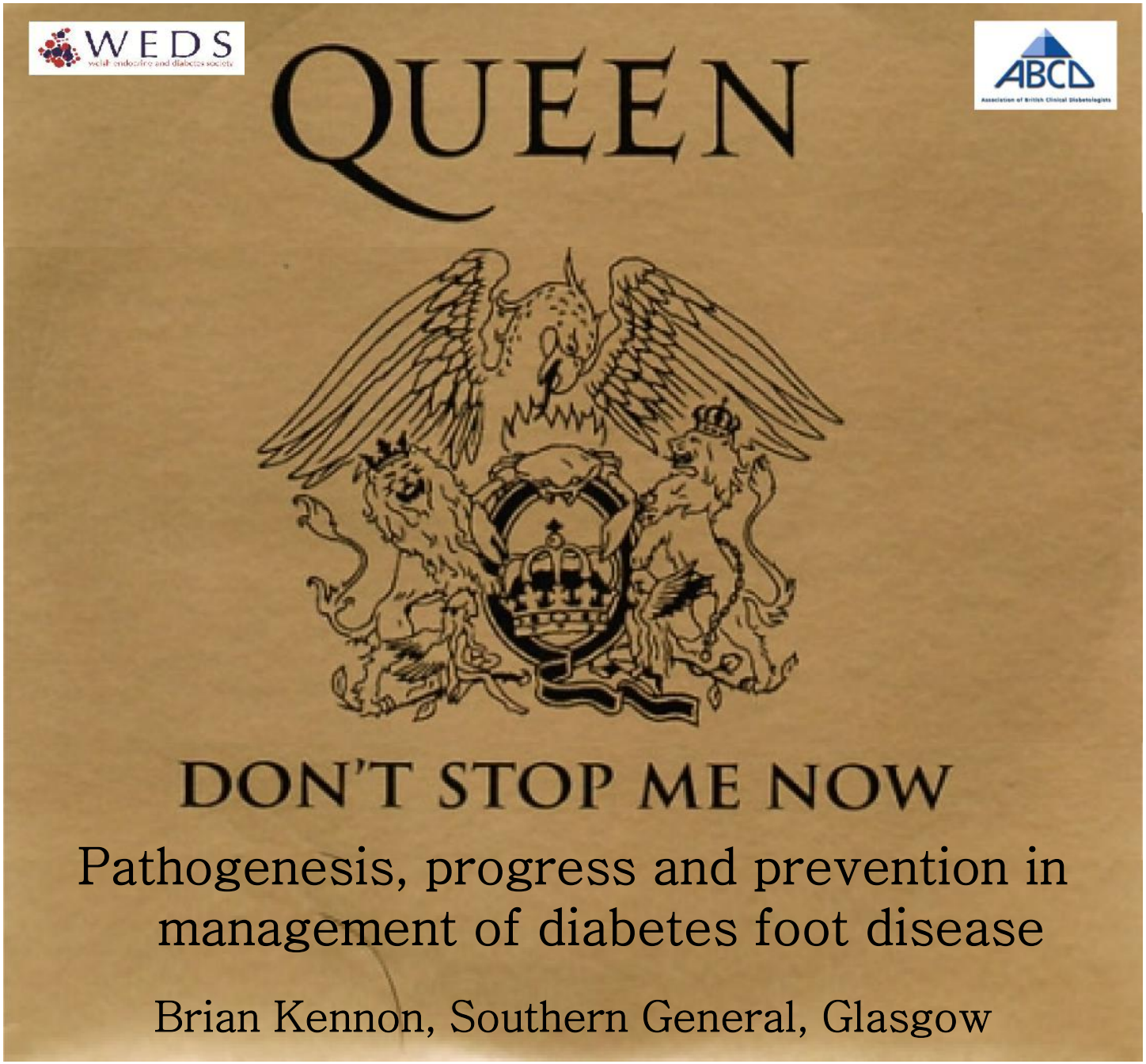


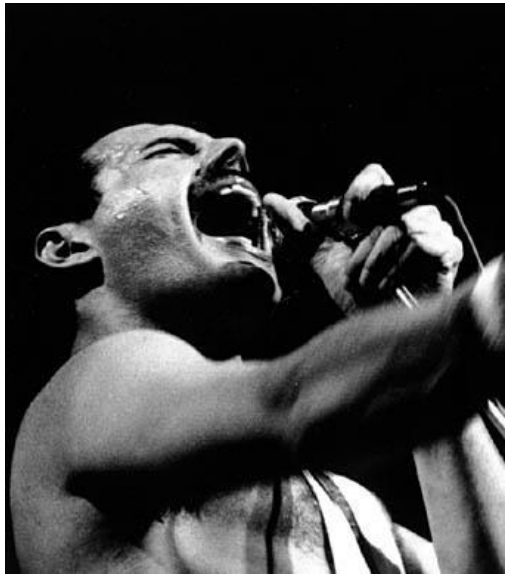
Pathogenesis, progress and prevention in management of diabetes foot disease

Brian Kennon, Southern General, Glasgow

Why the interest in foot disease?

QUIZ

QUEEN



In which year did Freddie Mercury die?

1991	1993

Outline

- Introduction
- Why is diabetes so bad for feet?
  - Neuropathy - Infection - Ischaemia
- Whose at risk of diabetes foot disease?
- What's the outcome of diabetes foot disease?
- How can we improve the outcome?
- Summary

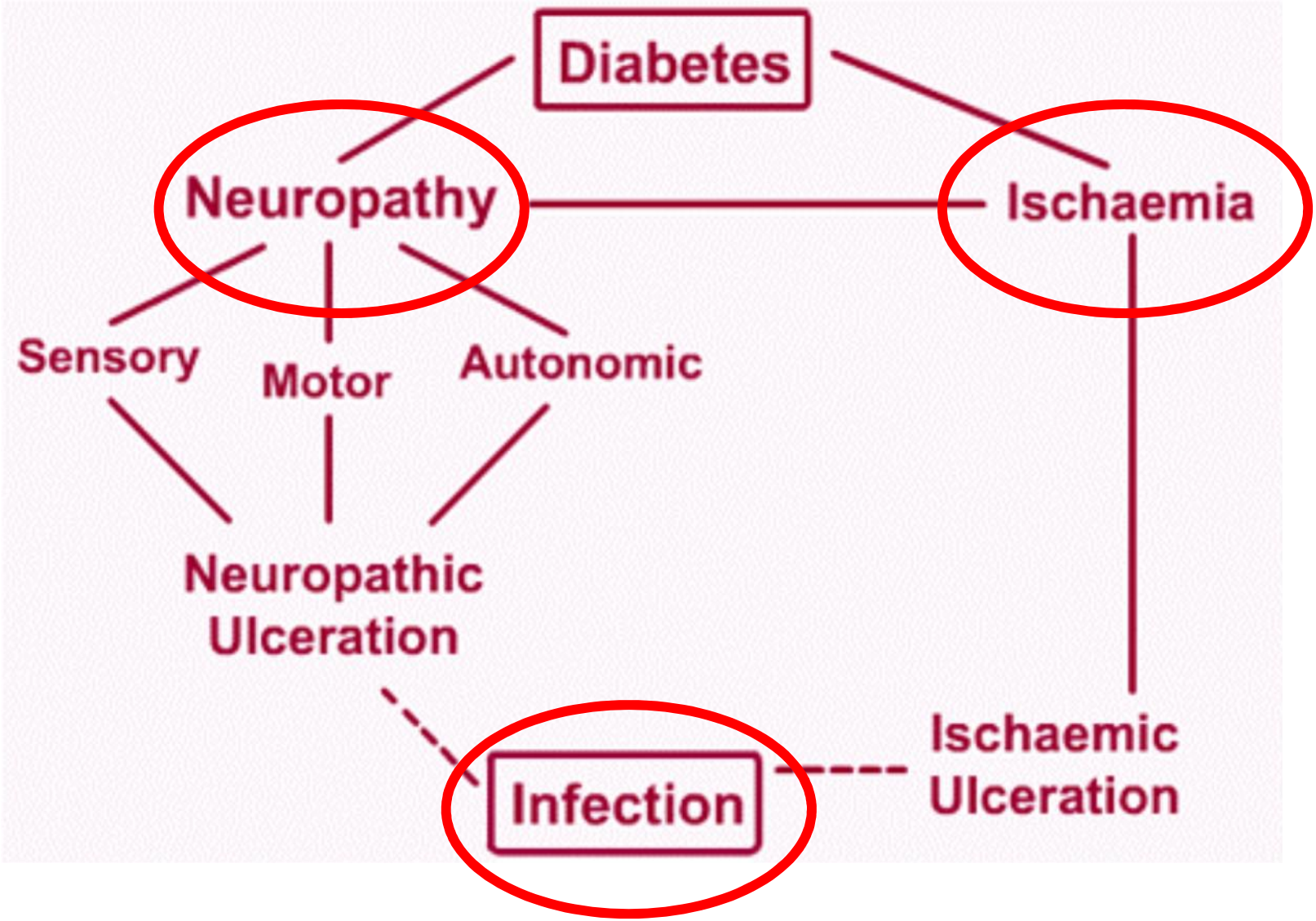
Foot Facts I

- Every 30 seconds a leg is lost to diabetes somewhere in the world
- In developed countries, up to 5% of people with diabetes have a foot problem
- 47-50% of diabetes-related admissions
- Average length of admission is 6 weeks
- Estimated that diabetic foot disease costs £662M annually in England & Wales

Foot Facts II

- 85% amputations preceded by a foot ulcer
- One in every six people with diabetes will have a foot ulcer during their lifetime
- 60 % of minor and 43% of major lower limb amputations are in individuals with diabetes
- Well-organised diabetic foot care teams, good diabetes control and well-informed self care can significantly reduce amputation rates

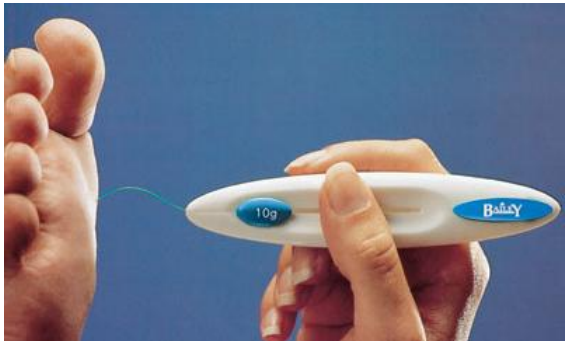
Why is Diabetes so bad for feet?



Is there neuropathy?

Sensory

- 10 g monofilament
- Don’t test over callus
- Test over 10 sites



Motor

- Neuropathic foot with high medial arch and prominent metatarsal heads

Autonomic

- Dry skin with fissuring
- Distended veins on dorsum of foot

Neuropathy & Pathology

C-fibre dysfunction

Loss of pain and warm thermal percerption

Wasted interossei, Hammer toes, Dry scaly skin, Decreased blood flow

Ulcer

Large fibre dysfunction

Loss of vibration and position sense

Equinus, Warm feet, Increased blood flow Osteopenia

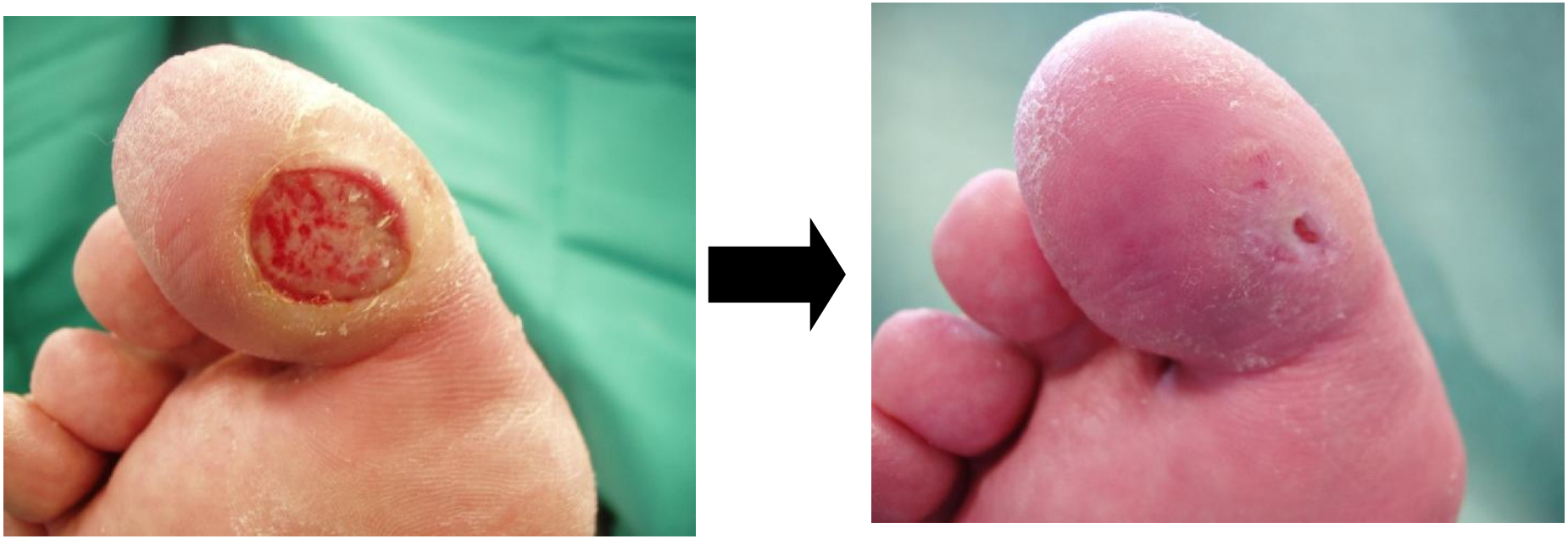
Neuroarthropathy

Neuropathic Ulceration

- **40 years old man**
- **Type 1 DM for 22 years**
- **Chronic poor control**
- **Retinopathy, Nephropathy & Neuropathy**
- **Presents with an ulcer of 2 weeks duration**

- **Classic neuropathic ulcer over a pressure area**
- **Mainstay of treatment is pressure relief**

Neuropathic Ulcertion



- Neuropathy affects up to 30% of patients with diabetes
- Increased with:
  - age
  - duration of diabetes
  - smoking
  - gender
  - sub-optimal glycaemic control

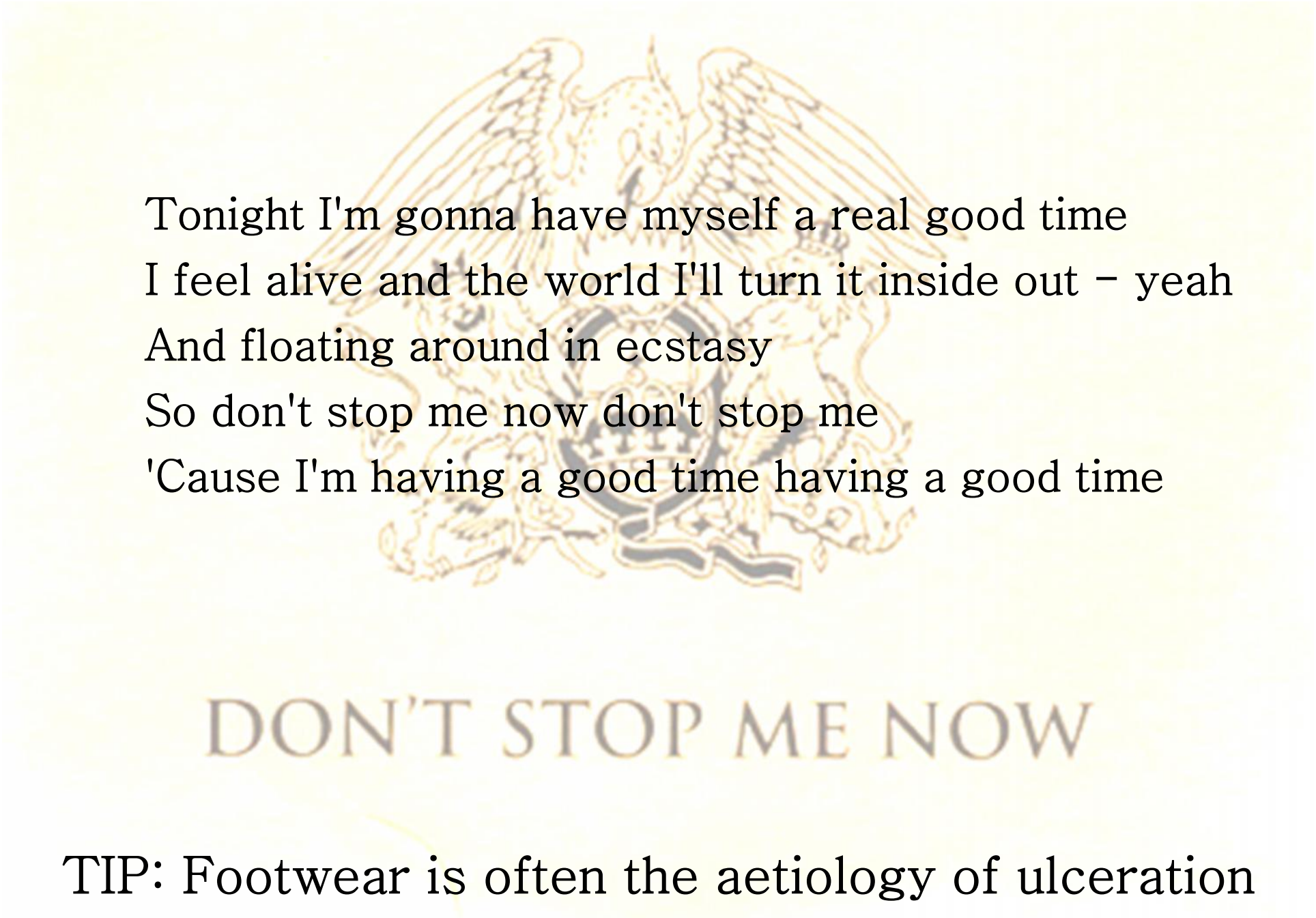
Recurrent Ulceration

Aetiology?

Why did the patient develop an ulcer?

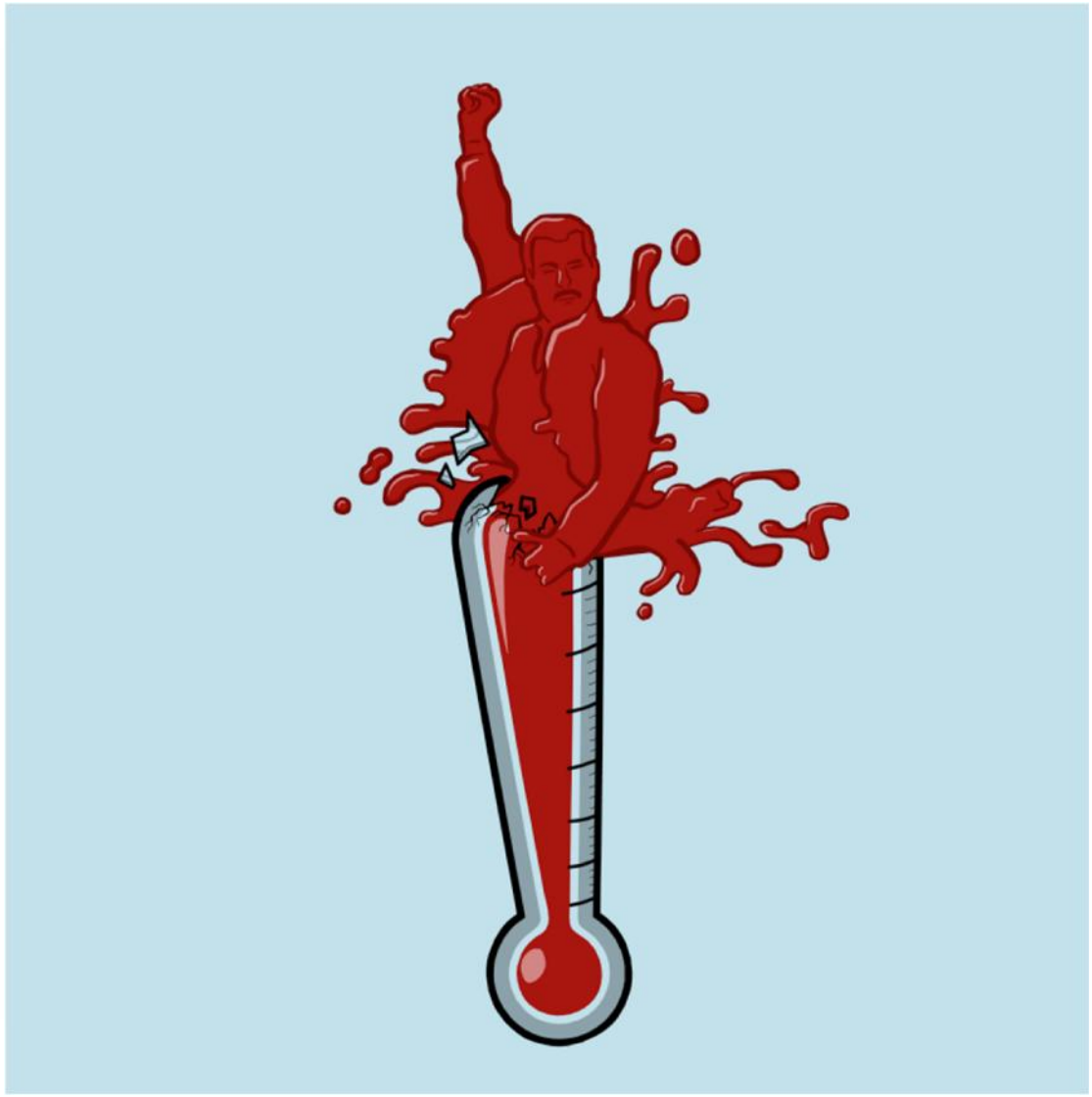
How do we prevent it from recurring?

1 year 34% 5 years 70%

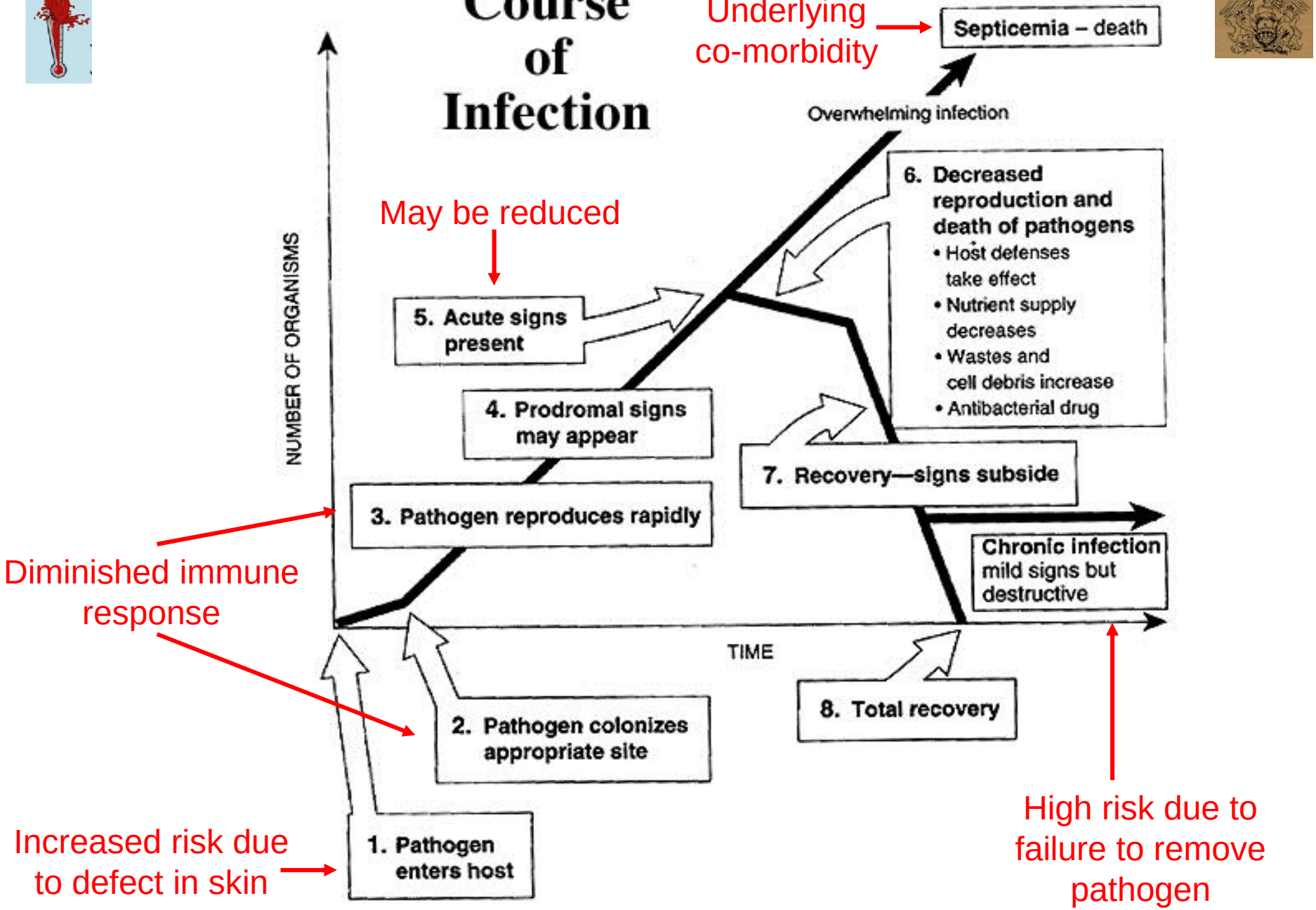


TIP: Footwear is often the aetiology of ulceration

Is there evidence of infection?



Course of Infection



QUIZ

QUEEN

What % of diabetic foot ulcers are infected at initial presentation?

58%

78%

ARTICLE

High prevalence of ischaemia, infection and serious comorbidity in patients with diabetic foot disease in Europe. Baseline results from the Eurodiale study

10 European countries, 14 centres, 1229 consecutive ulcers 2003-4

Stage	Definition	Number of patients	Percentage of study population
A	PAD −, infection −	270	24
B	PAD −, infection +	305	27
C	PAD +, infection −	205	18
D	PAD +, infection +	347	31

58% ulcers are infected

Infection was diagnosed if two or more were present:
frank purulence, local warmth, erythema, lymphangitis, oedema, pain, fever and foul smell.

82% subjects hospitalised had infection Rate higher if PAD at 63%v53%

Diabetologia (2007) 50:18–25

How to assess the severity…

Clinical Manifestation of Infection	PEDIS Grade	IDSA Infection Severity
No symptoms or signs of infection	1	Uninfected
Infection present, as defined by the presence of at least 2 of the following items: • Local swelling or induration • Erythema • Local tenderness or pain • Local warmth • Purulent discharge (thick, opaque to white or sanguineous secretion)		
Local infection involving only the skin and the subcutaneous tissue (without involvement of deeper tissues and without systemic signs as described below). If erythema, must be >0.5 cm to ≤2 cm around the ulcer. Exclude other causes of an inflammatory response of the skin (eg, trauma, gout, acute Charcot neuro-osteoarthropathy, fracture, thrombosis, venous stasis).	2	Mild
Local infection (as described above) with erythema > 2 cm, or involving structures deeper than skin and subcutaneous tissues (eg, abscess, osteomyelitis, septic arthritis, fasciitis), **and** No systemic inflammatory response signs (as described below)	3	Moderate
Local infection (as described above) with the signs of SIRS, as manifested by ≥2 of the following: • Temperature >38°C or <36°C • Heart rate >90 beats/min • Respiratory rate >20 breaths/min or $PaCO_2$ <32 mm Hg • White blood cell count >12 000 or <4000 cells/μL or ≥10% immature (band) forms	4	Severe[a]

How have your blood sugars been?

3 things to evaluate: **P**erson, **L**imb and **W**ound

Infection

- 43 years old man
- Type 2 DM for 3 years
- PHx Obesity
- Neuropathy
- Returned from holiday with a swollen hot red foot
- Pain in his foot
- Systemically unwell

Don't stop me now I'm having such a good time
I'm having a ball
Don't stop me now
If you wanna have a good time just give me a call
Don't stop me now ('Cause I'm having a good time)
Don't stop me now (Yes I'm havin' a good time)
I don't want to stop at all

DON'T STOP ME NOW

TIP: Pain in a neuropathic foot consider
urgent surgical assessment

I'm burnin' through the sky yeah
Two hundred degrees
That's why they call me Mister Fahrenheit
I'm trav'ling at the speed of light
I wanna make a supersonic man out of you

DON'T STOP ME NOW

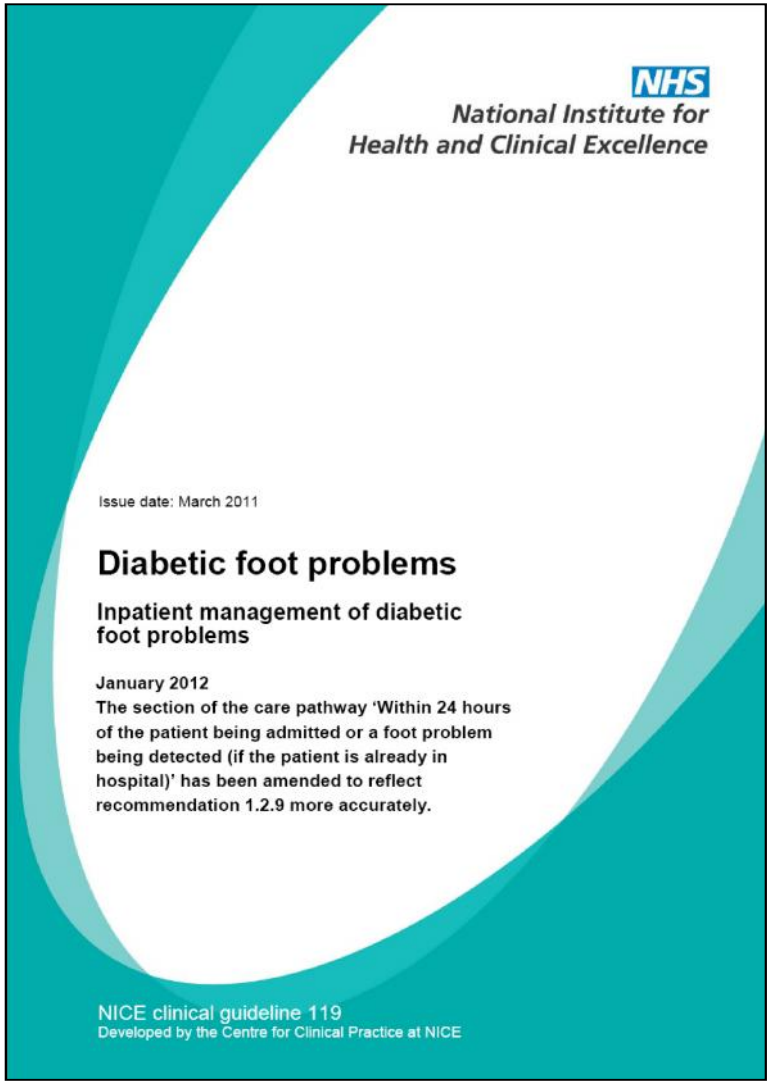
TIP: Treat infection aggressively

TIP: Some people find a prosthesis a positive experience

Therapeutic Options

- Treat infection
  - IV antibiotics, drainage & VAC device
- Maximise pressure relief
  - Bed rest & orthosis
- Maximise blood supply
  - Good blood supply
- Control blood glucose
  - Very erratic due to illness
- Manage CV risk factors
  - On appropriate treatment
- Surgical intervention
  - Amputation?

What antibiotics should you use?



What is the clinical effectiveness of different antibiotic regimens and antimicrobial therapies for diabetic foot infections (with or without osteomyelitis)?

Systematic search: 9817 studies.
13 studies were included:
- all were head-to-head trials
- no 2 studies with the same pair-wise comparisons.

Quality of the evidence

Evidence was inconclusive

Not possible to make recommendations on individual antibiotics

Recommendations

- Each hospital should have antibiotic guidelines
- Therapy for suspected osteomyelitis should not be delayed pending MRI
- Empirical therapy should be started based on severity of infection
- Definitive regimen is informed by microbiology results
- Lowest cost drugs appropriate to clinical setting should be used

Stepwise Approach to Antibiotic Choice

Is there a suspected infection?

YES — **NO**

Obtain good quality microbiology specimen

No further action

Assess severity of the infection

Mild | Moderate | Severe

Are they antibiotic-naïve?

Do they have a pencillin allergy?

Could there be MRSA or any other special circumstances?

Choose empirical antibiotic therapy

Amend therapy based on sensitivities and **clinical** response

The Diabetic Foot Journal Vol 12 No 2 2009

Mild infection (IDSA) or PEDIS 2: Antibiotic-naïve

Signs of infection with cellulitis <2cm, No systemic illness

Likely pathogens : *Staph. aureus* or beta-haemolytic streptococci.

Antibiotics

Primary: Oral FLUCLOXACILLIN 1 g qds for 5-7 days.

Oral alternatives: DOXYCYCLINE 100 mg bd

or CLINDAMYCIN 300–450 mg qds

****Second course is rarely effective if first appropriate & unsuccessful****

The Diabetic Foot Journal Vol 12 No 2 2009

Moderate infection (IDSA) or PEDIS 3: Antibiotic-naïve

Either: (a) lymphatic streaking, deep tissue infection or abscess or (b) Cellulitis >2 cm. No systemic illness.

Likely pathogens : *S aureus,* streptococci.and/or anaerobes

Antibiotics
Primary
Oral or IV Flucloxacillin 1 g qds

Oral alternatives
Co-trimoxazole 960 mg bd or
Co-amoxiclav 625 mg tds

Moderate infection (IDSA)/PEDIS 3: Not antibiotic-naïve

Likely pathogens : polymicrobial

Antibiotics
Primary : IV co-amoxiclav 1.2 g tds
Oral switch : Co-amoxiclav 625 mg tds, or Co-trimoxazole 960 mg bd.

Allergic to penicillins: IV ciprofloxacin 400 mg tds and IV metronidazole 500 mg tds, or IV gentamicin and IV metronidazole 500 mg tds.

– Add vancomycin if MRSA infection is suspected.

Severe infection (IDSA)/PEDIS 4: Antibiotic-naïve

Any infection accompanied by systemic toxicity. The presence of critical ischaemia of the involved limb may make the infection severe.

****Generally advised admission to hospital****

Likely pathogens
S. aureus or beta-haemolytic streptococci.
Anaerobes, enterobacteriaceae
Pseudomonas aeruginosa may also need to be treated.
P. aeruginosa is usually a coloniser.



Antibiotics
Primary
IV co-amoxiclav 1.2 g tds +/- add gentamicin

Allergic to penicillins or concern about renal function
IV ciprofloxacin 400 mg bd and IV metronidazole 500 mg tds.
– Add vancomycin if MRSA infection is suspected.

Severe infection (IDSA)/PEDIS 4: Specific circumstances

- Recent antibiotic therapy (i.e. preceding 90 days).
- Proven drug-resistant
- Extended-spectrum beta-lactamase-producing (ESBL)

Escherichia coli or *Klebsiella* spp. : seek specialist advice

Antibiotics

Primary : IV piperacillin/tazobactam 4.5 g tds,

– Add vancomycin if MRSA infection is suspected

Penicillin allergy

IV ciprofloxacin 400 mg bd and IV metronidazole 500 mg tds.

Consider empirical treatment of MRSA in the following:

- Hx of previous MRSA infection/colonization within the past year.
- Local prevalence of MRSA (ie, % of all S.aureus clinical isolates) is high
- The infection is sufficiently severe that failing to empirically cover MRSA while awaiting definitive cultures would pose an unacceptable risk of treatment failure.

IDSA Guideline for Diabetic Foot Infections • CID 2012:54 (15 June)

Osteomyelitis

Diagnosis

GOLD STANDARD: Bone biopsy

Clinical assessment:
PROBE-TO-BONE Test:

a. Infected wound and PTB +ve high likelihood
b. Non-infected wound and PTB –ve very unlikely

Investigations

Clinical suspicion: initial IXS is plain X-ray

****May take 2 weeks before any changes of acute osteomyelitis on plain radiograph and thus serial X-rays may be required****

Secondary investigations :

1. MRI
2. Isotope white cell scan
3. Triple phase bone scan (highly sensitive but not specific)

Markanday A, 2014 & Jeffcoate and Lipsky 2004

Osteomyelitis

Management: Surgery v Conservative Therapy

- Local surgery can increase healing time and decrease need for antibiotics
- Lone antibiotic therapy can eliminate infection in 80% of cases of osteomyelitis
- No evidence of best antibiotic regimen
- Recommended duration of therapy 4-6 weeks (if no surgery) may be longer depending on clinical response
- No evidence IV therapy superior to Oral
- Limited evidence if MRSA: add Rifampicin 660mg bd or Fusidic Acid 500mg tds

The Diabetic Foot Journal Vol 12 No 2 2009

Diabetes & PAD

Diagnosis and assessment of peripheral arterial disease in the diabetic foot

- UKPDS each 1% increase in HbA1c associated 28% increased risk PAD
- Diffuse disease which is often distal
- Less adaptive mechanisms to ischaemia and decreased collaterals
- AV shunting with capillary hypoperfusion
- Often asymptomatic as co-existent neuropathy
- 49% ulcers co-existing PAD
- EURODIALE study only 56% with severe PAD (ABPI <0.5) had vascular imaging and of those only 43% revascularised

Brownrigg et al Diabetic Med 2015 DOI: 10.1111/dme.12749

Is there evidence of ischaemia?

Clinical assessment

- Assess lower limb pulses & capillary return
  - (30% subjects deficient DP pulse)
- Lift limb above neutral position and note if pallor and then hyperperfusion once dependent
- Doppler examination: normal triphasic. In severe PAD absent or monophasic (often inaccurate)
- Femoral bruit can indicate sig PAD
- ABPI <0.9 or toe: brachial <0.7 indicates probable PAD
- ABPI <0.6 poor wound healing potential

If in doubt or a non-healing ulcer then image

Brownrigg et al Diabetic Med 2015 DOI: 10.1111/dme.12749

I'm a shooting star leaping through the sky
Like a tiger defying the laws of gravity
I'm a racing car passing by like Lady Godiva
I'm gonna go go go
There's no stopping me

DON'T STOP ME NOW

TIP: Elevate the leg to assess the severity of PAD

TIP: Do NOT drive wearing orthosis

Assessing the vascular system?

Doppler ultrasonography

- Pros: safe, inexpensive, good –ve predictor
- Cons: operator dependent, less reliable for infra-popliteal

CT angiography

- Pros: 90-95% sens & 92-96% spec detecting >50% stenosis
- Cons: risk of contrast, interference

Contrast enhanced MRI

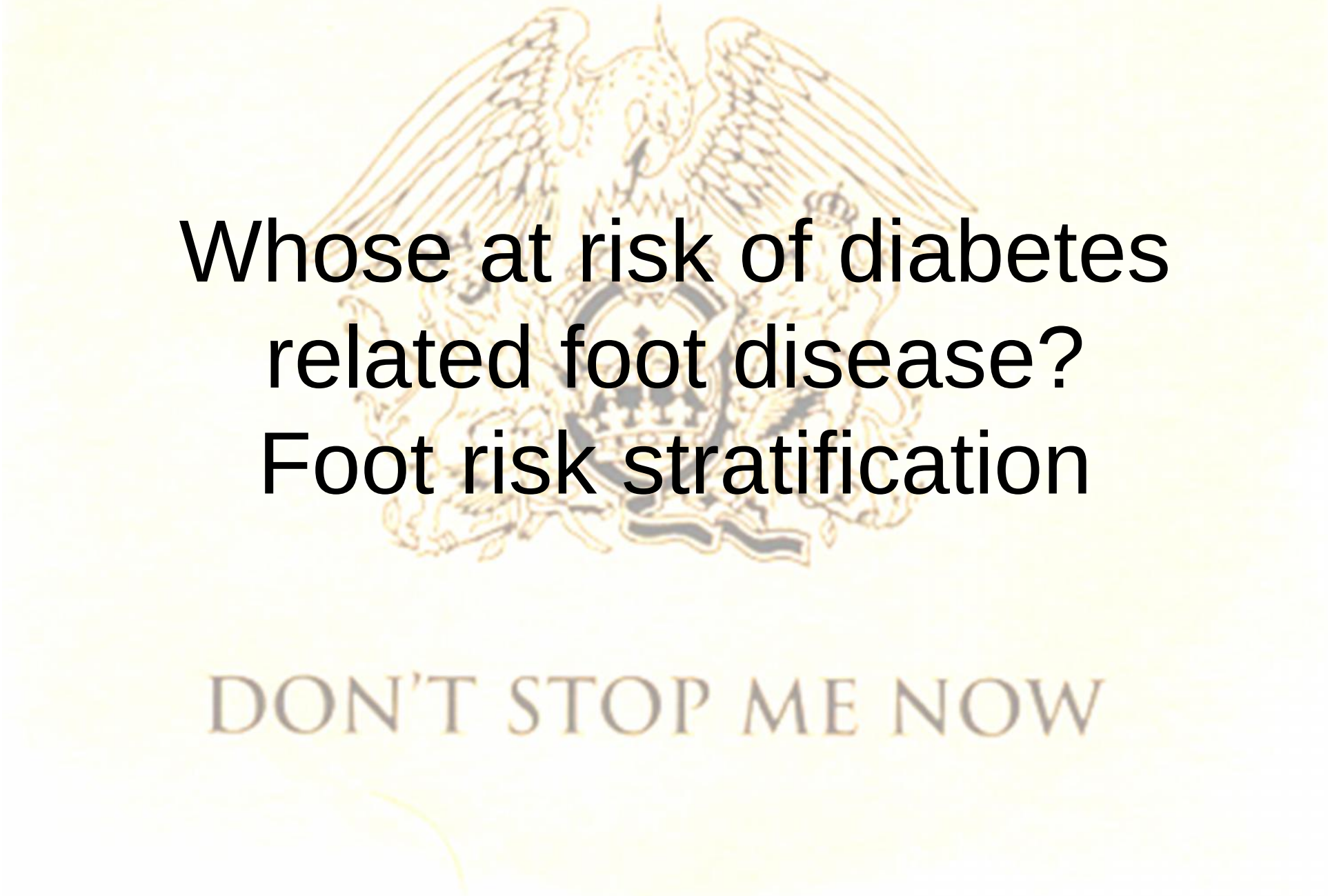
- Pros: 96% sens & 97% spec detecting >50% stenosis
- Cons: risk of contrast, limits of MRI

Digital subtraction angiography

- Pros: supposed gold standard, allows intervention
- Cons: invasive, complication rate 2%, risk of contrast

Brownrigg et al Diabetic Med 2015 DOI: 10.1111/dme.12749

Whose at risk of diabetes related foot disease? Foot risk stratification



Foot screening and risk stratification has been shown to reduce ulcer rate:

Don’t know

No

QUIZ

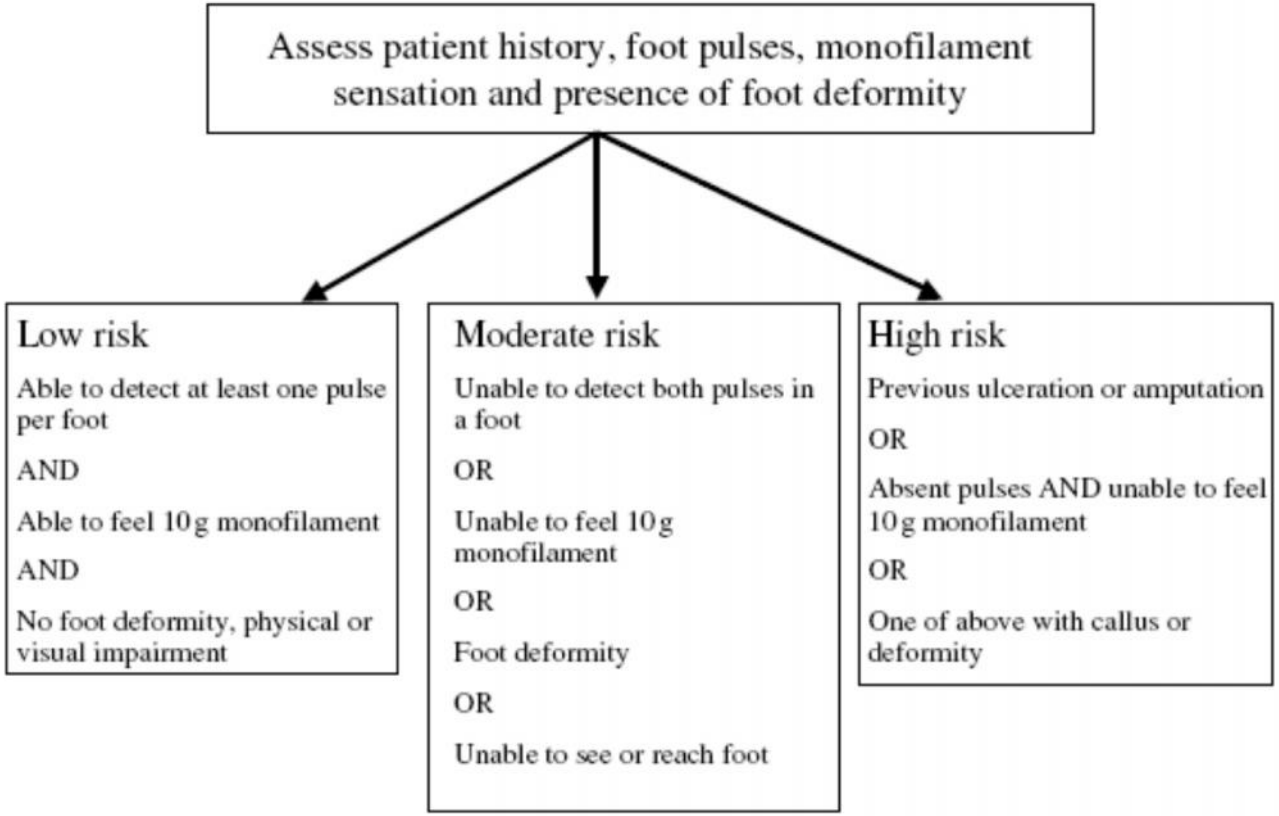
QUEEN

In specific groups

Yes

What is the evidence for foot screening?

Stratification of foot ulcer risk in patients with diabetes: a population-based study



G. P. LEESE, *Int J Clin Pract*, May 2006, **60**, 5, 541–545

Ulcer rate depending on risk stratification

Table 1 Ulcer outcome for patients who underwent foot risk stratification over 1.7-year follow-up

Overall results	*Developed ulcer during follow-up*	*Did not develop ulcer during follow-up*	*Total*
Risk score			
'High risk'	140 (29.4%)	337 (70.6%)	477
'Moderate risk'	18 (2.3%)	778 (97.7%)	796
'Low risk'	8 (0.36%)	2245 (99.6%)	2253
Total	166 (4.7%)	3360 (95.3%)	3526
	Sensitivity %	*Specificity %*	*Positive predictive value %*
High-risk group	84.3 (83.1–85.7)	90.0 (89.0–90.9)	29.4 (27.9–30.9)
High- and moderate-risk group	95.2 (94.5–95.9)	66.8 (65.3–68.4)	
			Negative predictive value %
Low-risk group			99.6 (99.5–99.7)

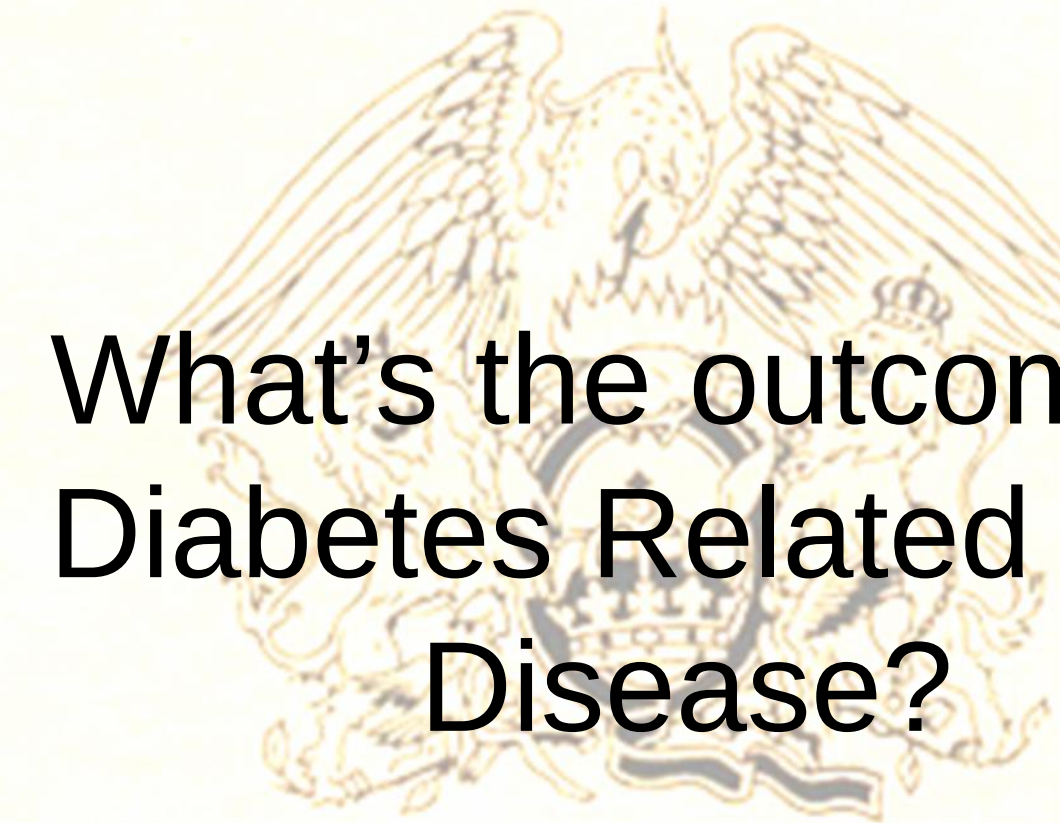
High risk v Low risk = x 83 risk ulceration

Mod risk v Low risk = x 6 risk ulceration

Int J Clin Pract, May 2006, **60**, 5, 541–545

THE INTERNATIONAL JOURNAL OF CLINICAL PRACTICE

What's the outcome of Diabetes Related Foot Disease?



QUIZ

QUEEN

One year after developing a diabetic foot ulcer more patients will have:

Died	Amputated

Assessing the Outcome of the Management of Diabetic Foot Ulcers Using Ulcer-Related and Person-Related Measures

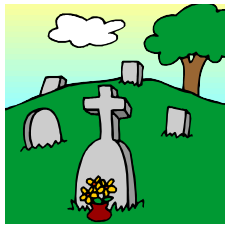
- **Ulcer related outcomes**
  - **Healing, Amputation, Death, Persistent ulcer**
- **Patient related outcomes**
  - **Survival, Ulcer free, Amputation**
- **449 patients recruited over a 3 year period**
  - **352 (78%) superficial ulcers**
  - **183 (41%) infected**
  - **216 (48%) PVD**

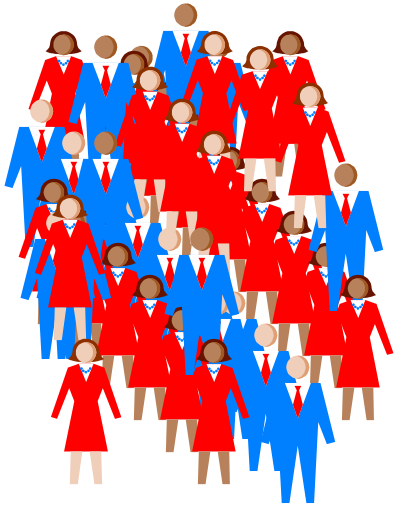
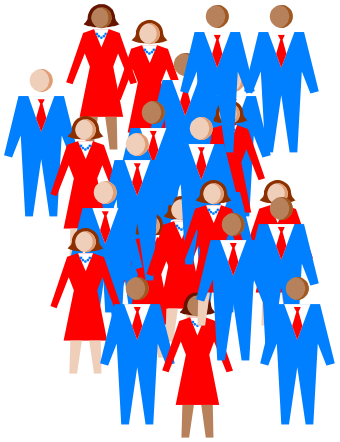
Jeffcoate et al, Diabetes Care 29:1784-7 2006

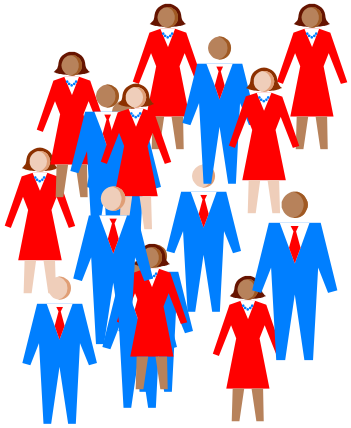
Assessing the Outcome of the Management of Diabetic Foot Ulcers Using Ulcer-Related and Person-Related Measures

Person related outcomes





45% **25%** **11%** **17%**

Jeffcoate et al, Diabetes Care 29:1784-7 2006

What factors influence outcome?

DON'T STOP ME NOW

QUIZ

QUEEN

Which factor(s) presents the greatest risk of an ulcer progressing to amputation?

Ulcer down to bone	Infection & ischaemia

University of Texas wound classification system

- Grade 0 Pre or post ulceration
- Grade 1 Superficial ulcer
- Grade 2 Probing tendon or capsule
- Grade 3 Probing to bone

- Stage A No infection, No ischaemia
- Stage B Infection
- Stage C Ischaemia
- Stage D Infection + Ischaemia

Lavery et al, Foot, Ankle Surgery 35:528-31 1996

Validation of a Diabetic Wound Classification System

Amputation & UoT Class

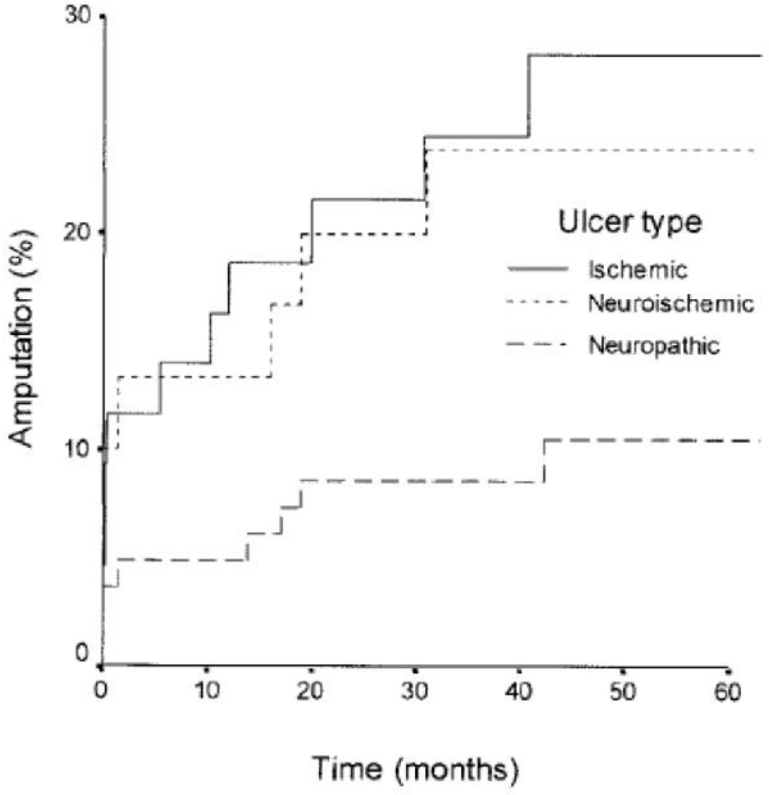
X 11

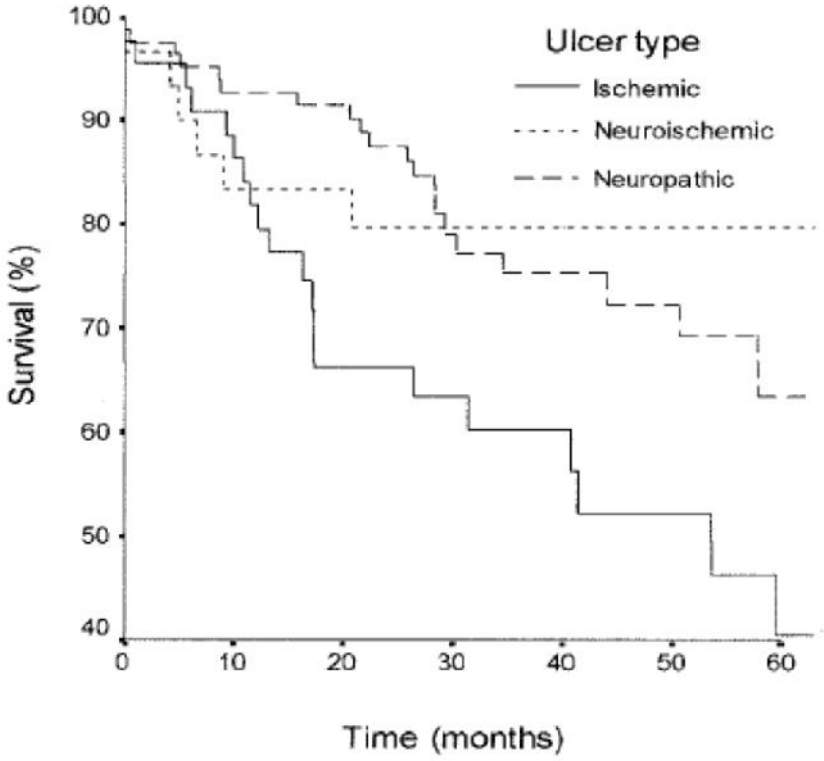
Stage	Grade 0 = healed	1 = superficial	2 = tendon or capsule	3 = bone or joint
A: no infection & no ischaemia	0%	0%	0%	0%
B: infection	13%	9%	29%	92%
C: ischaemia	25%	21%	25%	100%
D: infection & ischaemia	50%	50%	100%	100%

X 90

Armstrong et al, Diabetes Care 21:855-9 1998

Ulcer type: amputation & mortality rate





Malik et al, Diabetes Care 26:491 - 4, 2003

The impact of foot ulceration and amputation on mortality in diabetic patients. I: From ulceration to death, a systematic review

Key Messages

- lower limb ulceration in diabetic patients is associated with amputation and high mortality
- in this systematic review, we quantify the role new-onset ulceration plays in mortality in diabetic patients
- five-year mortality rates after ulceration were around 40%
- risk factors for death commonly identified were increased age, male gender, peripheral vascular disease and renal disease

Jupiter DC Int Wound J 2015; doi: 10.1111/iwj.12404

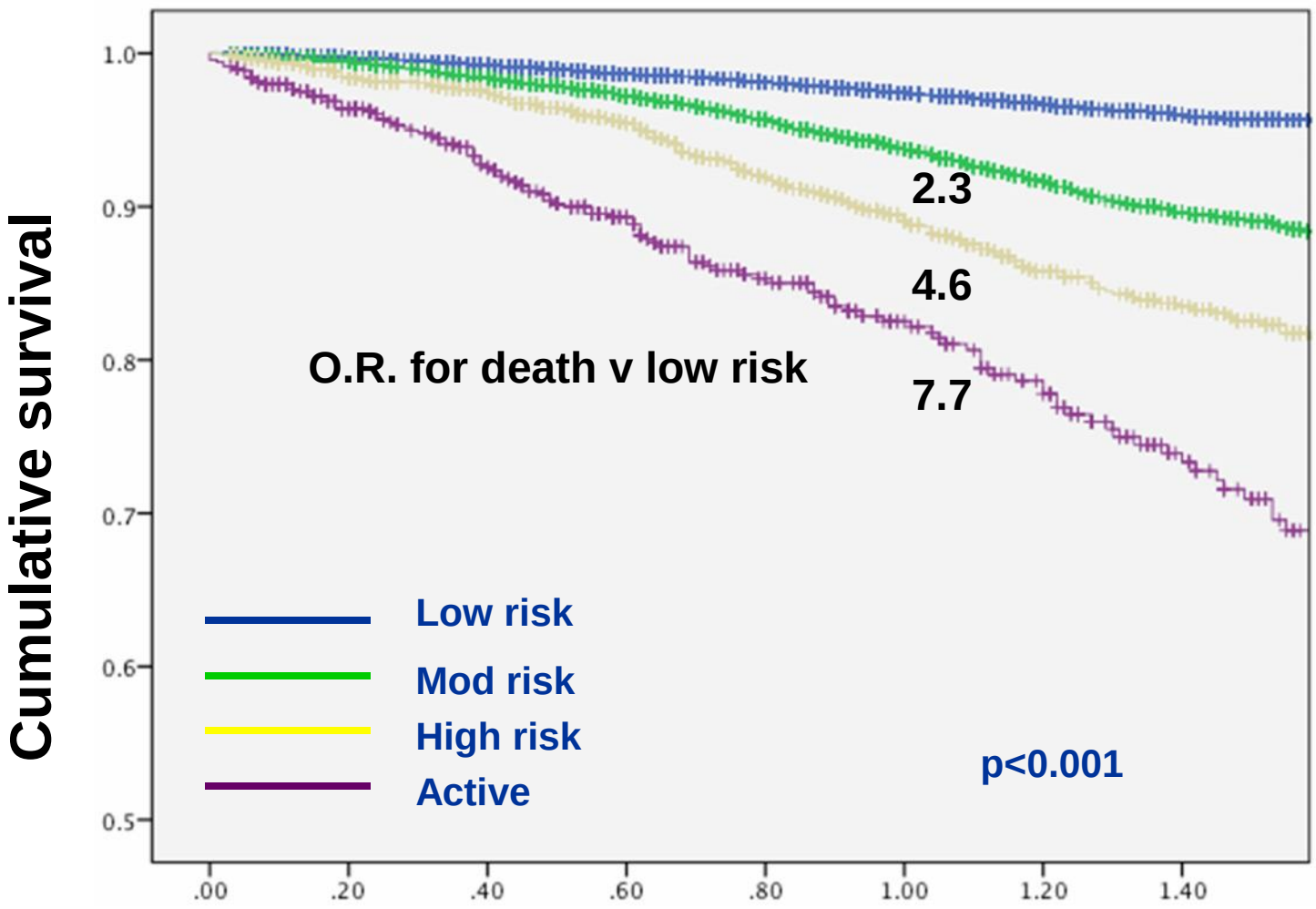
It’s not just ulcerated subjects!
Foot Risk Stratification & One Year Mortality

• A cohort study of 33,268 subjects in Greater Glasgow and Clyde, Scotland who had diabetes foot risk stratification performed from the 1st January 2009 onwards.
• 1 year mortality was calculated from the time of screening according to foot risk score

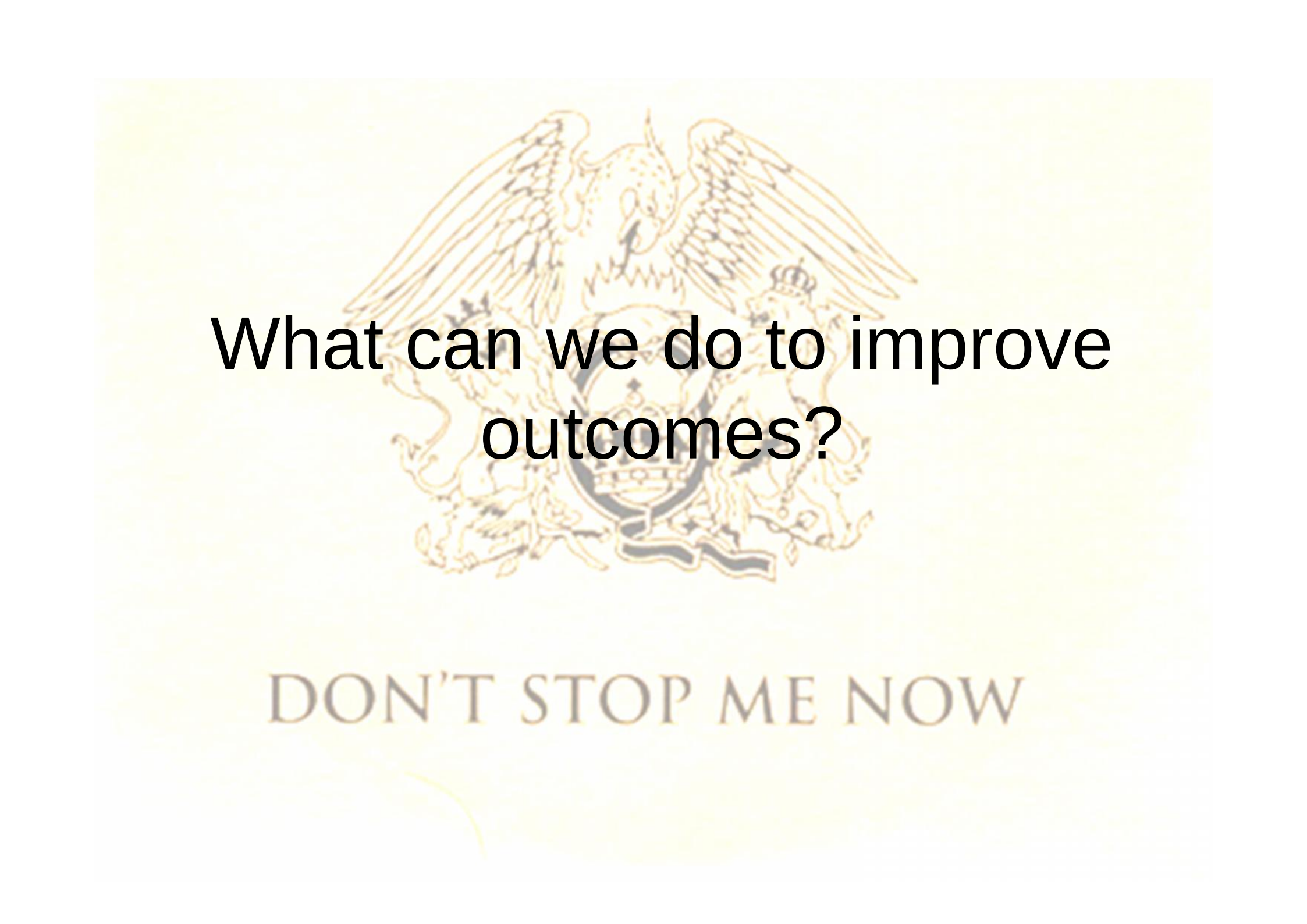
Foot risk score	Total number of subjects (%)	Dead within 1 year	1 year survival	O.R. for death v low risk
Low	21151(63.7%)	347	98.4%	1.0
Moderate	9274 (27.8%)	343	96.3%	2.3
High	2145 (6.4%)	138	93.6%	4.6
Active	698 (2.1%)	86	87.7%	7.7
Overall	33268	914	97.3%	

Kennon et al, IDF Dubai 2011 D-0937

Diabetes Foot Risk Stratification & One Year Mortality

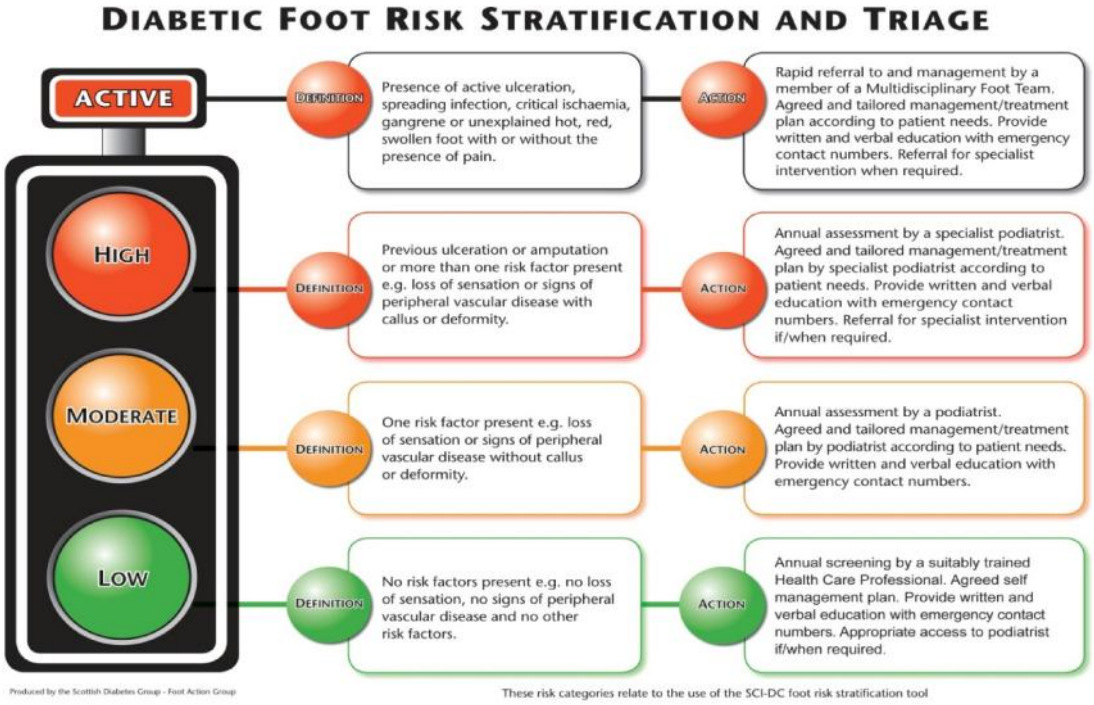


Kennon et al, IDF Dubai 2011 D-0937


What can we do to improve outcomes?
DON'T STOP ME NOW

Improving Outcomes

- Identify those individuals ‘at risk’
  - Foot risk stratification
  - Attempt to modify risk status
  - Unclear if intervention prevents ulceration



Ensure appropriately skilled HCP

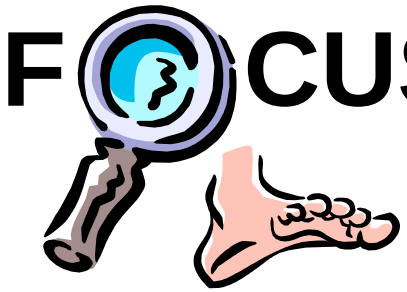
Online, interactive, e-learning resource using animations and case scenarios to ensure whichever healthcare professional carrying out foot screening, has the competence and confidence to do so

Foot Risk Awareness and Management Education

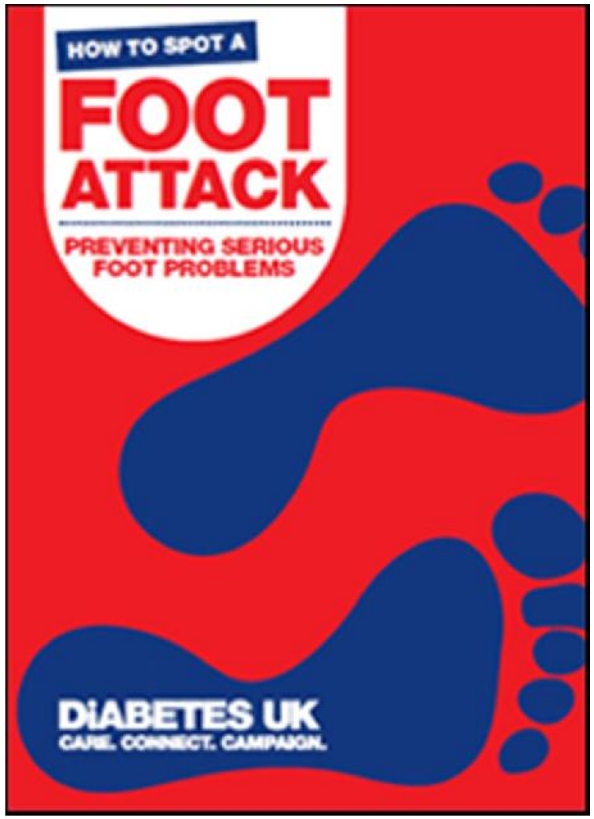
F R A M E

www.diabetesframe.org

Person Centred Care



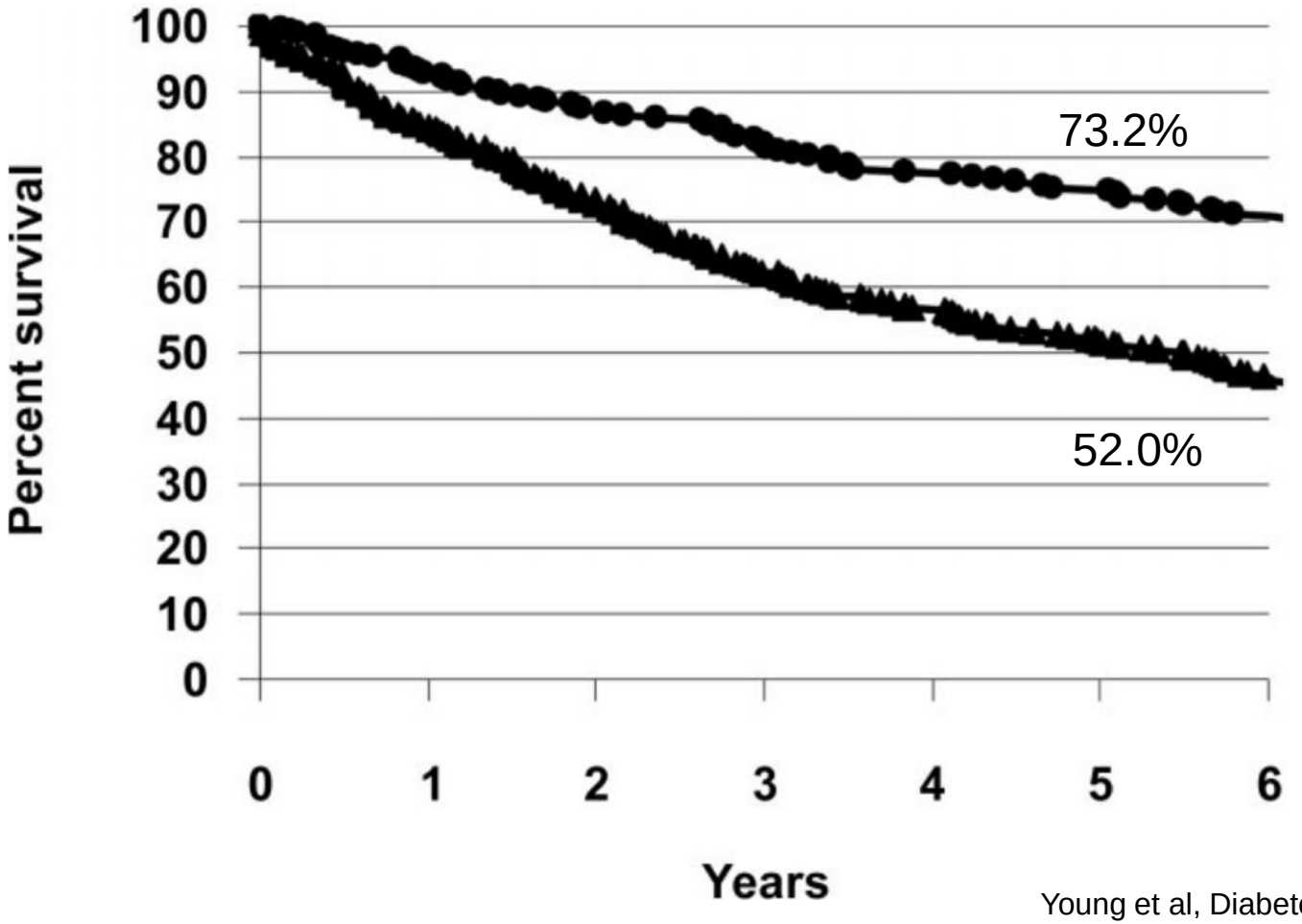
- Pilot aimed at developing a structured education resource for those with active foot disease or ‘high risk’
- Concentrates on why foot ulcers develop, what you can do to get them healed and how to reduce the risk of recurrence



Specialist Assessment & Intervention

- Early identification of acute problems and immediate referral to specialist foot teams
  - MDFC have been shown to decrease amputation rates
- Immediate assessment focusing on 4 key areas:
  - Infection - Ischaemia - Pressure - Glycaemia
- Early referral for possible surgical intervention
  - Delays in revascularisation and drainage of infection increases the risk of amputation and potentially death
- Develop care pathways similar to stroke
  - Timely imaging and revascularisation

Aggressive CV risk factor management



Young et al, Diabetes Care 2008; 31:2143-7

Reduce Iatrogenic Harm

The Scottish Inpatient Diabetic Foot Audit in November 2013 revealed that:

- 2.4% of in patients with diabetes developed a new foot lesion whilst in hospital
- 57% of in patients had not had their feet checked
- 60% who were discovered to be at risk of developing a foot ulcer did not have any pressure relief in place

(Scottish Diabetes Foot Action Group 2013)

Have your patients with diabetes had:

CPR for their Feet?

Check

Check both feet:

- Is there an ulcer or gangrene?
- Is neuropathy present?
- Is action required?

Protect

Protect feet if at risk due to:

- Neuropathy
- Previous ulcer or amputation
- Bed bound or fragile skin

Refer

Refer all patients with a foot ulcer, gangrene or other major concern to the podiatry department or diabetes team.

Ext .....

Diabetic foot problems: prevention and management of foot problems in people with diabetes

Care within 24 hours of a person with diabetic foot problems being admitted to hospital, or the detection of diabetic foot problems (if the person is already in hospital)

- Each hospital should have a care pathway for people with diabetic foot problems who need inpatient care. **[2011] [1.1.1]**

Assessing the risk of developing a diabetic foot problem

- For adults with diabetes, assess their risk of developing a diabetic foot problem at the following times: when diabetes is diagnosed, at least annually thereafter (see recommendation 1.3.11), if problems arise, and on any admission to hospital. **[1.3.3]**

Diabetic foot problems: prevention and management of foot problems in people with diabetes

Assessing the risk of developing a diabetic foot problem

- Refer people with an active diabetic foot problem to the foot protection service or multidisciplinary foot care service within 24 hours for appropriate triage according to local protocols. **[1.4.1]**

1.2.3 The multidisciplinary foot care service should be led by a named healthcare professional, and consist of specialists with skills in the following areas:

- Diabetology.
- Podiatry.
- Diabetes specialist nursing.
- Vascular surgery.
- Microbiology
- Orthopaedic surgery.
- Orthotics and/or biomechanics.
- Interventional radiology.
- Casting.
- Tissue viability.

Charcot Neuroarthropathy

Investigation

1.7.1 Be aware that if a person with diabetes fractures their foot or ankle, it may progress to Charcot arthropathy.

1.7.2 Suspect acute Charcot arthropathy if there is redness, warmth, swelling or deformity (in particular, when the skin is intact), especially in the presence of peripheral neuropathy or renal failure. Think about acute Charcot arthropathy even when deformity is not present or pain is not reported.

1.7.3 Refer the person urgently (within 24 hours) to the multidisciplinary foot care service to confirm the diagnosis, and offer non-weight-bearing treatment until definitive treatment can be started.

Charcot Neuroarthropathy

1.7.4 If acute Charcot arthropathy is suspected, X-ray the affected foot. Consider an MRI if the X-ray is normal but clinical suspicion still remains.

Treatment

1.7.5 If the multidisciplinary foot care service suspects acute Charcot arthropathy, offer treatment with a non-removable off-loading device. Only consider treatment with a removable off-loading device if a non-removable device is not advisable because of the clinical or the person's circumstances.

1.7.6 Do not offer bisphosphonates to treat acute Charcot arthropathy, unless as part of a clinical trial.

Charcot Neuroarthropathy

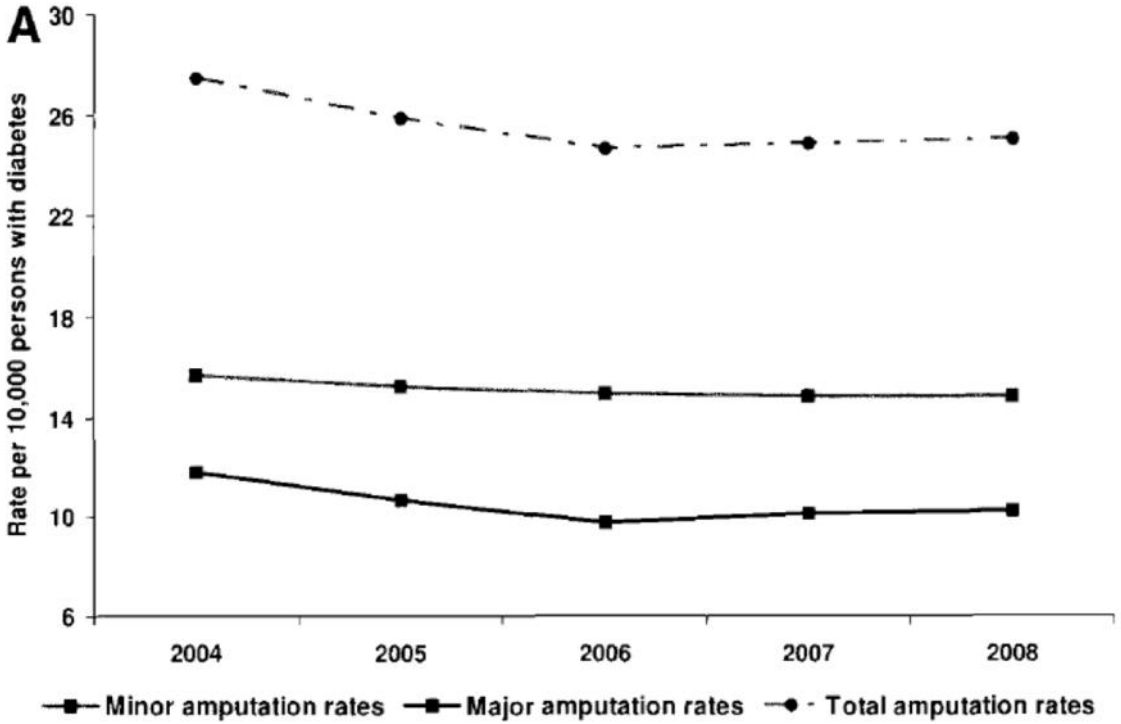
1.7.7 Monitor the treatment of acute Charcot arthropathy using clinical assessment. This should include measuring foot–skin temperature difference and taking serial X-rays until the acute Charcot arthropathy resolves. Acute Charcot arthropathy is likely to resolve when there is a sustained temperature difference of less than 2 degrees between both feet and when X-ray changes show no further progression.

1.7.8 People who have a foot deformity that may be the result of a previous Charcot arthropathy are at high risk of ulceration and should be cared for by the foot protection service.

Are we improving outcomes?

DON'T STOP ME NOW

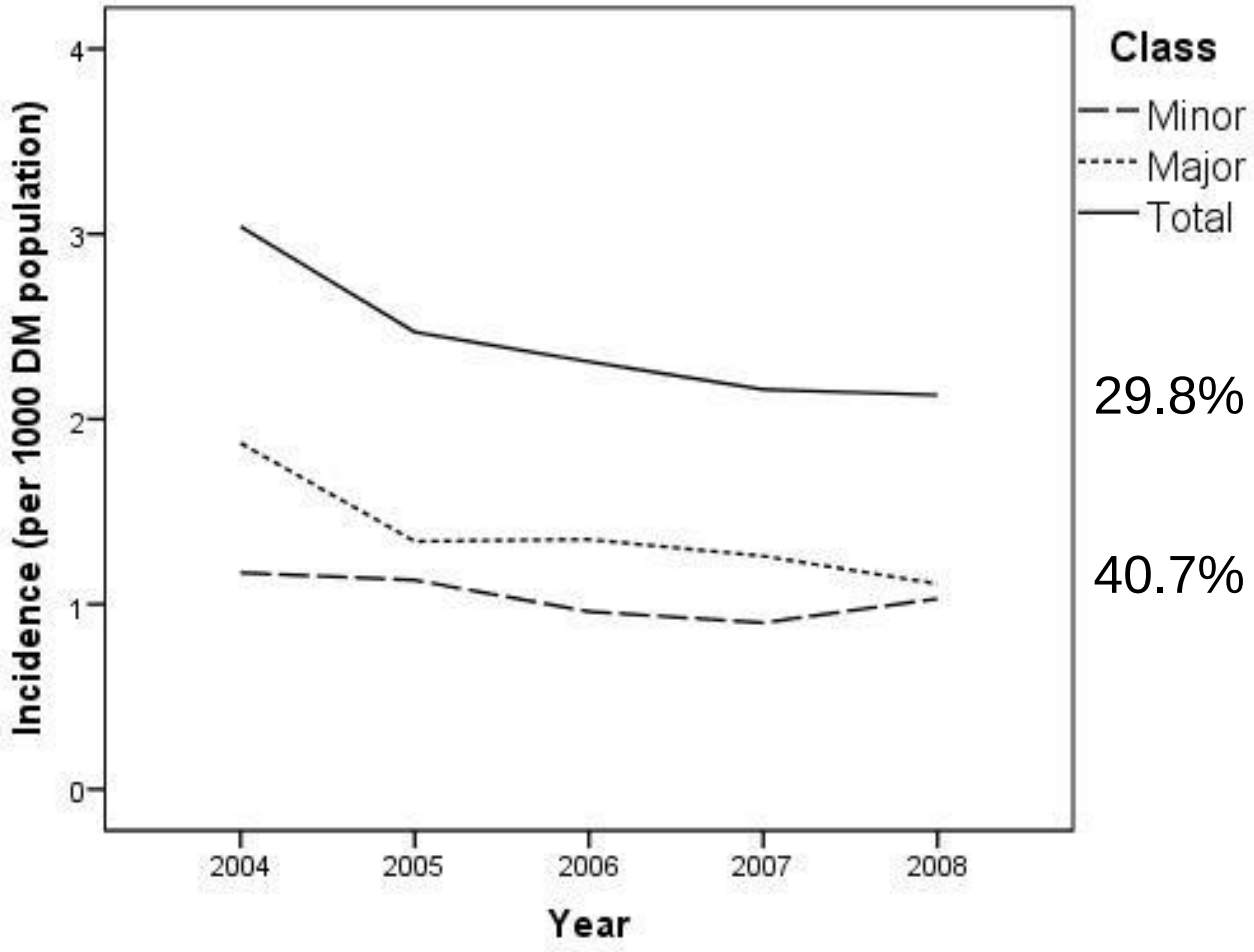
Lower Extremity Amputation Rates in England



Incidence of major & minor
LEA rate: unchanged

Vamos et al *Diabetes Care* 33:2592–2597, 2010

Lower Extremity Amputation Rates in Scotland

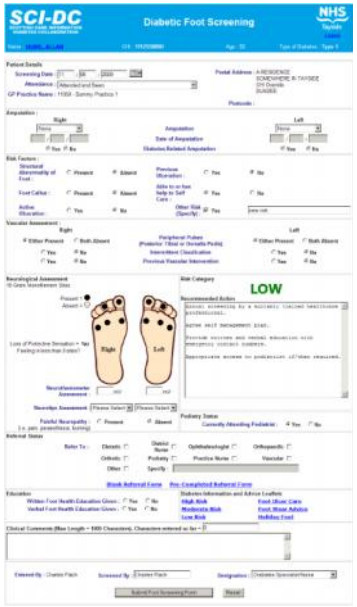


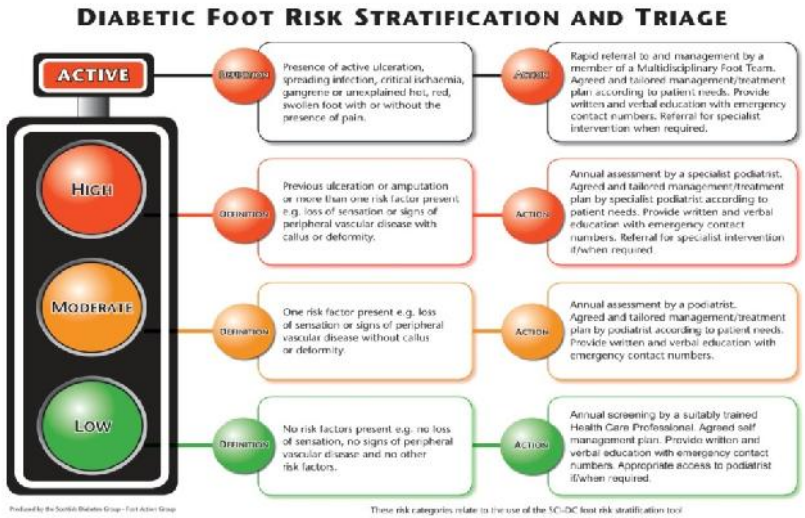
29.8% fall in any LEA $p < 0.001$

40.7% fall in major LEA $p < 0.001$

Kennon et al Diabetes Care 2012, doi: 10.2337/dc12-0511

Reasons for the discrepancy?





- Unified IT system in SCI-diabetes
- Standardised approach to risk stratification and management
- Patient information
- ? Less regional variation
- ? High baseline rate to begin with

Summary

- Diabetes increases the risk of foot ulceration & amputation
- Risk stratification identifies those ‘at risk’
- Immediate referral and review by specialist teams improves outcomes
- Multi-disciplinary foot teams can reduce major amputation rates (& mortality?)
- Acute surgical intervention can save limbs/lives
- Reducing iatrogenic harm for in-patients should be a priority for acute services

DON’T STOP ME NOW

Freddie highlights the importance of holistic care….

Yeah, I'm a rocket ship on my way to Mars
On a collision course
I am a satellite I'm out of control
I am a sex machine ready to reload
Like an atom bomb about to
Oh oh oh oh oh explode

DON'T STOP ME NOW

TIP: Podiatrists are well placed to assess for erectile dysfunction

Acknowledgements

- Diabetes Foot Team
  - Gillian Harkin
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- WESTMARC
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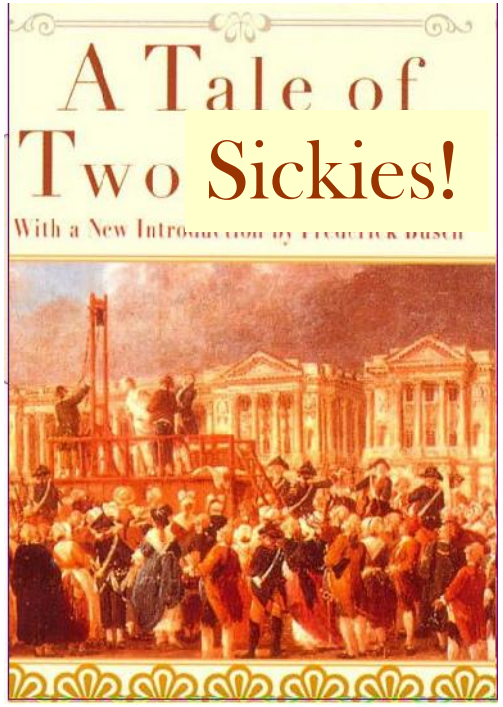
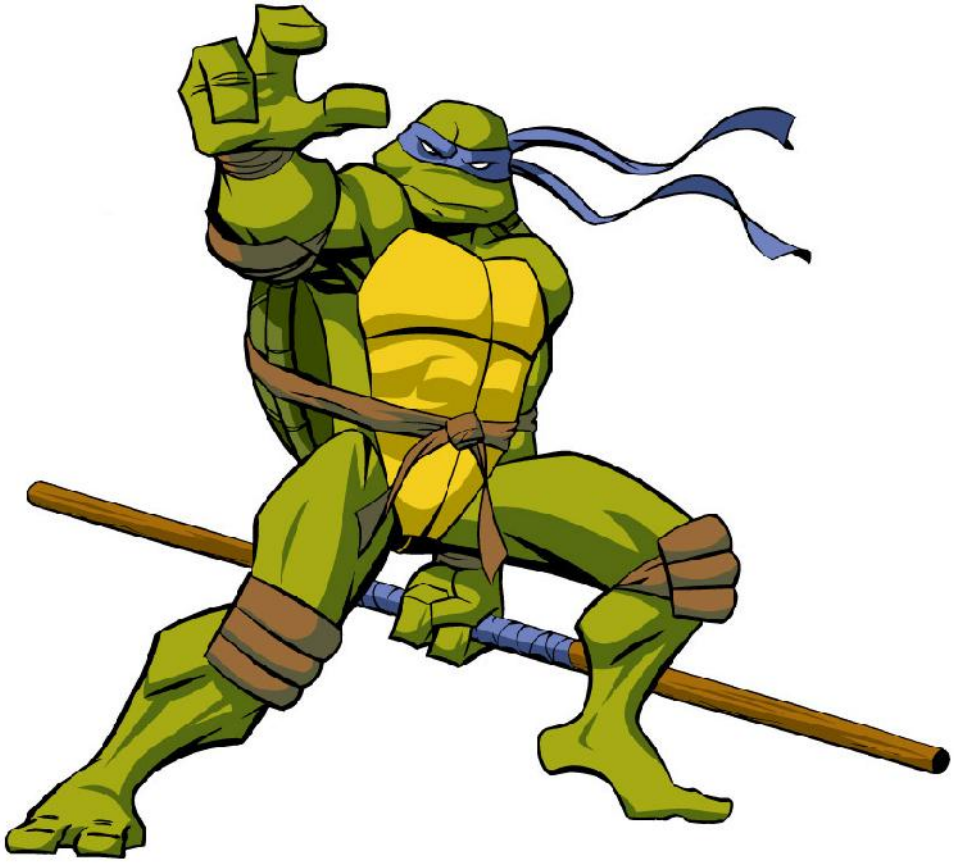
- Scottish Foot Action Group

Can elective amputation be the best therapeutic option?

Case Studies



Case 1



Elective amputation?

Therapeutic Options

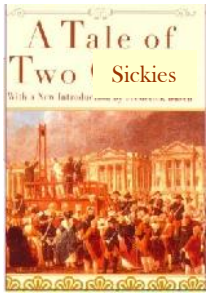
- INFECTION - IV antibiotics
- PRESSURE - Bed rest / Aircast boot
- VASCULAR - PHx angioplasty no further options
- GLYCAEMIA - Very erratic due to illness
- CVS RISK FACTORS – on appropriate treatment
- SURGERY - would mean AKA

Risk v Benefit

Anaesthetic
Immobility
Quality of Life
Stump problems

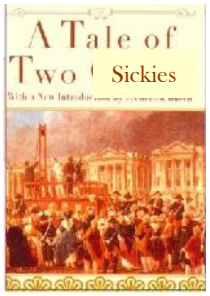
Definitive therapy
? Improve BG
Quality of Life

Elective amputation?



Case 2

- 60 years old lady
- Type 1 DM for 30 years
- PHx Left BKA 1994, PVD, Nephropathy, IHD, Retinopathy
- Presents with a hot red swollen foot
- Absent pulses
- Recurrent neuroischaemic ulcer UoT 3D



Case 2

- Recurrent severe sepsis
- Erratic blood glucose
- Poor appetite

Elective amputation?

Therapeutic Options

- INFECTION - IV antibiotics (venous access very poor)
- PRESSURE - Bed rest & orthosis
- VASCULAR - Severe distal vessel disease
- GLYCAEMIA - Very erratic due to illness
- CVS RISK FACTORS - On appropriate treatment
- SURGERY - Only option BKA (bilateral amputee)

Risk v Benefit

Anaesthetic
Immobility
Quality of Life
Stump problems

Definitive therapy
Improve BG
Quality of Life
Avoid recurrence

Elective amputation?

Factors determining outcome post amputation

- Age
- Activity level pre-op
- Co-morbidities
- Limb length
- Stump problems
- Planning
- Patient motivation

Elective	Emergency
++	+
+	+++
++	+
++	+++
++++	+
+++	+

Case 1

- Father would NOT move house
- Refused an amputation
- Readmitted with overwhelming sepsis
- Developed multi-organ failure
- Died aged 49

Would amputation have improved his mortality?

Statistically a success!!

Case 2

- Right transtibial amputation
- Bilateral amputee
- Independently mobile
- Good diabetes control
- ‘Feels great’
- Just back from Canada…….

A definite statistical failure!

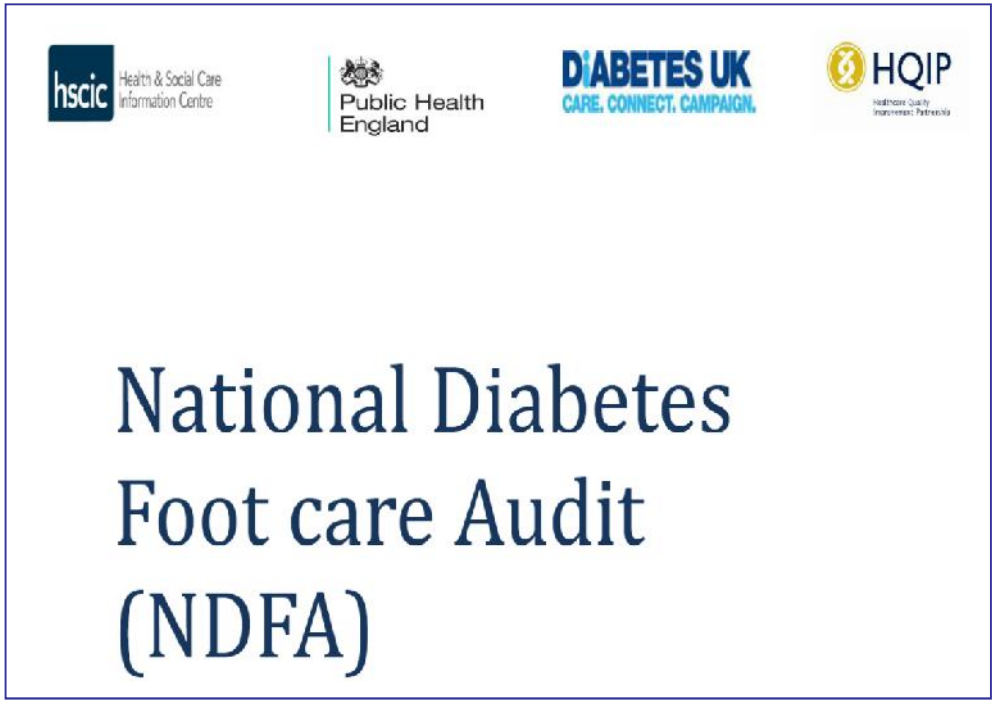
Larvae Therapy

Antimicrobial Activity

- Active removal of bacteria through ingestion and digestion
- Create alkaline wound (pH 8.5) which is an unfavourable environment for bacteria
- Increased irrigation in the wound due to larvae exudate flushes bacteria from site
- Broad spectrum activity: MRSA, Strep. pyogenes and Strep. Pneumoniae, Candida Albicans, Pseudomonas aeruginosa, Enterobacter cloacae, Escherichia coli, varios bacillus strains
- MRSA colonisation was eliminated from 12 of the 13 ulcers (92%)
- Larvae therapy and antibiotics work synergistically

Bowling FL et al Diabtes Care 30:2;2007
Arora S et al Annals of Clin Microbio & Antimicrobials. 2011; 10: 6

Improving Performance



This will assess the:

- Structure
- Process
- Outcomes

Only centres in England & Wales at present