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A Commentary on Antibiotic Misuse and Resistance in the Care on Non-Healing Wounds

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About the Study

Diabetic foot, venous leg and pressure ulcers as well as other non-healing wounds afflict millions of patients and burden healthcare systems worldwide. The presence of bacteria in open wounds, often in a biofilm phenotype, impede the healing process and lead to costly complications [1-5]. Our study "Reliance on clinical signs and symptoms assessment leads to misuse of antimicrobials: Post hoc analysis of 350 chronic wounds", published in 2022 in Advances in Wound Care [6], underscores the challenges clinicians specializing in wound care management face in diagnosing and treating bacterial infections. Reliance on subjective clinical signs and symptoms leads to misuse of antibiotics. The data point to the urgent need for objective, real time diagnostics to enhance antimicrobial stewardship efforts amidst escalating concerns of antibiotic resistance.

Antibiotic misuse and resistance

Antibiotic resistance is an escalating global threat, fueled by misuse and over-prescription of antibiotics in many healthcare settings. In wound clinics, antibiotics are indiscriminately prescribed based on habit or subjective assessments of clinical signs and symptoms rather than evidence-based diagnostic measures [7,8]. This approach not only fails to address the underlying cause of infection, but also contributes to the emergence and spread of antibiotic-resistant bacterial strains [9-13].

Our work revealed a concerning trend: Antimicrobials were prescribed at similar rates for wounds identified as positive (83%) or negative (90%) for clinical signs of infection [6]. This discrepancy between clinical assessment and antibiotic prescribing practices highlights its inadequacy as a standalone diagnostic method. We also discovered that many patients (33%) were prescribed systemic antibiotics despite an absence of clinical signs of infection. Together, these results give a snapshot into the ubiquitous antimicrobial prescribing occurring at American Wound Care Centers, underscoring the urgent need for a paradigm shift towards objective, evidence-based diagnostic measures.

The urgent need for objective diagnostic measures

Objective, evidence-based approaches offer a promising avenue for enhancing the accuracy and precision of bacterial diagnosis in non-healing wounds. Gold-standard techniques such as quantitative tissue culture of wound biopsies provide concrete evidence of bacterial presence and load, enabling targeted antimicrobial therapy tailored to individual patient needs. This approach optimizes treatment outcomes and mitigates the risk of antibiotic resistance. However, widespread adoption of objective diagnostic measures in clinical practice necessitates investment in research, education, and infrastructure to ensure accessibility and affordability. Furthermore, the results from sample-based techniques are often delayed, leading to the prescription of empirical antimicrobials and antibiotics. There is also a significant risk of sampling error in obtaining a culture [14].

Antibiotic stewardship programs

Antibiotic Stewardship Programs (ASPs) play an essential role in de-escalating antibiotic resistance by promoting responsible antibiotic use and optimizing patient outcomes. However, the effectiveness of these programs hinges on accurate and timely diagnostics to guide antimicrobial therapy. Medical technology holds immense promise in enhancing the impact of ASPs. Our own experience incorporating fluorescence imaging of bacterial loads (MolecuLight®) into our diagnostic algorithm has yielded positive results. By providing clinicians with rapid and precise diagnostic information at the bedside [1,15,16], fluorescence imaging empowers Healthcare Professionals (HCPs) to locate harmful bacteria, audit their debridement efforts, and better assess the need for antibiotics to reduce unnecessary exposure [17]. The automatic differentiation of *Pseudomonas aeruginosa* also helps tailor antibiotic therapy to individual patient needs [18,19]. Regular use of bacterial fluorescence imaging in our practice facilitates real-time monitoring of treatment efficacy, allowing for timely adjustments to therapy. Thus, integrating such diagnostic technologies into ASPs not only enhances patient care but preserves antibiotic efficacy to help sustain global public health efforts.

Conclusion

Antimicrobial stewardship efforts should not be solely reliant on clinical assessment of bacterial infection in chronic wounds. This questionable practice perpetuates the cycle of antibiotic misuse and resistance. I cannot overemphasize the importance of adopting objective, evidence-based diagnostic technologies, which empower clinicians to optimize patient care, preserve antibiotic efficacy and safeguard public health in the face of this pressing global health crisis of antibiotic resistance.

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