Doncaster and Bassetlaw Hospitals NHS
NHS Foundation Trust

Skin and Soft Tissue Infection Guideline, including Diabetic Foot Ulcer Infection

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Amendment Form

Version	Date	Brief Summary of Changes	Author
2	March 2016	Revised guidelines	Dr Ken Agwuh
1	October 2012	New guidelines	Dr Ken Agwuh Dr John Hosker

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1. INTRODUCTION

Cellulitis:

- Is an infection of the deeper layers of the skin including the subcutaneous tissues
  - Usually acute in presentation
  - Main causative agents include Staphylococcus aureus and Beta haemolytic streptococcus, such as Groups A, B, C and G streptococcus.
- Clinical findings:
  - Skin is very red,
  - Hot/warm to touch,
  - Swollen, may be associated with blisters, or pyrexia.
  - The borders of cellulitis are not well demarcated or elevated as in erysipelas.
- Investigations:
  - Send deep swab for cultures if area of cellulitis on the skin is associated with skin ulcer, laceration/puncture wounds, and blisters.
  - Blood cultures x2 sets if temperature less <36 or >38° C
  - Inflammatory markers CRP/WBC
- Management:
  - Mark area of redness on skin (this will help with review of clinical progress)
  - Start empirical antibiotic as stated in table.
  - Consider switch to oral antibiotic with good clinical response.
  - Review antibiotics at day 5, can extend if not fully resolved.

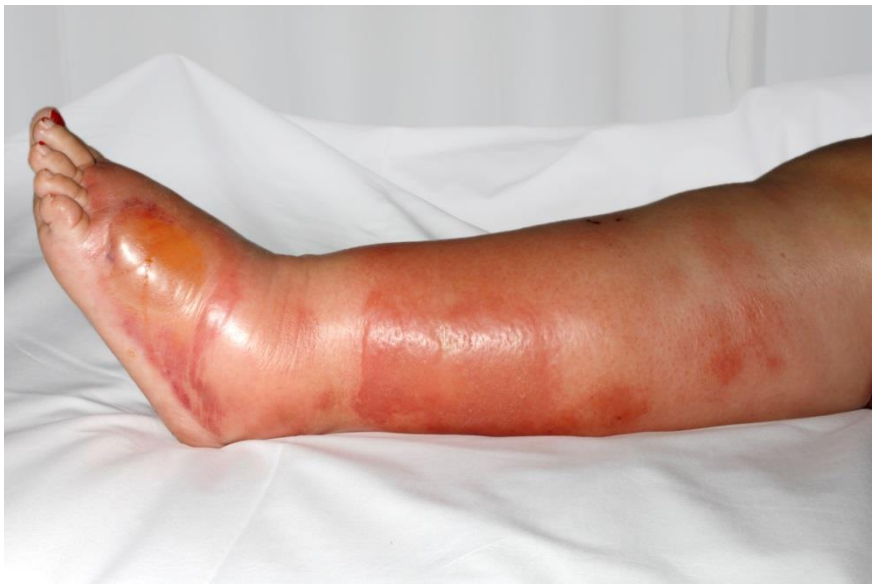

Fig 1: Cellulitis of the left leg associated with oedema and blister.

2. RISK FACTORS

Risk Factors	Organism(s)
MRSA colonisation	Meticillin-resistant *Staphylococcus aureus*
Animal bite (e.g. cat, dog)	*Pasteurella multocida, Capnocytophaga canimorsus*
Human bite	*Eikenella corrodens*, anaerobes
Intravenous drug abuse	*Staphylococcus aureus*, Streptococcus sp, Anaerobes (Clostridium), Gram negatives
Sea or fresh water exposure	*Vibrio vulnificus* (sea water) *Aeromonas hydrophila* (fresh water)
Fish tank water exposure	*Mycobacterium marinum*

The choice of antimicrobial therapy may be guided by:

- History of presenting complaint
  - Acute or chronic
  - Circumstances surrounding the development of the skin & soft tissue infection (SSTI)

- Significant past medical history,
  - Diabetes,
  - Immunocompromised state,
  - Similar presentation with SSTI previously etc.

- Recent antimicrobial history within the last one month

- Previous or recent positive microbiology results

3. NECROTISING FASCIITIS:

This is an uncommon severe infection involving the subcutaneous tissues and the fascia. It affects mainly the extremities but can occur in any part of the body.
The infection spreads rapidly and is associated with a high mortality, as a result early surgery is essential to establish the diagnosis and debride infected and necrotic tissues.

Classification:

Necrotising fasciitis can be categorised into 2 groups

- **Type 1** is a mixed infection including anaerobes, gram negative organisms and gram positive organisms. Mostly occurs in immunocompromised individuals. Typically occurs in the perineum and trunk, and
- **Type 2** is mainly due to Group A streptococcus with or without Staphylococcus aureus. This is less common than the type 1. Typically occur in the limbs and affects healthy individuals, with often associated history of trauma (usually minor).

Presentation:

The most common presentation for necrotising fasciitis include:

- Evidence of skin infection, erythema and or vesicles;
- A woody feel to tissues and crepitus that often appears late in the progression of the disease;
- Fever, rigors, nausea, vomiting or septic shock in a patient with an obvious skin infection;
- Severe pain and systemic features of infection
- Complaints of pain out of proportion to the clinical findings.
- Laboratory findings include rising CRP, WBC, and elevated serum creatinine kinase (CK) levels.

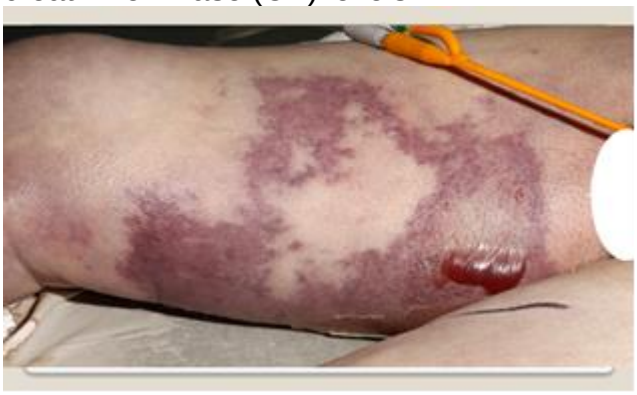

Fig 2: area of erythema with vesicles in a patient with necrotising fasciitis

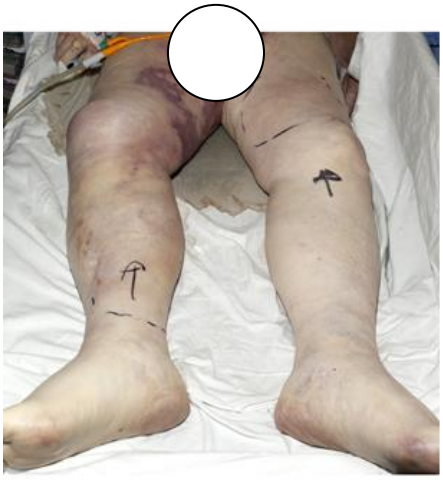

Fig 3: Woody feel and crepitus in late progressive necrotising fasciitis

Management:

- If necrotising fasciitis is suspected the patient must be referred for **IMMEDIATE** review by a senior clinician, as this is a rapidly progressing, life threatening infection.
- Surgical exploration is essential to definitively establish the diagnosis from other entities, also in obtaining samples for culture to identify the pathogen involved and as part of treatment, which consist of wide debridement of skin, subcutaneous tissue, fascia and any necrotic muscle, and may require multiple debridements. The use of antibiotics without debridement is associated with mortality rate approaching 100%.
- Discuss with microbiologist if the region involved includes the perineum, scrotum (as in Fournier's gangrene) or if there is risk of polymicrobial involvement.
- Blood cultures are positive in about 60% and 20% of type 2 and type 1 necrotising fasciitis respectively.

4. EMPIRICAL ANTIBIOTIC GUIDE FOR SKIN AND SOFT TISSUE INFECTION:

CLINICAL CONDITION	FIRST LINE	PENICILLIN ALLERGY
Mild to moderate cellulitis	oral Flucloxacillin 500mg - 1gm, 6 hourly	oral Clarithromycin 500mg 12 hourly
Moderate to severe cellulitis	iv Flucloxacillin 1gm-2gm, 6 hourly**(discuss with Microbiologist if Ceftriaxone is indicated)**	iv Clindamycin 600mg - 1.2gm, 6 hourly
Erysipelas and impetigo	oral Flucloxacillin 500mg - 1gm, 6 hourly (consider iv if severe)	oral Clarithromycin 500mg 12 hourly
Necrotising fasciitis: (see notes under classification above) **Type 1**	iv Piperacillin/tazobactam 4.5gm 8 hourly AND iv Clindamycin 1.2gm 6 hourly	Contact Microbiologist
Type 2	iv Benzyl Penicillin 1.2 - 2.4gm 6 hourly AND iv Clindamycin 1.2gm 6 hourly	Contact Microbiologist
Cellulitis / Erysipelas / Impetigo associated with MRSA colonisation	iv Vancomycin (refer to Trust policy) OR Discuss alternative with microbiologist	If allergic to Vancomycin, discuss alternative with microbiologist
Cellulitis associated with bite (e.g. Human, dog, cat)	iv Co-Amoxiclav 1.2gm, 8 hourly OR oral Co-Amoxiclav 625mg, 8 hourly if mild to moderate	oral Ciprofloxacin 500mg, 12 hourly + oral Clindamycin 300mg-450mg, 6 hourly
Intravenous Drug Abuser (with associated abscess)	iv Flucloxacillin 1gm-2gm, 6 hourly AND oral Metronidazole 400mg 8 hourly, OR oral Flucloxacillin 500mg-1gm, 8 hourly AND oral Metronidazole 400mg 8hourly	iv Cefuroxime 750mg -1.5gm 8hrly AND iv Metronidazole 500mg 8hrly OR oral Clindamycin 450mg 6hrly (monotherapy)
Cellulitis associated with sea or fresh water contact	Contact Microbiologist	Contact Microbiologist
Cellulitis associated with fish tank water exposure	Contact Microbiologist	Contact Microbiologist
Orbital cellulitis	iv Cefotaxime 1-2gm 6 hourly.	Contact Microbiologist

6. EMPIRICAL ANTIBIOTIC GUIDE FOR INFECTED DIABETIC FOOT ULCER:

INFECTION	FIRST LINE	PENICILLIN ALLERGY
Mild to moderate infected foot ulcer	iv Flucloxacillin 1-2gm 6 hourly with oral Metronidazole 400mg 8 hourly	iv Clindamycin 600mg 6 hourly (monotherapy) OR oral Clarithromycin 500mg bd with oral Metronidazole 400mg 8 hourly
Severe infected foot ulcer	iv Co-Amoxiclav 1.2gm 8 hourly OR oral Co-Amoxiclav 625mg 8 hourly	iv Clindamycin 600mg - 1.2gm 6 hourly OR oral Clindamycin 450mg 6 hourly
Clinical evidence of osteomyelitis at site of foot ulcer (in mild to severe foot ulcer)	iv Flucloxacillin 1-2gm 6 hourly AND oral Fusidic acid 500mg 8 hourly. Discuss duration with microbiologist	iv Clindamycin 600mg – 1.2gm 6 hourly AND oral Fusidic acid 500mg 8 hourly
History of positive MRSA from foot ulcer swab/tissue sample (in mild to severe cases)	Treat based on sensitivity result from swab/tissue samples	Discuss with Microbiologist

Infected Diabetic foot ulcer- management includes:

- Sepsis screen (send deep swabs/tissues for cultures), and blood cultures if temperature spike present, before starting antibiotics
- Antimicrobial therapy (duration will depend on depth and severity of infection). Review antimicrobial choice with culture results
- Surgical debridement (liaise with vascular or orthopaedic team)

NOTE: Never use Fusidic acid on its own

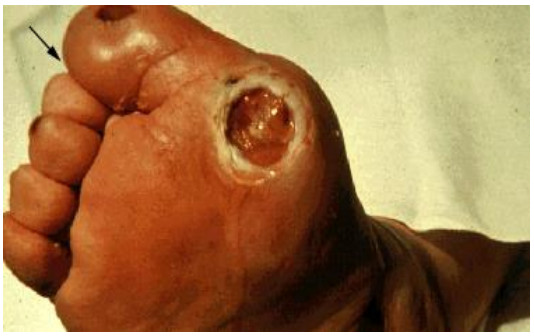

Fig 4: Diabetic foot ulcers

6. REFERENCES

- **Mandell, Douglas, and Bennett's principle and practice of infectious diseases edited by G.L Mandell, J.E Bennett, R Dolin. 7th ed**

- **Anaya D A, Dellinger E P: Necrotising soft tissue infection, diagnosis and management. Clin Infect Dis 2007; 44(5): 705**

- **Wong C H, Chang H C et al. : Necrotising fasciitis: clinical presentation, microbiology, and determinants of mortality. J bone joint Am 2003; 85-A(8): 1454**

- **Stevens D L et al. IDSA guideline: practice guidelines for the diagnosis and management of skin and soft-tissue infections. CID 2005:41**