

Appropriate Antimicrobial 'Sole-utions'?:

An assessment of antimicrobial appropriateness in the management of diabetic foot infections.

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Background

Diabetic foot infections (DFIs) represent some of the most common and highly morbid complications of diabetes. The burden of DFIs on the healthcare system is underappreciated as a single patient with a DFI can require more consultations and hospitalizations than a patient with heart disease, renal disease or cancer⁽¹⁾. These interventions cost the Australian healthcare system an estimated \$1.6 billion each year⁽¹⁾. Therefore, appropriate antimicrobial management in these patients is critical.

Chronic DFIs are often polymicrobial, involving Gram-positive and Gram-negative aerobic and anaerobic bacteria. *Pseudomonas aeruginosa* is a key pathogen which can impact the management of this presentation. Assessing the risk of pseudomonas can guide empirical therapy. Risk factors for pseudomonas infection include previous colonization, recent hospitalization, broad-spectrum antibiotic use, water exposure and immunocompromised patients.

Aim

To assess appropriateness of antimicrobial therapy for patients admitted with DFIs in the West Moreton region

Methods

Design: A prospective audit of 38 DFI presentations from February 2019 until September 2019 was conducted. Appropriateness of antimicrobials taken during admission was determined via a modified National Antimicrobial Prescribing Survey (NAPS) according to the eTG DFI monographs. Antibiotics taken prior to admission were noted as they may impact treatment choice for inpatients. A multidisciplinary team consisting of a pharmacist, antimicrobial stewardship pharmacist and the infectious diseases team collaborated to grade the patients' antibiotic appropriateness.

Inclusion: Patients with a new diagnosis of DFI or representing for ongoing therapy

Exclusion: Patients not prescribed antibiotics or patients transferred to another hospital

Patient Variables: age, gender, eGFR, HbA1c, weight, microbiology, amputations

NAPS Variables: Antibiotic choice, dose, duration, frequency, spectrum of cover, microbiology mismatch, allergy, route and surgical prophylaxis.

Table 1: Modified NAPS Grading Criterion

| Grading | Criteria |
|------------|---|
| Optimal | All dosage, frequency and guided therapy correct |
| Adequate | Likely effective therapy, with one non-optimal variable |
| Suboptimal | Likely effective therapy, with 1 > non-optimal variable |
| Inadequate | Therapy likely ineffective for significant duration |

Results

Figure 1: Appropriateness of antimicrobial prescribing in management of DFIs as per WMHHS guidelines (n=38)

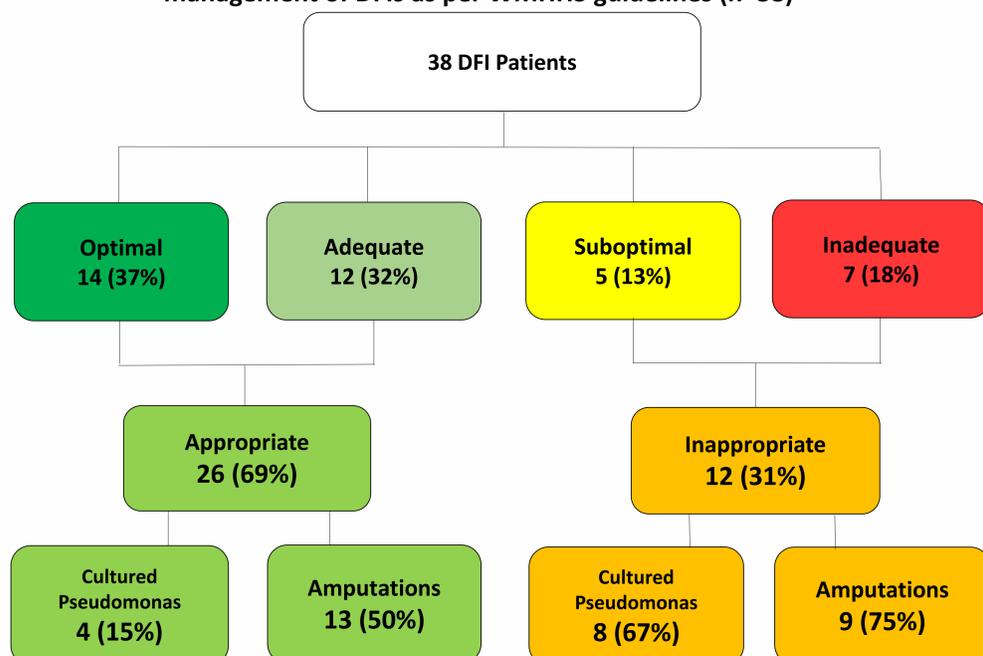


Table 2: Patient Characteristics and Microbiology (N = 38)

| Patient Variables | N = 38 |
|--------------------------|-------------------|
| Average age (range) | 58 years (34-86) |
| Gender (male) | 25 (66%) |
| Average Weight (range) | 98 kg (54 - 145) |
| Average Hba1C (range) | 9.3% (6.1%–14.2%) |
| eGFR<30mL/min | 9 (24%) |
| Type 2 Diabetes Mellitus | 34 (89%) |
| Pseudomonas Cultured | 12 (31%) |
| Amputations | 21 (55%) |

Examples of prescribing considered adequate include:

- Targeted therapy where duration is not optimal
- Stepping down from IV to oral therapy is not timely
- Multiple switching between routes of administration

Examples of prescribing considered inappropriate include:

- Duplication of therapy (PO ciprofloxacin and IV 'Piptaz')
- Polymicrobial infection where therapy is too narrow
- Extensive periods of therapy which is too narrow
- Therapy based on inappropriate pseudomonas risk assessment

Discussion

In the cases graded inappropriate, antimicrobials chosen for empirical therapy had an unsuitable spectrum of activity, or where directed therapy was available, therapy was not changed. Given that 67% of inappropriate cases cultured pseudomonas, risk assessment upon admission should be more thorough and the result documented with each presentation. This will allow for more appropriate empirical therapy for patients identified to be at a higher risk of pseudomonas colonization. Overall the rationale for antimicrobial choice was sometimes poorly documented, leading to switching of therapy when care was taken over by another physician. Routine checking of microbiology should also be employed in every case in order to switch to directed therapy as soon as possible.

Suggestions for the future would be to increase the awareness of the need for pseudomonas risk assessments at the first point of presentation, while also encouraging prescribers to keep up-to-date with evolving antimicrobial monographs. Although the sample size is relatively small it still allows an insight into the trends of antimicrobial prescribing for DFIs and further analysis in the future may reinforce these findings. Further study will assess longer term outcomes and complications (amputations, re-admissions, length of stay) in this cohort of patients.

Conclusions

Given the complexity of these presentations and the co-morbidities of the patient population, antimicrobial therapy was overall appropriately managed. The burden of diabetes in the West Moreton region is rising and successful early intervention for these patients is essential for preserving their health, as well as reducing the further burden to the healthcare system. Front-line staff, including pharmacists, must be aware of risk factors and impact of Pseudomonas in this group of patients. A focused antimicrobial stewardship campaign can be directed to enhance knowledge and better selection of empiric antimicrobial therapy.

