DIABETES/METABOLISM RESEARCH AND REVIEWS
Diabetes Metab Res Rev 2012; **28**(Suppl 1)**:** 234–235.
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/dmrr.2251

Specific guidelines for the treatment of diabetic foot infections 2011†

B. A. Lipsky[1]*
E. J. G. Peters[2]
A. R. Berendt[3]
E. Senneville[4]
K. Bakker[5]
J. M. Embil[5]
L. A. Lavery[6]
V. Urbančič-Rovan[7]
W. J. Jeffcoate[8,9]

[1]*VA Puget Sound Health Care System, University of Washington, Seattle, WA, USA*

[2]*VU University Medical Centre, Amsterdam, The Netherlands*

[3]*Nuffield Orthopaedic Centre, Oxford, UK*

[4]*Gustave Dron Hospital, Tourcoing, France*

[5]*IWGDF, Heemstede, The Netherlands*

[6]*University of Manitoba, Winnipeg, MB, Canada*

[7]*University of Texas Southwestern Medical Center and Parkland Hospital, Dallas, TX, USA*

[8]*University Medical Centre, Ljubljana, Slovenia*

[9]*Nottingham University Hospitals NHS Trust, Nottingham, UK*

*Correspondence to: B. A. Lipsky, VA Puget Sound Health Care System, University of Washington, 1660 South Columbian Way (S-123-GMS), Seattle, WA 98108, USA.
E-mail: dblipsky@hotmail.com

†Published on behalf of the International Working Group on the Diabetic Foot.

Received: 12 October 2011
Accepted: 12 October 2011

Keywords diabetes mellitus; diabetic foot; infection; osteomyelitis; antibiotics; surgery; systematic review

These guidelines are based upon two companion International Working Group on the Diabetic Foot papers: 'A Systematic Review of the Effectiveness of Interventions in the Management of Infection in the Diabetic Foot' and 'Expert Opinion on the Management of Infections in the Diabetic Foot'.

Diagnosis

- Every diabetic patient with a foot wound should be assessed for the presence of infection.
- The diagnosis of diabetic foot infection is based on clinical findings of inflammation, rather than solely the results of culture.
- The severity of infection should be assessed after debridement of callus and necrotic tissue on the basis of its extent and depth and the presence of any systemic inflammatory findings.
- Hospitalization is needed for all patients with a severe infection, many patients with a moderate infection but few with mild. Patients who are unwilling or unable to adhere to required treatment and those who need certain surgical or diagnostic procedures may also require hospitalization.
- The consensus criterion standard for diagnosing osteomyelitis is an aseptically obtained bone sample with histopathological findings of inflammation and a positive culture. Other useful tests are probing to bone, the erythrocyte sedimentation rate, sequential X-rays, and especially magnetic resonance imaging. Nuclear medicine scans and computed tomography are less helpful.

Surgical procedures

- Early surgical intervention for some moderate or severe infections may reduce the risk of lower extremity amputation.
- All systemically unwell patients should be evaluated for necrotizing infections, gangrene or deep abscesses, which often require urgent surgical intervention.
- Surgical procedures may be performed by any appropriately skilled healthcare provider and typically involve removal of any necrotic soft tissue or accessible dead bone. Elective surgery may be necessary for substantially compromised soft-tissue envelope, loss of mechanical function of the foot, a degree of bone involvement that is limb threatening, for revascularization of an ischemic limb or when the patient prefers to avoid prolonged antibiotic therapy.
- Selected cases of diabetic foot osteomyelitis can be effectively treated by antibiotic therapy without surgical debridement of infected bone, but there are no established criteria on how to select these patients.

Antibiotic regimens

- Clinically uninfected wounds do not require antimicrobial therapy.
- For clinically infected wounds, the selected antibiotic regimen should be as targeted to likely pathogens and as narrow spectrum as possible.
- Cultures of superficial swabs often yield contaminants, but those of deep tissue specimens (after debridement) assist in optimizing antibiotic selection.
- Initial antibiotic therapy is usually empirical, and the regimen should include activity against *Staphylococcus aureus* and aerobic streptococci. Consider agents active against methicillin-resistant *S. aureus* for patient with risk factors for this pathogen or if the local prevalence is high. Agents directed against gram-negative organisms are appropriate in patients with severe infection or in areas where their prevalence is high.
- When culture and sensitivity results are available, consider a change to a more specific regimen targeted just at the isolated pathogens but also consider the clinical response to the empirical treatment.
- Available data do not favour any particular antibiotic treatment strategy, that is, specific antibiotic class or agent, route or duration of therapy.
    - Severe infections require parenteral therapy (at least for the first few days), but mild and most moderate infections can be treated with oral antibiotics that are highly bioavailable.
    - Parenteral agents may also be required for those unable to tolerate oral agents or who are infected with pathogens resistant to available oral agents.
    - Only limited evidence supports the use of selected topical antibiotics for treating infected wounds.
- In patients with osteomyelitis, antibiotic therapy based on culture results of bone, as opposed to wound swabs, may be more targeted and improve outcomes. Treatment duration can likely be based on the extent of residual soft tissue or bone infection and dead bone, after any surgical procedure.
- Few data inform decisions on the cost-effectiveness of various antibiotic regimens.

Adjunctive treatments

- No convincing evidence supports the use of topical antimicrobials for infected or uninfected diabetic foot wounds.
- The choice of a dressing should be based mainly on whether the wound is exudative or dry.
- Studies on granulocyte colony-stimulating factors have reported mixed results on various outcomes of diabetic foot infection.
- No convincing evidence supports the use of other adjunctive therapies in the treatment of diabetic foot infections.

Conflict of interest

BAL has served as a consultant to Merck, Pfizer, Cubist, DiPexium, Johnson & Johnson. ARB was a Pfizer Visiting Professor in 2011 to the University of Washington Department of Allergy and Infectious Diseases, an educationally unrestricted programme for which funding was awarded to DAID on a peer reviewed and competitive basis. ARB received no personal financial benefit from this programme. ES has served as an investigator in the EU-CORE database study (NOVARTIS).

DOI: 10.1002/dmrr