Diabetes Professional Care - DPC

Foot & Wound Clinic

INFECTION

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DPC 2019

NHS

Solent

NHS Trust

Learning Outcomes

- Understand why the foot in diabetes is so vulnerable to infection
- Understand what is mild, moderate and severe infection
- How can you use NEWS2 in the foot in diabetes – what are the limitations
- Understand the significance of Osteomyelitis and the impact on clinical outcomes
- Understand what antimicrobial products can be available to your patients and how to access these
- Understand the significance of the correct identification of infection
- When to refer on and how you would find out to whom to refer to

Amputation and Diabetes

- 85% of amputations start with a single foot ulcer

Ref: https://*www.diabetes.org.uk/resources-s3/2019-02/1362B_Facts%20and%20stats%20Update%20Jan%202019_LOW%20RES_EXTERNAL.pdf*

- Here to aim to improve outcomes

Infection

- **Diabetic foot infections** are perhaps the most common and most limb-threatening infectious complications of systemic disease.

- **Diabetes foot** - Biggest Cause of secondary care admission for Diabetes patients

- As such infection in these patients is best using a **Multi-Disciplinary Team** approach

Infection

https://www.nice.org.uk/guidance/ng19/chapter/Recommendations

Investigation

- 1.6.1 If a diabetic foot infection is suspected and a wound is present, send a soft tissue or bone sample from the base of the debrided wound for microbiological examination. If this cannot be obtained, take a deep swab because it may provide useful information on the choice of antibiotic treatment. [2015]

- 1.6.2 Consider an X ray of the person's affected foot (or feet) to determine the extent of the diabetic foot problem. [2015]

- 1.6.3 Think about osteomyelitis if the person with diabetes has a local infection, a deep foot wound or a chronic foot wound. [2015]

Infection

https://www.nice.org.uk/guidance/ng19/chapter/Recommendations

Investigation

- 1.6.4 Be aware that osteomyelitis may be present in a person with diabetes despite normal inflammatory markers, X rays or probe to bone testing. [2015]

- 1.6.5 If osteomyelitis is suspected in a person with diabetes but is not confirmed by initial X ray, consider an MRI to confirm the diagnosis. [2015]

Infection

Clinically, infections can be classified as :

- ✓ **Localised,**
- ✓ **Spreading and**
- ✓ **Severe.**

Each of these presentations may be complicated by osteomyelitis.

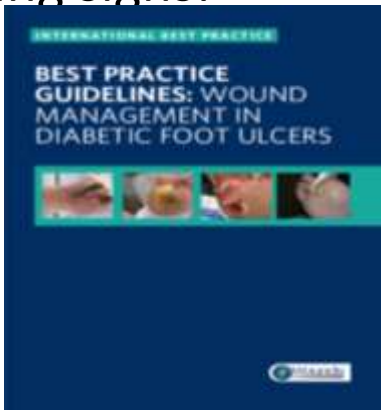
Each of these infections can be caused by Gr +ve; Gr –ve or anaerobic bacteria, singly or in combination.

Occasionally there may be contamination from fungal elements

Infection

Bacteriological swabs should only be taken when there is clinical evidence of infection in a wound

Superficial tissue lesion with at least two of the following signs:



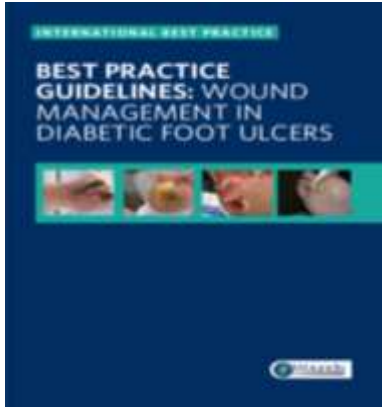
— **Local warmth**
— **Erythema >0.5–2cm around the ulcer**
— **Local tenderness / pain**
— **Local swelling / induration**
— **Purulent discharge**

- Other causes of inflammation of the skin must be excluded

Infection

TABLE 2: Classification and severity of diabetic foot infections (adapted from[46])

Clinical criteria	Grade/severity
No clinical signs of infection	Grade 1/uninfected
Superficial tissue lesion with at least two of the following signs: — Local warmth — Erythema >0.5–2cm around the ulcer — Local tenderness/pain — Local swelling/induration — Purulent discharge Other causes of inflammation of the skin must be excluded	Grade 2/mild
Erythema >2cm and one of the findings above or: — Infection involving structures beneath the skin/ subcutaneous tissues (eg deep abscess, lymphangitis, osteomyelitis, septic arthritis or fascitis) — No systemic inflammatory response (see Grade 4)	Grade 3/moderate
Presence of systemic signs with at least two of the following: — Temperature >39°C or <36°C — Pulse >90bpm — Respiratory rate >20/min — $PaCO_2$ <32mmHg — White cell count 12,000mm^3 or <4,000mm^3 — 10% immature leukocytes	Grade 4/severe



Infection

- Antibiotics / resistance
- MDT – review fast
- Admit in to hospital – clear pathways

Management Identifying

- Post cleansing of wound
- Deep as possible tissue sample or bone
- Deep as possible wound swab in the absence of tissue
- Swab prior to commencing antibiotics at first contact if infection diagnosed/ suspected or as close to the start of commencement of antibiotics
- % will come back with no data

Management
Antibiotics

<u>Treat aggressively with antibiotic therapy:</u>

- ***Follow your Local antibiotic guidelines***

General principles:

- Localised infection with limited cellulitis – oral antibiotics (OP basis with regular monitoring for clinical response); signs of infection can be diminished in the presence of signs of neuropathy, ischaemia
- Spreading infection – systemic antibiotics
- Severe deep infection-urgent admission to hospital for broad-spectrum IV antibiotics

Antibiotics and infection

Types of bacteria
Gram +
Gram -
Anaerobic
Atypical

The 4 Rs	
Right Organism	**Identify from swab / clinical signs**
Right Antibiotic	
Right Duration	**7 days then review**
Right Dose	**BMI (30 plus)**

	SINBAD 0-6
S	Site
I	Ischaemic
N	Neuropathy
B	Bacterial
A	Area
D	Depth

TEXAS	0	I	II	III
A	Pre or post	Superficial **not** to tendon / capsule or bone	Tendon / capsule but **not** bone	Probe to bone
B	**Infected**	**Infected**	**Infected**	**Infected**
C	Ischaemic	Ischaemic	Ischaemic	Ischaemic
D	**Ischaemic & infected**	**Ischaemic & infected**	**Ischaemic & infected**	**Ischaemic & infected**

SINBAD

Jeffcoate et al

SINBAB	0	1	Score
Site	Forefoot (0)	Rearfoot (1)	0 /1
Ischaemia	At least on Pedal pulse (0)	Clinical evidence of reduced blood supply (1)	0 /1
Neuropathy	Intact (0)	Not intact 8/10 and less (1)	0 /1
Bacterial Load	None (0)	Present (1)	0 /1
Area	Ulcer < 1cm2 (0)	> 1cm2 (1)	0 /1
Depth	Texas 0 or 1 (0)	2 or 3 (1)	0 /1

SINBAD score	Time to Heal
0-2 (Moderate)	**Up to 77 days (£4,000 per annum)**
3-6 (Severe)	**126-577 days (£17,000 per annum)**

Diabetic Foot Classification

TEXAS	0	I	II	III
A	Pre or post ulceration	Superficial *not to tendon / capsule or bone*	Tendon / capsule *but not bone*	Probe to bone
B	Infected	Infected	Infected	Infected
C	Ischaemic	Ischaemic	Ischaemic	Ischaemic
D	Ischaemic & infected	Ischaemic & infected	Ischaemic & infected	Ischaemic & infected

12 signs of infection

Classic Signs of infection

- Erythema,
- Oedema,
- Heat,
- Pain

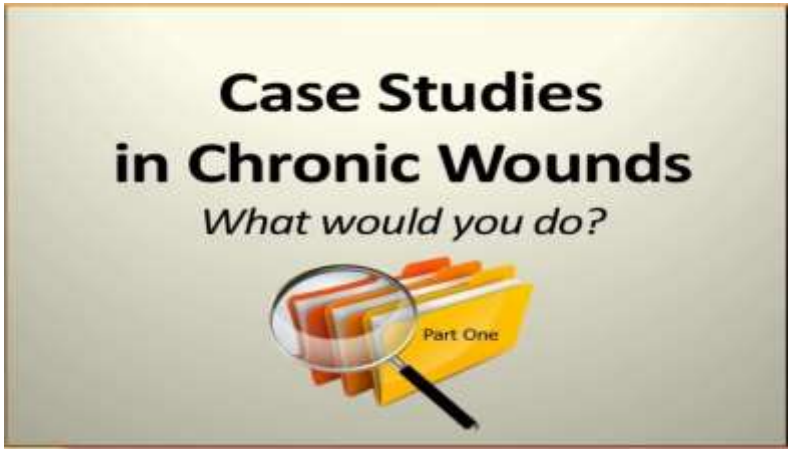
Signs of inflammation plus

- Purulent exudate

Signs specific to Chronic wounds

- Serous exudate,
- Delayed healing,
- Friable granulation tissue,
- Discoloured granulation tissue,
- Foul odour,
- Pocketing of the wound base,
- Wound Breakdown

Chronic Wounds



Four main groups of bacteria

Types	Stain

Four main groups of bacteria

Types

1. Gram positive
2. Gram negative
3. Anaerobes
4. Atypical

Stain

Four main groups of bacteria

Types

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Stain

- Gram +ve (blue/purple) - Thick peptidoglycan cell wall retains primary stain
- Gram -ve (pink/red) - Thin peptidoglycan cell wall does not retain primary stain

Helpful……

Patient risk/ Pathogen group	•Mild-to-moderate infection •No prior antibiotics •No recent healthcare exposure •No history of multi-resistant pathogens	•Severe or life-threatening infection •Prior antibiotics •Healthcare exposure •History of multi-resistant pathogens
Gram +ve	**Flucloxacillin or Doxycycline**	Vancomycin or Linezolid (MRSA cover)
Gram –ve	**Doxycycline or** Ciprofloxacin or Co-amoxiclav	Gentamicin or Pip-taz
Anaerobe	**Metronidazole** (**or** Co-amoxiclav	Metronidazole or Pip-taz
Atypical	**Doxycycline or Clarithromycin**	IV Clarithromycin or Ciprofloxacin

Patients with Diabetes

Example of Empirical 1st line

- First Line**: Flucloxacillin 1000mg QDS** and **Metronidazole 400mg TDS** for 7 days
- If penicillin allergic OR known to be infected/colonised with MRSA within the last year: **Doxycycline 100mg BD** and **Metronidazole 400mg TDS** for 7 days

Generic Problems with Antibiotics

- Local and pandemic microbiological resistance
- Interactions
- Side effects & Clostridium Difficile

Antibiotics Side Effects: Organs?

- Gut: eg: nausea, vomiting, diarrhoea
- Liver eg:
  - enzyme inducers (Rifampicin)
  - Cholestasis (Fluclox)
  - Antibuse effect (Metronidazole)
- Kidney
- MSS eg tendons eg: fluoroquinolones
- Reproductive? eg COC
- Neuro: headaches
- Skin eg: rashes
- Respiratory: allergy
- Immune: reactions etc
- Others? Change in advice re antibiotics and COC

Good holistic history

- Podiatric problem
- Health history and co-morbidities
- Liver and kidney function
- Medicines inc OTC
- Allergies
- Alcohol, smoking etc

What will be the general impact of antibiotics on this person?

Safe Approach

- Don’t use unless necessary
- Use minimum dose necessary but an adequate dose and duration
- Use as narrower spectrum as possible
- Informed targeting where possible
- Think interactions and side effects
- South Central Antibiotic Guidelines

Empirical

- **Empiric** therapy or **empirical** therapy is therapy based on experience and, more specifically, therapy begun on the basis of a clinical educated guess in the absence of complete or perfect information.
- The name shares the same stem with **empirical** evidence, involving an idea of practical experience

Interactions: Information?

- PGD information
- EMC website https://www.medicines.org.uk/emc
- E system alerts?
- BNF, e BNF interaction pages
- cBNF
- Manufacturer's info
- Stockley etc

Prescribe the right drug, right dose, right duration

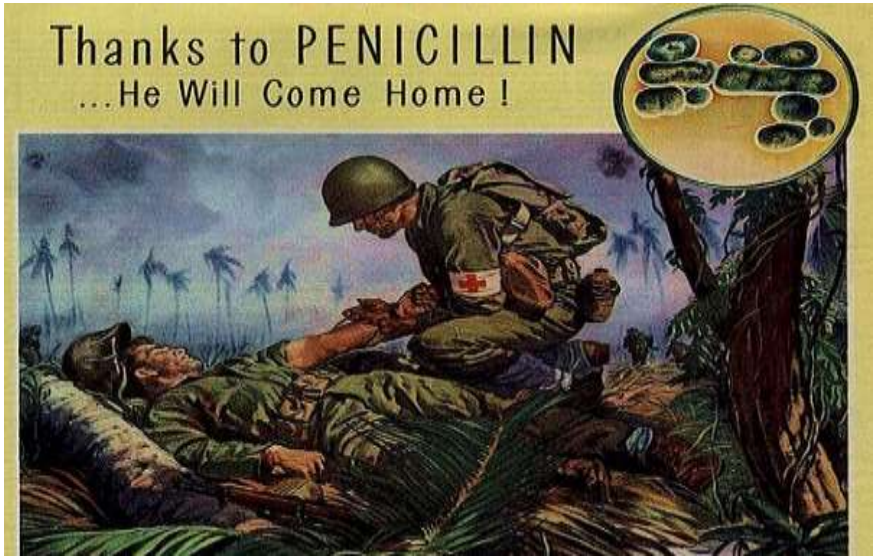
- Try to avoid collateral damage to normal flora by targeting likely pathogens with narrow-spectrum agents (local guidelines)
- Use an adequate dose for the patient based on age, weight and organ function
- Don’t treat for longer than necessary to reduce the risk of selecting out multi-resistant pathogens

4 Cs – high risk for C Diff

- Co-amoxiclav
- Clindamycin
- Ciprofloxacin
- Cephalosporins

Antibiotic Resistance

- Antibiotic resistance in bacteria spreads at three levels:
- Transfer of bacteria between people;
- Genetic mechanisms;
- Biochemical mechanisms.



Oral or IV?

SINBAD

Jeffcoate et al

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D	Ischaemic & infected	Ischaemic & infected	Ischaemic & infected	Ischaemic & infected

Osteomyelitis

Osteomyelitis

Osteomyelitis

Osteomyelitis

Debride?

Osteomyelitis


10.18.2018 10:07

Friday 19th Oct

20th Oct 2018

NEWS2
National Early Warning Score

In severe infection, the patient has systemic toxicity or metabolic instability (eg fever, chills, tachycardia, hypotension, confusion, vomiting, leucocytosis, acidosis, severe hyperglycaemia)

NEWS2
National Early Warning Score

National Early Warning Score (NEWS2)

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Royal College of Physicians

NEWS2
National Early Warning Score

Score 5 and above – refer to A&E for Medical Management

SBAR - Communication

- ❑ Situation
- ❑ Background
- ❑ Assessment
- ❑ Recommendation

NEWS2
National Early Warning Score

Score 5 and above – refer to A&E for Medical Management

Reassessment

1.6.14 When microbiological results are available:

- review the choice of antibiotic and
- change the antibiotic according to results, using a narrow-spectrum antibiotic, if appropriate. [2019]

1.6.15 Reassess people with a suspected diabetic foot infection if symptoms worsen rapidly or significantly at any time, do not start to improve within 1 to 2 days, or the person becomes systemically very unwell or has severe pain out of proportion to the infection. Take account of:

- other possible diagnoses, such as pressure sores, gout or non-infected ulcers
- any symptoms or signs suggesting a more serious illness or condition, such as limb ischaemia, osteomyelitis, necrotising fasciitis or sepsis
- previous antibiotic use. [2019]

Reassessment

Prevention

1.6.16 Do not offer antibiotics to prevent diabetic foot infections. Give advice about seeking medical help if symptoms of a diabetic foot infection develop. [2019]

Thank you