Diabetic Foot Infections

RISK FACTORS ASSOCIATED WITH DIABETIC FOOT INFECTIONS

- Ulceration for > 30 days
- Recurrent foot ulcers
- Traumatic wound
- Severe peripheral vascular disease (PVD) in the affected limb (ABI < 0.4)
- Prior amputation
- Neuropathy
- End-stage renal disease (ESRD)

CLASSIFICATION AND ETIOLOGIC AGENTS

STAGE	Clinical features	Etiologic agents
MILD	Ulcer with superficial (skin and subcutaneous) inflammation; non-purulent cellulitis; non-limb threatening	*Usually monomicrobial:* Streptococci, *S. aureus*
MODERATE	Ulcer with inflammation extending into fascia and/or risk of osteomyelitis, but no systemic inflammatory response signs (SIRS)	*Can be polymicrobial:* Streptococci, *S. aureus* +/- gram-negative bacilli (generally aerobic)
SEVERE	Extensive inflammation, deep tissue invasion + SIRS (systemic toxicity) +/- severe hyperglycemia	*Usually* polymicrobial: Streptococci, *S. aureus*, gram-negative bacilli, anaerobes

DIAGNOSTIC CONSIDERATIONS

- Exclude other causes of inflammatory response of skin: trauma, gout, venous stasis, thrombosis, acute Charcot neuro-arthropathy
- Limb ischemia/dry gangrene can present with skin discolouration, fetid odour, friable tissue, undermining of wound edges, failure to heal – vascular consultation may be needed to differentiate from severe diabetic foot infection
- **Consider diabetic osteomyelitis if:** Probe to bone positive, and/or ulcer area > 2 cm^2, and/or abnormality on X-ray, "sausage digit"; MRI is best imaging modality for diagnosis of osteomyelitis

SIRS DEFINED AS PRESENCE OF ≥ 2 OF THE FOLLOWING

- Temperature > 38°C or < 36°C
- Heart rate > 90/min
- Respiratory rate > 20/min or $PaCO_2$ < 32 mmHg
- WBC > 12,000 or < 4,000 cells/µL (or > 10% immature (band) forms)

EMPIRIC PHARMACOLOGICAL THERAPY[1]

STAGE	THERAPY	DURATION
Ulcer only (no inflammation)	**No antimicrobials**	
MILD *If low suspicion for drug-resistant organisms, wound culture is often unnecessary*	**Cefadroxil** 1 g PO BID OR **Cefazolin** 2 g IV q8h (if cannot tolerate PO) **If severe (type 1) allergy to β-lactam:* Clindamycin 450 mg PO QID or 600 mg IV q8h (if cannot tolerate PO)	1-2 weeks (until resolution of infection, not until complete wound healing)
MODERATE *Obtain cultures of inflamed ulcer or pus*	**Ceftriaxone** 2 g IV q24h **If severe (type 1) β-lactam allergy:* Moxifloxacin 400 mg PO (IV if unable to tolerate PO) q24h *If MRSA suspected[2]:* add vancomycin[3] 15 mg/kg IV q12h	2-4 weeks (until resolution of infection, not until complete wound healing)
SEVERE *Obtain cultures of inflamed ulcer or pus*	**Consult Infectious Diseases** **Piperacillin-tazobactam** 4.5 g IV q8h + **vancomycin[3]** loading dose 25 mg/kg then 15 mg/kg IV q 12h **If severe (type 1) allergy to β-lactam:* Ciprofloxacin 400 mg IV q12h + metronidazole 500 mg IV q8h + vancomycin[3] loading dose 25 mg/kg then 15 mg/kg IV q 12h	2-4 weeks (6 weeks if associated osteomyelitis)

[1]Dosing of antibiotics assume normal renal function; adjustments are required if renal dysfunction
[2]MRSA risk factors: Prior infection/colonization, high-prevalence area, homelessness, injection drug use
[3]See Vancomycin Therapeutic Drug Monitoring guideline; consult pharmacy for dosing adjustments

ADDITIONAL COMMENTS

- **De-escalate or modify regimens based on culture and susceptibility data once available**
- Multidisciplinary team approach (wound care, metabolic control of glycemia, vascular surgery, ortho, ID) improve patient outcomes

REFERENCES

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- Thurber EG, Kisuule F, Humbyrd C, Townsend J. Inpatient Management of Diabetic Foot Infections: A Review of the Guidelines for Hospitalists. J Hosp Med. 2017;12(12):994-1000.

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