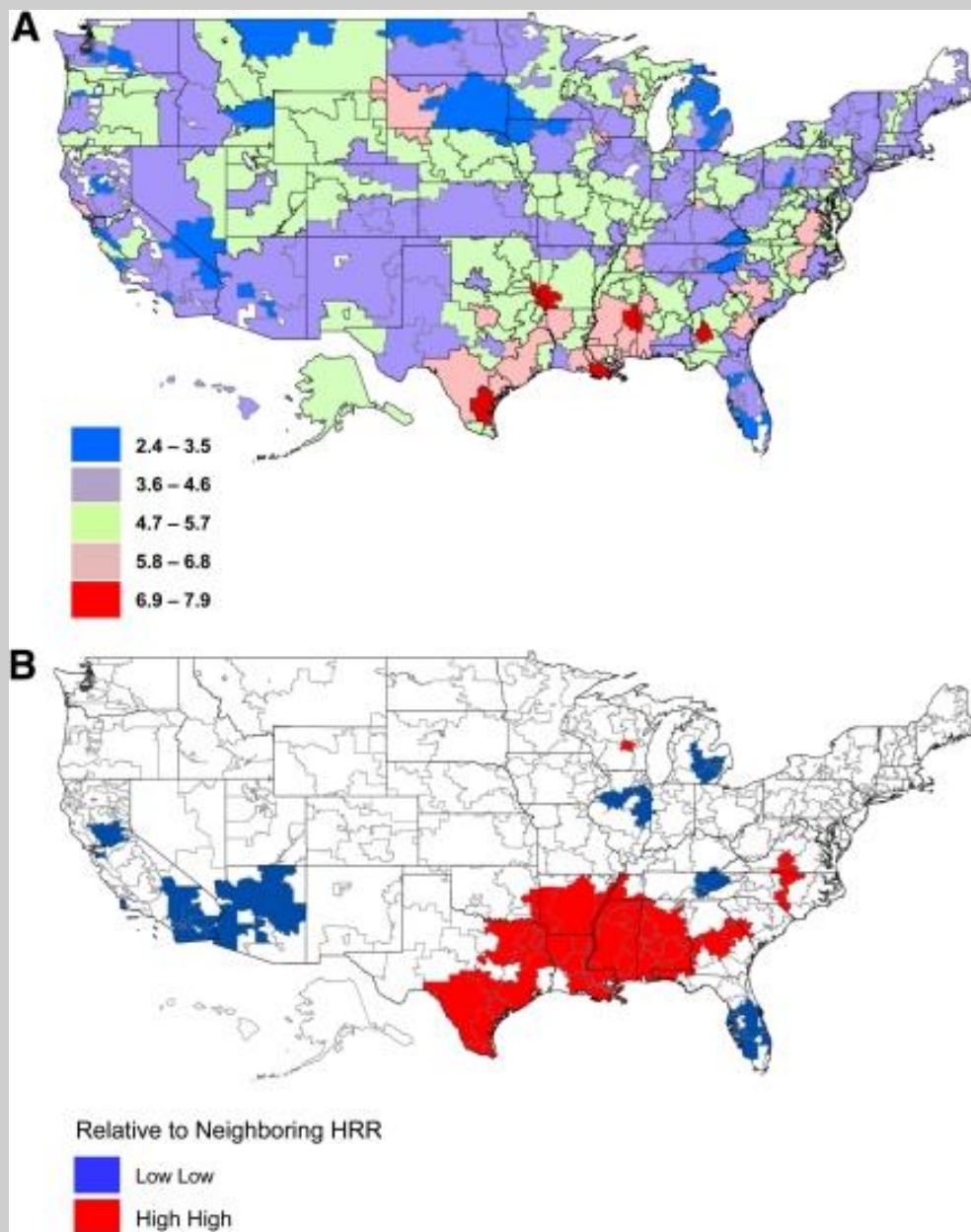
Connelly et al Br J Surg 2001

*Canavan et al
2000*

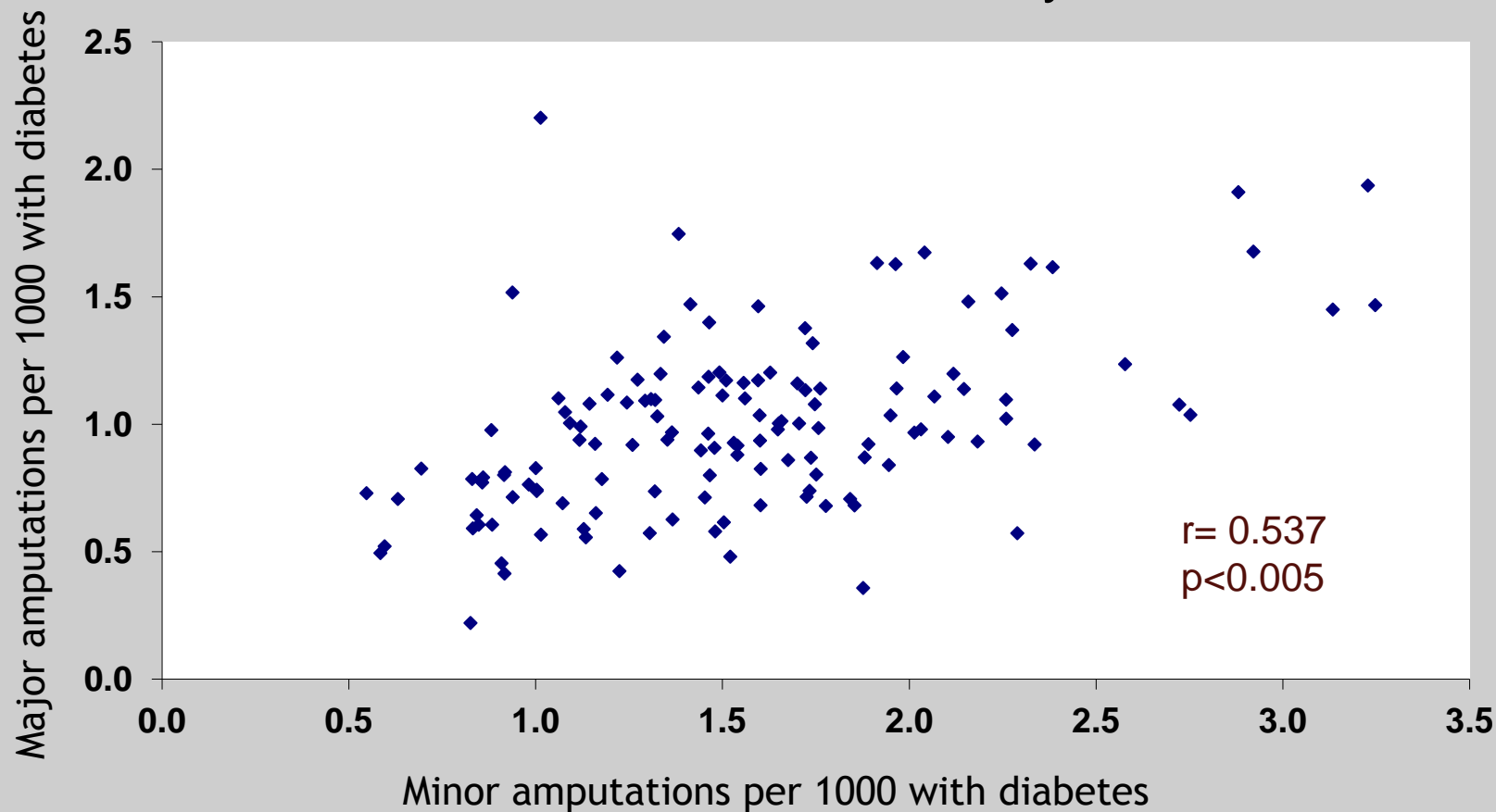
Location, Location, Location: Geographic Clustering of Lower- Extremity Amputation Among Medicare Beneficiaries With Diabetes

*Margolis DJ et al
Diabetes Care 2011*

A possible result of
training and local
reinforcement

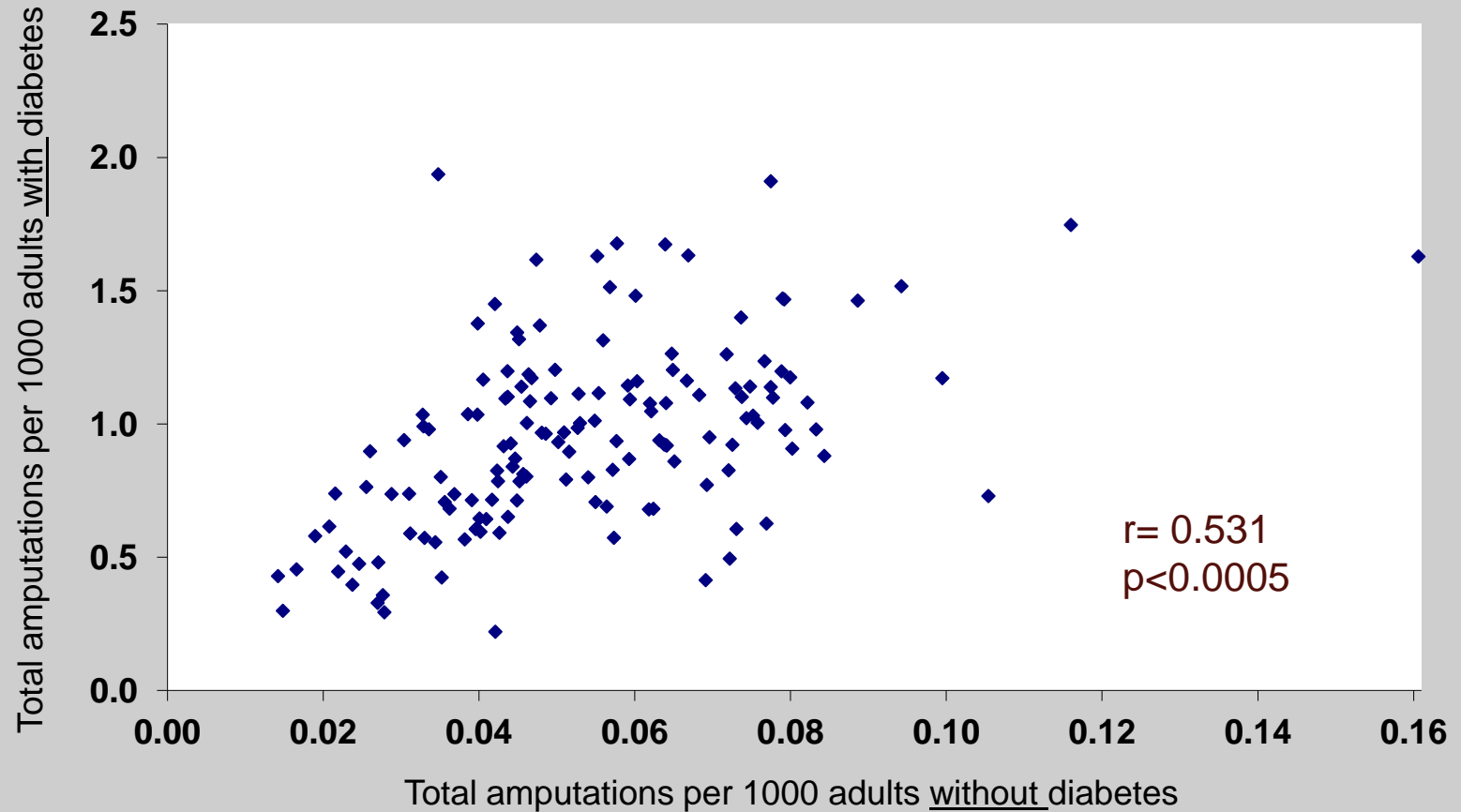


Minor versus MAJOR lower limb amputation in adults with diabetes by PCT



Source: Hospital Episode Statistics (2007/08-2009/10), The Information Centre for health and social care

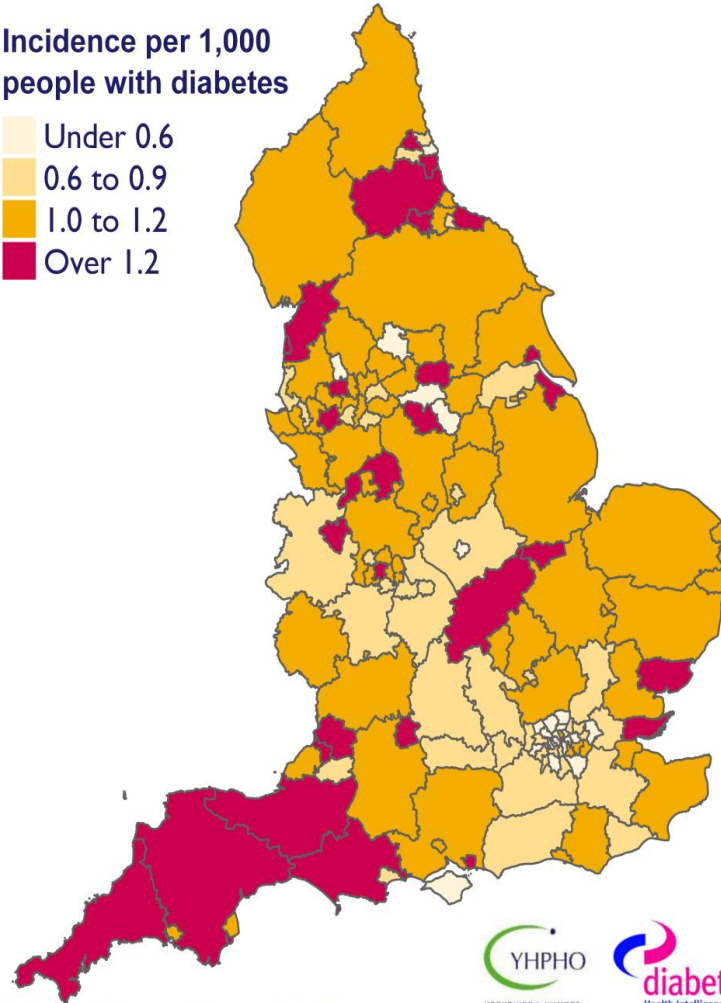
MAJOR amputation in adults with and without diabetes



Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012

YHPHO
YORKSHIRE & HUMBER
PUBLIC HEALTH OBSERVATORY

diabetes
Health Intelligence
A STRATEGIC PROGRAMME WITHIN YHPHO

Produced by YHPHO 2012

10 fold
variation
between
PCTs

Social deprivation

Ethnicity

Medical practice

Incidence of major amputations in diabetes per 10³ at risk

Incidence	Year of study	Site
0.06	1997-9	Madrid 7 women
0.12	1997-9	Madrid 7 men
2.30	1990-8	Leverkusen
2.48	1993-4	Tayside
3.11	1995	Middlesbrough
3.83	1996-7	Medicare USA
4.14	1995	Ipswich
6.00	1994-6	Chipewa Indians
18.0	1980s	Oklahoma Indians



Incidence of major amputations in diabetes per 10³ at risk

	Incidence	Year of study	Site
	0.06	1997-9	Madrid 7 women
1999 0.76 →	0.12	1997-9	Madrid 7 men
	2.30	1990-8	Leverkusen
	2.48	1993-4	Tayside
→	3.11	1995	Middlesbrough
	3.83	1996-7	Medicare USA
	4.14	1995	Ipswich
	6.00	1994-6	Chipewa Indians
	18.0	1980s	Oklahoma Indians

Incidence of major amputations in diabetes per 10³ at risk

Incidence	Year of study	Site
0.06	1997-9	Madrid 7 women
0.12	1997-9	Madrid 7 men
2.30	1990-8	Leverkusen
2.48	1993-4	Tayside
3.11	1995	Middlesbrough
3.83	1996-7	Medicare USA
4.14	1995	Ipswich
6.00	1994-6	Chipewa Indians
18.0	1980s	Oklahoma Indians



Incidence of major amputations in diabetes per 10³ at risk

Incidence	Year of study	Site
0.06	1997-9	Madrid 7 women
0.12	1997-9	Madrid 7 men
2.30	1990-8	Leverkusen
2.48	1993-4	Tayside
3.11	1995	Middlesbrough
3.83	1996-7	Medicare USA
4.14	1995	Ipswich
6.00	1994-6	Chipewa Indians
18.0	1980s	Oklahoma Indians

2005

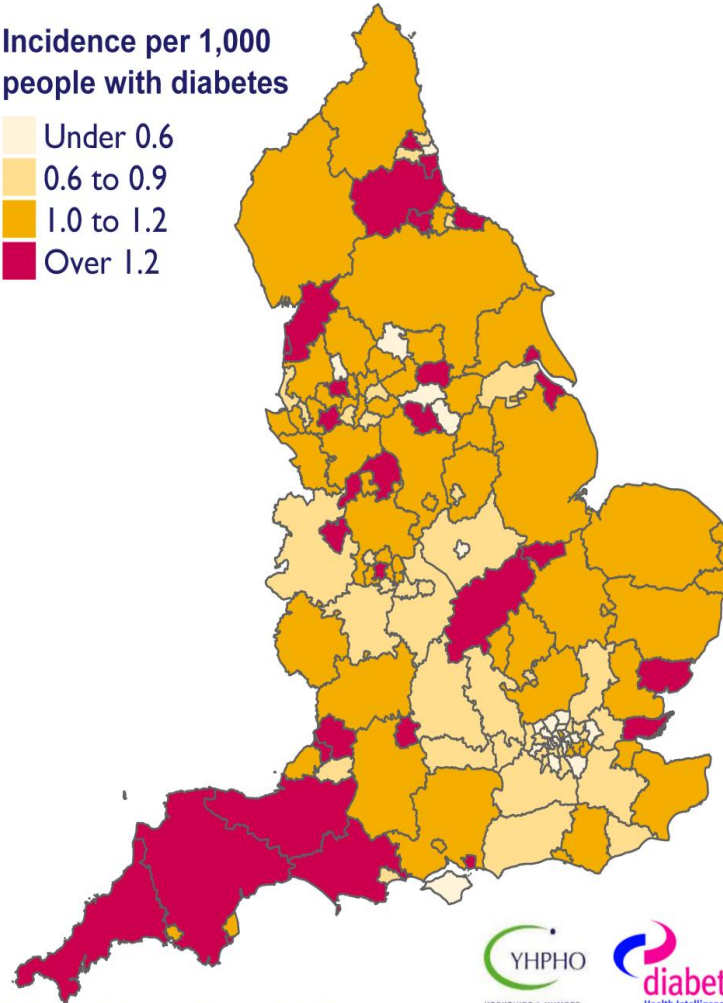
0.67



Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012



Produced by YHPHO 2012

10 fold
variation
between
PCTs

Social deprivation

Ethnicity

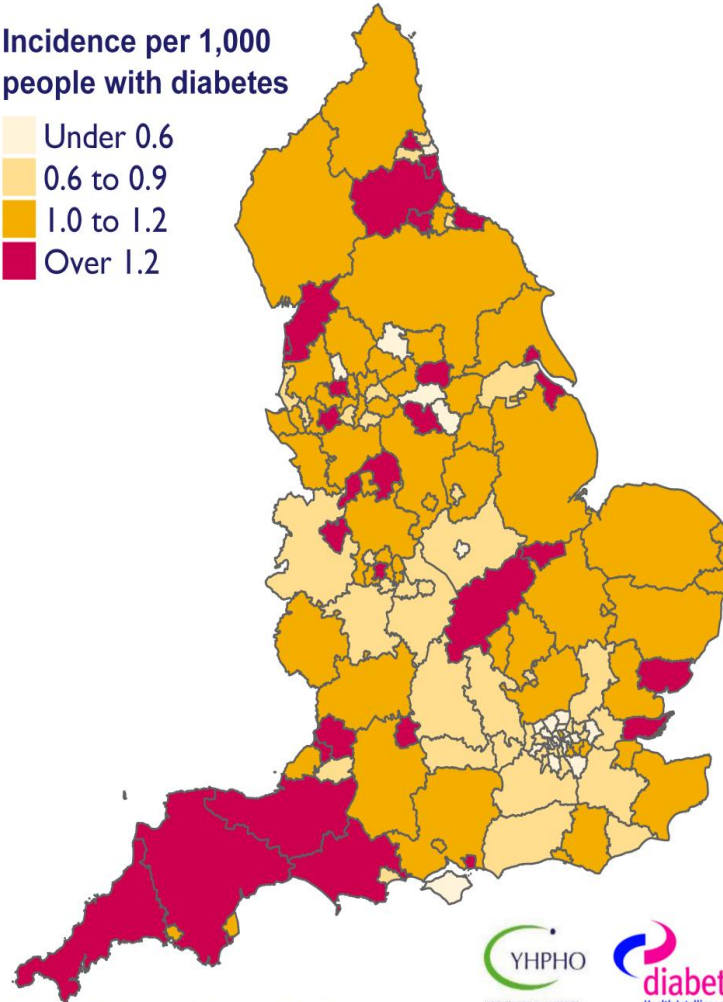
Medical practice

MDT rapid
access

Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000
people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012

YHPHO
YORKSHIRE & HUMBER
PUBLIC HEALTH OBSERVATORY

diabetes
Health Intelligence
A STRATEGIC PROGRAMME WITHIN YHPHO

Produced by YHPHO 2012

10 fold
variation
between
PCTs

Social deprivation

Ethnicity

Medical practice

MDT rapid
access

Nason (2013)
€114,063 saving

Is amputation (major, not LEA) the best outcome measure ?

What do people want ?

- To be better as soon as possible – preferably without hospital admission and without amputation
- To be alive, as active as they were, with no ulcer and without having to go to hospital clinics

Outcome measures reflect the activity of many people

1. The patient
2. General practice
3. Foot protection service
4. Specialist multidisciplinary footcare service
5. Prevention of recurrence

Outcome measures reflect the activity of many people

1. The patient
2. General practice
3. Foot protection service
4. Specialist multidisciplinary footcare service
5. Prevention of recurrence

How good are we: all of us working together ?

The National Diabetes Foot-care Audit

NDFA

**NDA
Consortium**



Process

1. Time to referral of active foot disease
 - <2 days
 - 2 days – 2 weeks
 - 2 weeks – 2 months
 - >2 months
2. Ulcer severity (SINBAD)

SINBAD Classification

1	Site	forefoot	0	mid/hindfoot	1
2	Ischaemia	none	0	some	1
3	Neuropathy	none	0	some	1
4	Bacterial infection	none	0	some	1
5	Area	<1cm ²	0	>1cm ²	1
6	Depth	shallow	0	deep	1
Total score					0-6

Ince et al 2008

Outcome

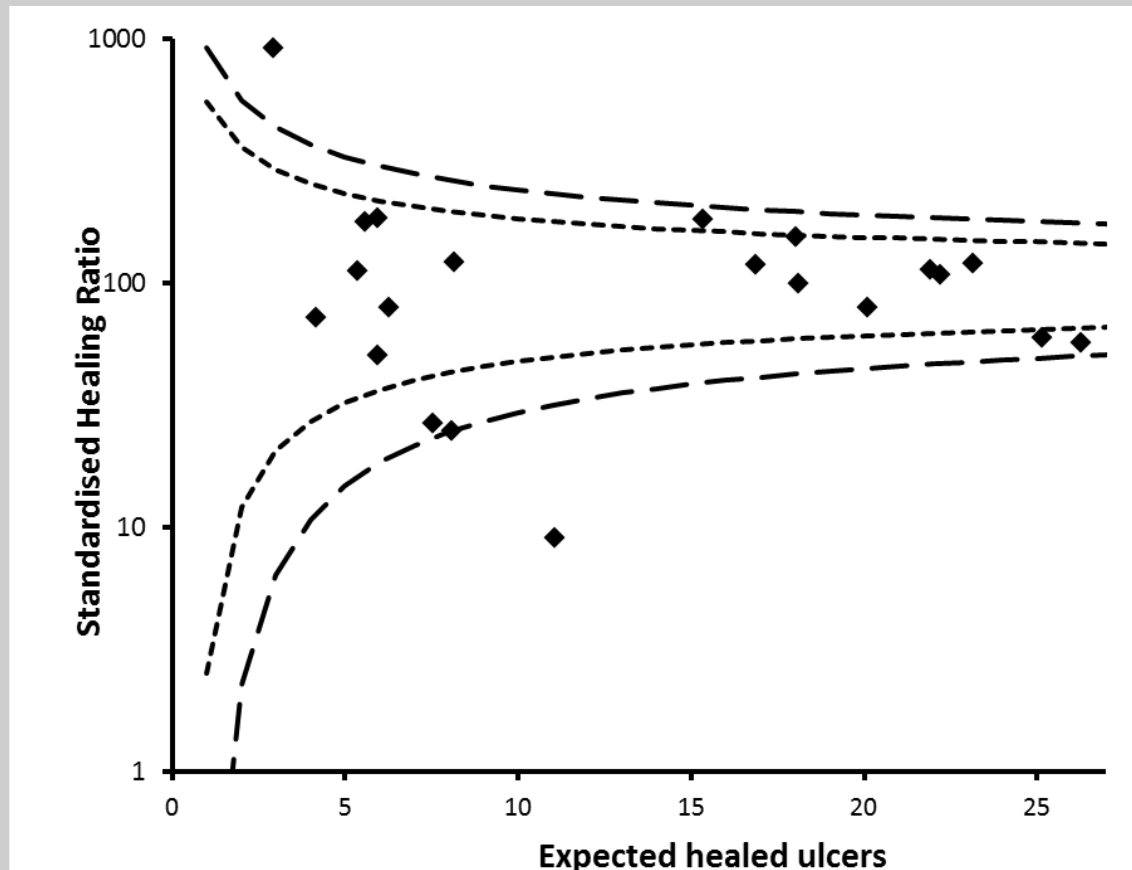
- 1. Is the person alive and ulcer-free at 12 weeks ?**
- 2. Is the person alive and ulcer-free at 24 weeks ?**

Outcome

1. Is the person alive and ulcer-free at 12 weeks ?
2. Is the person alive and ulcer-free at 24 weeks ?

Linkage to HES and OPCS

Funnel plot of Standardised (location, depth, PAD) Healing Ratios



N Holman 2013

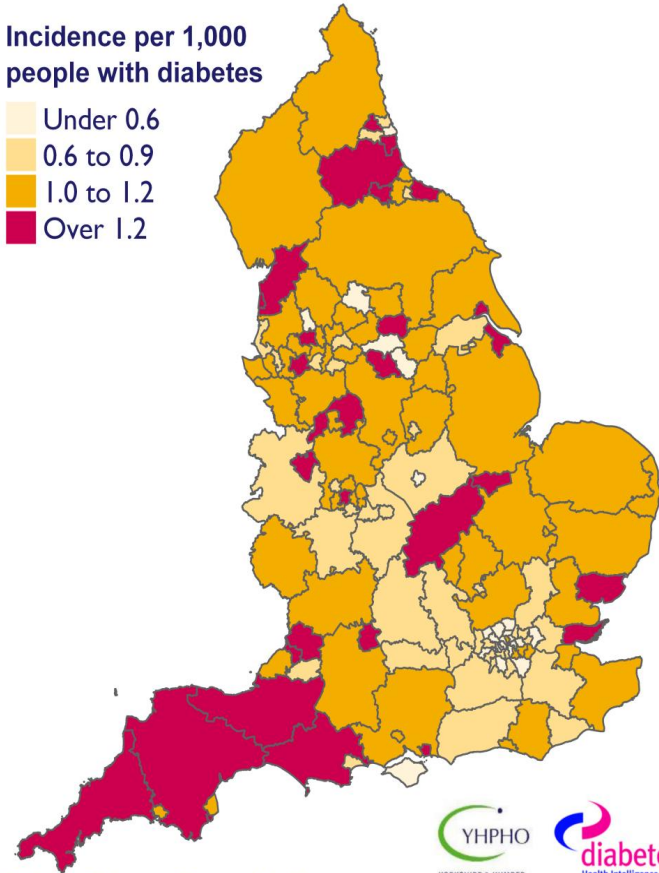


IRELAND

Major amputation rates in people with diabetes

Sources: The Quality and Outcomes Framework (QOF) 2007/08 to 2009/10,
Hospital Episode Statistics (HES) 2007/08 to 2009/10,
The NHS Information Centre for health and social care

Incidence per 1,000 people with diabetes



Contains Ordnance Survey data ©
Crown copyright and database right 2012



Produced by YHPHO 2012

WALES

ENGLAND

How good are we at managing disease of the foot in diabetes ?

- 1 We don't know but
- 2 we need to know and
- 3 it's not hard to find out.
- 4 If we can reduce variation,
we will improve outcome and
reduce cost.

How good are we at managing disease of the foot in diabetes ?

William Jeffcoate
Foot Ulcer Trials Unit
Department of Diabetes and
Endocrinology
City Hospital, Nottingham

wjeffcoate@futu.co.uk

