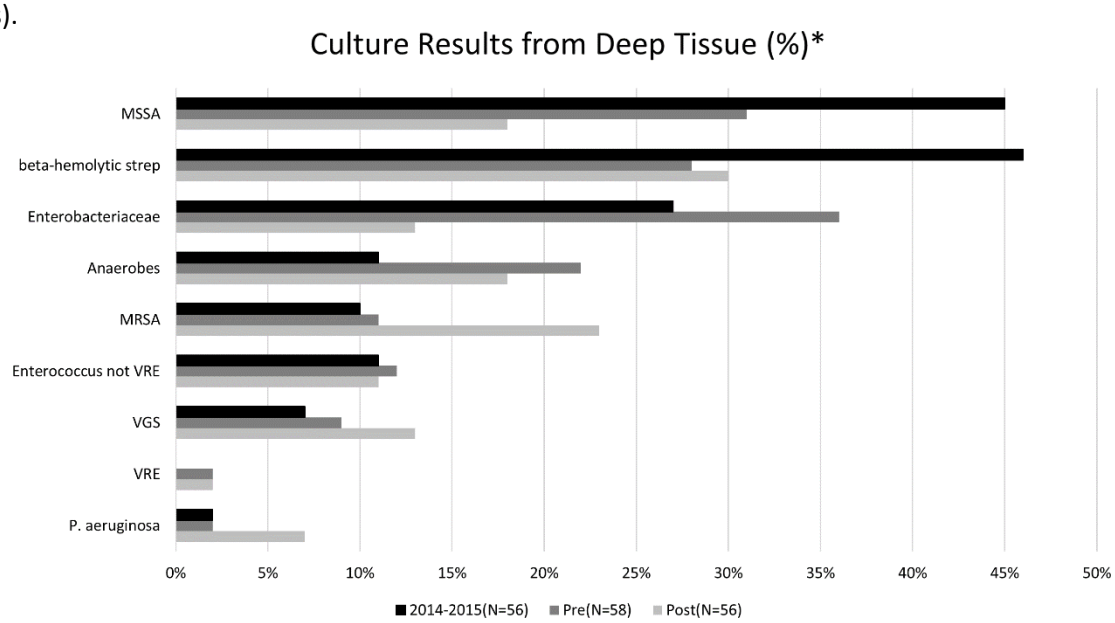
Diabetes-Related Foot Infections: Institutional Treatment Guidance

These guidelines should not replace clinical judgment. Therapeutic decisions should be based on clinical data including patient history, comorbidities, antimicrobial susceptibility patterns, and cost. The Infectious Diseases consult services are available for complex patient consultations and should be strongly considered in all patients with severe infections or osteomyelitis. Recommendations incorporate the 2023 IWGDF/IDSA diabetes-related foot infections (DFI) guidelines while accounting for local factors such as susceptibility patterns and formulary.

The antimicrobial stewardship program evaluated 170 deep tissue cultures in DFI over time periods ranging from 2014 to 2019. The microbial etiology was primarily gram-positive cocci (methicillin-sensitive *Staphylococcus aureus* and beta-hemolytic streptococci). Pseudomonas was rare (3.5% of cases).



Management Guidance:

Wound Cultures:

Do:

- Obtain culture by deep tissue biopsy after cleaning and debriding the wound.
- Obtain blood cultures in patients with signs of sepsis/septic shock or severe DFI.

Do NOT:

- Culture a wound that appears uninfected
- Swab the wound to obtain a culture.
- Culture without first cleaning and debriding a wound.
- Order blood cultures in patients with mild-moderate DFI

Imaging:

- An x-ray is recommended for all new foot ulcers in patients with diabetes to evaluate for deformity, bony destruction, soft tissue gas, and/or foreign bodies.
- An MRI is preferred when more specific imaging is needed to evaluate for either soft tissue abscess or osteomyelitis.

Osteomyelitis Evaluation:

- Consider osteomyelitis in any infected, deep, or large foot ulcer, particularly those that are chronic and over bony prominences.
- Plain films along with the probe-to-bone test are reasonable first steps in evaluating for osteomyelitis.
- Patients where the diagnosis remains unclear should undergo MRI.
- Patients with findings suggestive of osteomyelitis should undergo debridement with bone culture <u>before antibiotics are started, if possible</u>
    - Consult surgery (orthopedics or vascular) for potential surgical intervention.
        - If known peripheral vascular disease, vascular surgery is preferred.
    - If debridement is not an option, an IR-guided bone biopsy should be obtained to determine the microbial etiology.
- Consult infectious diseases for evaluation and management of long-term antibiotics.

Antibiotics:

- Do not start empiric antibiotics in diabetes-related foot ulcers without signs of infection, even if osteomyelitis is identified. Wait until diagnostic cultures are available to direct therapy.
- Choose antibiotics based on the severity of infection and previous culture data if available.
- Do not routinely include anti-MRSA therapy in non-severe DFI unless risk factors are present.

Other Ancillary Studies and Consults to Consider:

- Obtain ankle-brachial index (ABI) with transcutaneous oximetry (TcPO2) if available in all patients without ABIs in last 12 months.
- Obtain inpatient Wound Care Consult on all foot wounds and arrange outpatient wound care follow-up.
- Diabetes management is essential to wound healing. Consult Diabetes Education and consider consulting DEM service for hyperglycemia management.
- Provide offloading devices to improve healing.
- Identify potential barriers to care, in particular social factors (e.g., transportation, stable housing, access to wound care supplies and offloading footwear, food insecurity, employment modifications, etc), that can be optimized to ensure adequate follow-up.
- If considering prolonged IV antimicrobial therapy, consult Outpatient Parenteral Antimicrobial Therapy (OPAT) team for evaluation and follow-up. Infectious Diseases should be consulted in all cases where OPAT is considered.

Treatment Guidance

Infection Severity (IWGDF/IDSA Classification)	Typical Pathogens	Recommended Treatment
Chronic Ulceration without Signs of Infection	N/A	Do <u>not</u> culture wound Do <u>not</u> treat with antibiotics If osteomyelitis identified, consult ID and arrange for bone biopsy, but hold antibiotics
Mild • **At least 2 of the following are present at the site of the ulcer/wound:** ○ **Swelling or induration** ○ **Erythema >0.5cm but <2cm around wound** ○ **Tenderness or pain** ○ **Increased warmth** ○ **Purulent drainage** • **Primarily outpatient**	Gram-positive cocci only: beta-hemolytic streptococci, MSSA Consider addition of MRSA active agent if history of MRSA infection/colonization.	<u>Preferred Regimens:</u> • Cephalexin 1000mg PO TID **OR** • Cefadroxil 1000mg PO BID **OR** • Amoxicillin-clavulanate 875/125 mg PO q12h <u>MRSA Risk Factors</u> • TMP/SMX DS 1 tab PO q12h **OR** • Linezolid 600mg PO q12h • Alternative: add Doxycycline 100 mg PO q12h to preferred regimens <u>Severe PCN Allergy</u> • TMP/SMX DS 1 tab PO q12h **OR** • Linezolid 600mg PO q12h
Moderate • **Local infection with involvement of deeper structures (abscess, osteomyelitis, septic arthritis, tenosynovitis) or more extensive erythema (>2 cm spread or associated lymphangitis) without systemic signs of inflammation** • **Often hospitalized**	Gram-positive cocci as above. Plus aerobic gram-negatives. Consider addition of MRSA active agent if history of MRSA infection/colonization.	<u>Oral Options:</u> • <u>Preferred</u>: Amoxicillin-clavulanate 875/125 mg PO q12h • <u>MRSA risk factors:</u> add one of the following to preferred regimen: • Doxycycline 100 mg PO q12h **OR** • TMP/SMX DS 1 tab PO q12h **OR** • Linezolid 600mg PO

		q12h
		• <u>Penicillin allergy</u>: Levofloxacin 750 mg PO daily **PLUS** Metronidazole 500mg PO q8-12h
		
		<u>IV Options:</u>
		• <u>Preferred</u>:
		  • Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV/PO q8-12h **OR**
		  • Ampicillin/sulbactam 3g q6h
		• <u>History of ESBL or ceftriaxone-resistant organism in prior 6 months</u>: Ertapenem 1g IV daily
		• <u>MRSA risk factors</u>: add IV/PO Linezolid 600mg q12h, IV Daptomycin 6mg/kg q24h, or IV Vancomycin (*consult pharmacy for patient-specific dose*)
		• <u>Penicillin Allergy</u>: Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV/PO q8-12h
		• <u>Severe Penicillin and Cephalosporin allergy</u>:
		  • Levofloxacin 750 mg IV/PO daily **PLUS** Metronidazole 500mg IV/PO q8-12h **OR**
		  • Ertapenem 1g IV daily

Severe
• **As above with systemic signs of infection, such as:**
  ○ **Fever**
  ○ **Tachycardia**
  ○ **Leukocytosis**
	More likely to be polymicrobial.
	
	Target gram-positive cocci (including MRSA), aerobic gram-negative rods, and anaerobes.
		Consult surgical team and infectious diseases in all severe infections
		
		<u>MRSA Agent</u>
		• Linezolid 600mg IV/PO BID **OR**
		• Daptomycin 6mg/kg IV daily

○ **Hypotension** ○ **Sepsis** ○ **Necrotizing infection** • **Managed exclusively in the inpatient setting**	Do not include *Pseudomonas* coverage unless risk factors present, such as water exposure or prior isolation of *Pseudomonas*	**OR** • Vancomycin IV (*consult pharmacy for patient-specific dose*) PLUS Gram Negative and Anaerobic Agent • Preferred: Ceftriaxone 2g IV daily **PLUS** Metronidazole 500mg IV/PO q8-12h **OR** • Alternative: Piperacillin/Tazobactam 4.5g IV q8h over 4 hours • History of ESBL or ceftriaxone resistant organism in last 6 months: Ertapenem 1g daily • *Pseudomonas* Risk Factors: Replace Ceftriaxone with Cefepime 1g IV q6h **OR** use Piperacillin-Tazobactam regimen • Penicillin Allergy: Ceftriaxone 2g IV q24h **PLUS** Metronidazole 500mg IV/PO q8-12h • Severe Penicillin and Cephalosporin allergy: Ertapenem 1g IV daily

Abbreviations: TMP-SMX Trimethoprim-Sulfamethoxazole (DS = 160mg/800mg)

Duration and Route of Therapy for DFI: The duration of therapy and route of administration will vary based on patient factors, severity of infection, presence of bone involvement, extent of surgical debridement, and pathogens isolated. The table below is a general guideline; base all decisions on duration and route on individual case data. **ID consultation recommended for cases with bone/joint involvement that is not completely resected.**

Site of Infection and Severity	Route	Duration
Soft Tissue only: Mild	Oral	1-2 weeks
Soft Tissue only: Moderate	Oral or IV with change to PO with improvement*	1-3 weeks
Soft Tissue only: Severe	IV then change to PO with improvement*	2-4 weeks
Bone or Joint: complete resection of infected tissue (i.e., amputation)	IV or PO	<2 days post-resection
Bone or Joint: residual soft tissue infection but complete bone resection	IV then change to PO with improvement*	1-2 weeks

Bone and Joint: resected but residual bone infection	IV then change to PO with improvement*	3-4 weeks
Bone and Joint: no surgery or residual dead bone	IV then change to PO with improvement*	6-8 weeks

* Early switch to highly bioavailable oral agents (fluoroquinolones, TMP-SMX, linezolid, metronidazole, high-dose cephalexin/cefadroxil, high-dose amoxicillin, etc.) is safe and effective in most patients

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