DIABETIC FOOT INFECTION

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- Careful attention to properly diagnosing the condition
- Obtaining appropriate specimens for culture
- Thoughtfully selecting antimicrobial therapy
- Quickly determining when surgical interventions are required
- Providing any needed additional wound and overall patient care

Infected (IWGDF classification)

- At least two of these items are present:
- Local swelling or induration
- Erythema >0.5 cm around the wound
- Local tenderness or pain
- Local increased warmth
- Purulent discharge
- And
- No other cause(s) of an inflammatory response of the skin (eg, trauma, gout, acute Charcot neuro-osteoarthropathy, fracture,thrombosis, or venous stasis)

Mild infection

- Infection with no systemic manifestations
- Involving only the skin or subcutaneous tissue (not any deeper tissues)

  and

- Erythema does not extend >2 cm around the wound

Moderate infection

- Infection with no systemic manifestations
- Erythema extending ≥2cm from the wound margin
- Tissue involvment deeper than skin and subcutaneous tissues:

  (eg, tendon, muscle, joint, and bone,)

Sever infection

- Any foot infection with associated systemic manifestations (of the systemic inflammatory response syndrome [SIRS])
- As manifested by ≥2 of the following:
- Temperature, >38 or <36 C
- Heart rate, >90 beats/min
- Respiratory rate, >20 breaths/min or $PaCO_2$< (32mmHg)
- White blood cell count >12 000/mm or <4000/mm
- or >10% immature (band) forms

IWGDF classification

- Infection involving bone (osteomyelitis)

Anti microbial therapy

Most diabetic foot infections are polymicrobial, with up to five to seven different specific organisms often involved. The microbiology of diabetic foot wounds is variable depending on the extent of involvement

- **Cellulitis or mildly infected ulcers:**

  S. aureus and β-hemolytic streptococci

- **More chronic lesions and those previously treated with antibiotics:**

  may also contain Enterobacteriaceae

  or nonenteric gram-negative bacilli such as *P. aeruginosa*

  or both.

- **Malodorous wounds:**

  anaerobic pathogens

- **Chronic refractory ulcers, especially if associated with gangrene:**

  wide variety of microorganisms, including the previously mentioned pathogens as well as

  enterococci, diphtheroids, anaerobes, and even fungi.

IV or Oral?

- For mild and most moderate infections, treatment with well-absorbed oral antibiotic agents is generally effective.
- In patients with a more severe infection (some classification 3 and most 4), initial parenteral antibiotic therapy is to achieve immediate high serum levels, but can usually be switched to oral within a week.

Empiric therapy:

- Should be based on the clinician's best guess at the likely causative pathogen(s)

  and

- Local antibiotic susceptibilities

  along

- with a variety of other factors:

1.history of drug allergies, recent hospitalization

2. patient co-morbidities [e.g., renal dialysis]

3. likelihood of adverse events or potential drug interactions

4. availability and cost of various agents

In light of the complexity and often polymicrobial nature of DFI

- Definitive treatment should especially be based on principles of

1 .antibiotic stewardship:

- (a regimen with the narrowest spectrum, shortest duration, fewest adverse effects,and safest and least expensive route).

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Topical antibiotics

- Treatment with topical antimicrobial therapy has many theoretical advantages
- no published studies support treating either mild infections (with topical therapy alone) or moderate infections (with topical therapy adjunctive to systemic antibiotics)
- Pexiganan (an antimicrobial peptide) or with the gentamicin-collagen sponge failed to demonstrate superiority to standard of care alone.

Biofilm

- Recent studies suggest that many (perhaps most) DFIs are caused by bacteria in a biofilm mode, although biofilm infection is difficult to diagnose clinically.
- Pathogens in biofilm, compared with planktonic, infections are more difficult to treat
- some antibiotics (eg, rifampicin, daptomycin, and fosfomycin) appear to be more effective for biofilm infection than others.

Mild DFI:

- For patients who have not recently received antibiotic therapy and who reside in a temperate climate area, target empiric antibiotic therapy at just aerobic gram-positive pathogens (beta-haemolytic streptococci and S aureus) in.
  (Strong; low)

1. moderate or severe infection
2. severely ischemic affected limb
3. who haven been treated with antibiotic therapy within a few weeks
4. For patients residing in a tropical/subtropical climate

- selecting an empiric antibiotic regimen that covers gram-positive pathogens, commonly isolated gram-negative pathogens, and possibly obligate anaerobes in cases of moderate to severe DFIs.
- Then, reconsider the antibiotic regimen based on both the clinical response and culture and sensitivity results. (Weak; low)

Pseudomonas aeruginosa

- Empiric treatment aimed at Pseudomonas aeruginosa is not usually necessary in temperate climates, but consider it if P aeruginosa has been isolated from cultures of the affected site within the previous few weeks, or in tropical/subtropical climates (at least for moderate or severe infection).
- (Weak; low)

- Obligate anaerobes can play a role in a DFI, especially in ischemic limbs and in case of abscesses.
- Empiric treatment of these pathogens, eg, with an imidazole (metronidazole), or beta-lactam with beta-lactamase inhibitor, should be considered for a DFI associated with ischemia or a foul-smelling discharge.
- Some newer cephalosporins (combined with enzyme inhibitors)and fluoroquinolones have activity against most obligate anaerobes, which might preclude the need for combining them with anti-anaerobic agents.

Do not treat clinically uninfected foot ulcers with systemic or local

antibiotic therapy with the goal of reducing the risk of infection or

promoting ulcer healing.

(Strong; low)

TABLE 4 Factors to consider in selecting an empiric antibiotic regimen for diabetic foot infections [a]

Infection severity	Additional factors	Usual pathogen(s)[c]	Potential empirical regimens[d]
Mild	No complicating features	GPC	S-S pen; first gen ceph
	ß-lactam allergy or intolerance	GPC	Clindamycin; FQ; T/S; macrolide; doxy
	Recent antibiotic exposure	GPC + GNR	ß-L-ase-1; T/S; FQ
	High risk for MRSA	MRSA	Linezolid; T/S; doxy; macrolide
Moderate or severe[e]	No complicating features	GPC ± GNR	ß-L-ase 1; second/third gen ceph
	Recent antibiotics	GPC ± GNR	ß-L-ase 2; 3rd gen ceph; group 1 carbapenem (depends on prior therapy; seek advice)
	Macerated ulcer or warm climate	GNR, including *Pseudomonas*	ß-L-ase 2; S-S pen + ceftazidime; S-S pen + cipro; group 2 carbapenem
	Ischaemic limb/necrosis/gas forming	GPC ± GNR ± Anaerobes	ß-L-ase 1 or 2; group 1 or 2 carbapenem; 2nd/3rd gen ceph + clindamycin or metronidazole
	MRSA risk factors	MRSA	Consider adding, or substituting with, glycopeptides; linezolid; daptomycin; fusidic acid T/S (±rif)[b]; doxycycline
	Risk factors for resistant GNR	ESBL	Carbapenems; FQ; aminoglycoside and colistin

Diabetes and osteomyelitis

- Is nonsurgical (antibiotic only) treatment , safe and effective as surgical treatment?
- In a patient with diabetes and uncomplicated forefoot osteomyelitis, for whom there is no other indication for surgical treatment, consider treating with antibiotic therapy without surgical resection of bone.
- In a patient with probable diabetic foot osteomyelitis with concomitant soft tissue infection, urgently evaluate for the need for surgery as well as intensive post-operative medical and surgical follow-up.

- Treat diabetic foot osteomyelitis with antibiotic therapy for no longer than 6 weeks.
- If the infection does not clinically improve within the first 2 to 4 weeks, reconsider the need for collecting a bone specimen for culture, undertaking surgical resection, or selecting an alternative antibiotic regimen.
- Treat diabetic foot osteomyelitis with antibiotic therapy for just a few days if there is no soft tissue infection and all the infected bone has been surgically removed.

In a person with diabetes and a foot infection, does the addition of any specific adjunctive treatment to systemic antibiotic therapy improve resolution of clinical findings of infection or accelerate ulcer healing?

- hyperbaric oxygen therapy (HBOT) or topical oxygen therapy as an adjunctive treatment (weak, low)
- do not use adjunctive granulocyte colony stimulating factor treatment (Weak; moderate)
- do not routinely use topical antiseptics, silver preparations, honey,
- bacteriophage therapy,
- or negative pressure wound therapy (NPWT). (Weak; low)