

What I would most like to learn about managing diabetic foot infections



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Diabetic foot infections are among the most common and costly complications of diabetes. In his guest editorial, Benjamin A. Lipsky considers the answers to questions relating to the diagnosis of causative pathogens, the effectiveness of topical antimicrobial therapy for mildly infected ulcers and the most appropriate way to treat diabetic foot osteomyelitis.

In 1987, my colleague Roger Pecoraro, a diabetologist with whom I worked in a primary care clinic, asked me to see a patient with diabetes and a nasty foot infection. "As an infectious diseases specialist, how would you suggest I treat this?" he asked. After providing some generic advice I went to the library (that place people went in the pre-internet era) and looked for textbooks and articles on diabetic foot infection. I was surprised to find remarkably little data; the few published investigations made pronouncements like "[as is] apparent from this study, antibiotic therapy does not eradicate the organisms in the deep tissue, and surgical procedures are usually required for definitive treatment."^[1]

The textbooks suggested that these infections were nearly always polymicrobial, that all patients needed to be hospitalised and that they should be treated with broad-spectrum, parenteral, and prolonged antibiotic therapy. As this differed from our experience, we conducted a prospective, randomised trial comparing two relatively short-course oral antibiotic regimens in patients treated in the ambulatory setting. Our results suggested that almost all of the published advice was largely wrong.^[2]

Flash forward 25 years and there are now approximately 2200 papers listed on PubMed on "diabetic foot infections", with many guidelines^[3,4] based on systematic reviews of this literature^[5]. We now know that:

- Acute infections in patients (at least in northern countries) who have not recently had antibiotic treatment are usually caused by only aerobic Gram-positive cocci (predominantly *Staphylococcus aureus*).

- Those infections that are mild or moderate in severity can be treated with a week or two of oral (and occasionally even topical for mildly infected ulcers) antibiotic therapy in the outpatient setting.
- Lower-extremity amputation is usually avoidable.

So, what's left to learn about foot infections, now among the most common and costly complication of diabetes? Here are the three questions that I would most like to have answered.

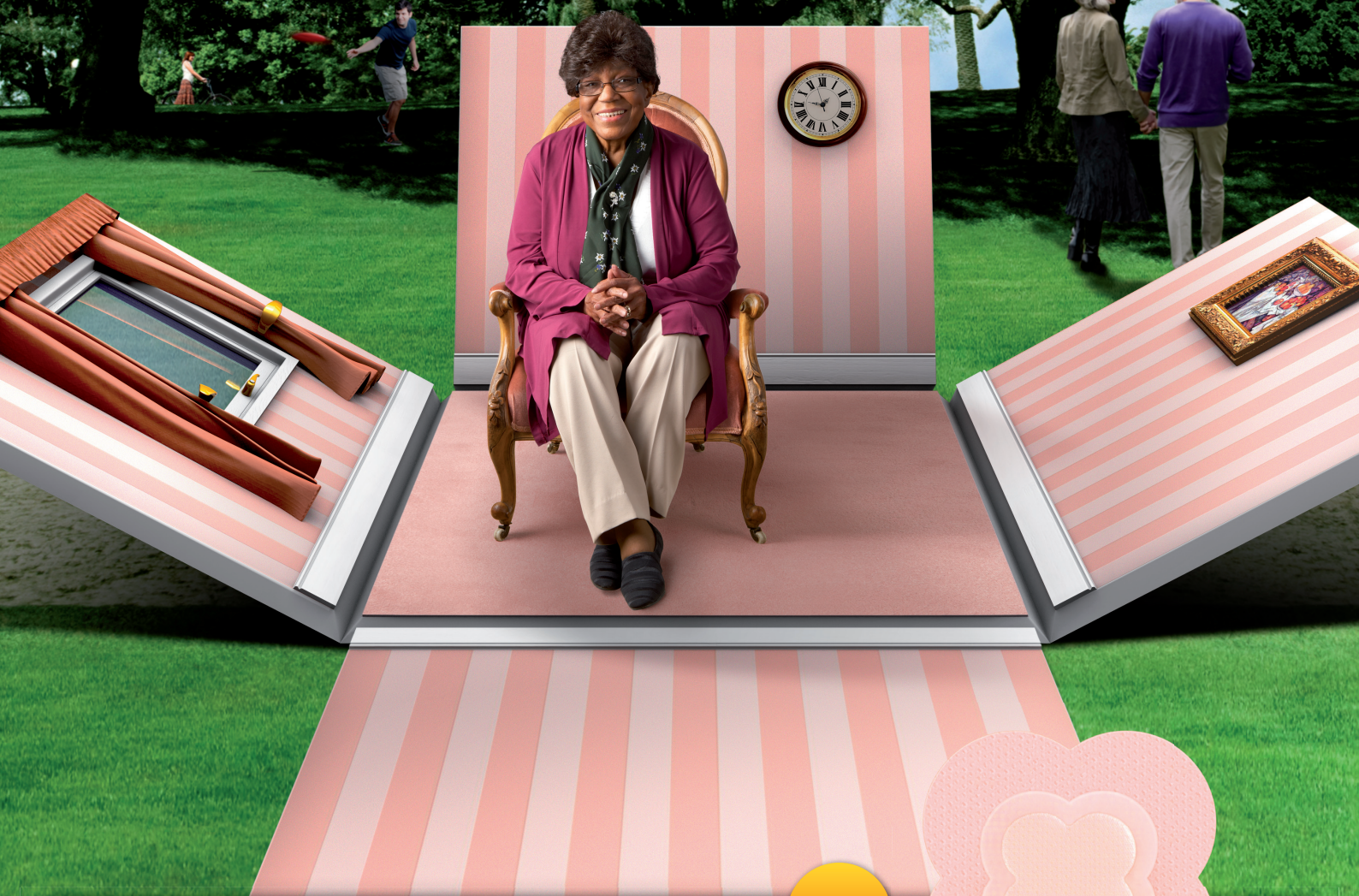
1. What's the best way to determine the causative pathogens in diabetic foot infections?

All open wounds are colonised with micro-organisms, but we believe only those causing host damage need to be treated. Deciding which among the isolated organisms are pathogens starts with obtaining an appropriate specimen from the wound. While swab cultures are easy to obtain, the few small, suboptimal published studies suggest that, compared with tissue specimens, they often contain colonisers (i.e. are non-specific) and fail to grow fastidious and anaerobic organisms that are potential pathogens (i.e. are insensitive).

An ongoing large, multicentre, prospective study in the UK that is comparing these two types of specimens from infected diabetic foot wounds should soon provide some useful data^[6]. Another approach that will soon help answer this question is the use of the rapidly emerging molecular microbiological methods to quickly determine which organisms in a wound have genes for virulence factors, as well as for antibiotic resistance.^[7]

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"We have come a long way in improving outcomes, but there is much for those of us interested in this field to do to enhance management of this important and growing problem."

2. Is topical antimicrobial therapy effective for mildly infected ulcers?

Topical therapy has many potential advantages, including providing high local antibacterial concentrations without the possible adverse effects of systemic levels of the drug^[8]. Furthermore, agents that are potentially toxic when used systemically may be safe when administered topically. Finally, non-antibiotic antimicrobials can be used topically, avoiding overuse of antibiotic agents that are needed for systemic infections, thus reducing the pressure driving antibiotic resistance. There have been few studies of topical antimicrobials for diabetic foot infections^[9], but several are now in the process of obtaining approval for prospective randomised trials. We should have more information about the role of this route of administration in the next few years.

3. What is the most appropriate way to treat diabetic foot osteomyelitis?

Surgical resection of all necrotic and infected bone has been the traditional approach to treating chronic osteomyelitis, but in recent decades evidence is mounting that antibiotic therapy alone may be sufficient to eradicate many of these infections^[10]. Due to concern for limited penetration of antibiotics and a lack of antibacterial phagocytes in bone, intravenous therapy has generally been used for osteomyelitis.

In the UK, an ongoing large, multicentre trial^[11] is comparing parenteral with oral antibiotic therapy for treating various types of complex musculoskeletal infections, including diabetic foot osteomyelitis; results should be available within a year, providing an answer to this important question.

Improving outcomes

These and many other questions need to be addressed to ensure we provide optimal care for patients with diabetic foot infections. We have come a long way in improving outcomes, but there is much for those of us interested in this field to do to enhance management of this important and growing problem. ■

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