

Characteristics of severe hand infections – a retrospective study

Authors: Ezgi Dogar¹, PD Dr.med Doruk Akguen¹, Ariane Scheller¹, Dr.med. Peter Raduenzel², Univ.-Prof. Dr. med. Ulrich Stoeckle¹ · Prof. Dr. med. Andrej Trampuz³, Dr.med. Sebastian Meller¹

¹Charité– Universitätsmedizin Berlin, Centre for Musculoskeletal Surgery, Germany

²Charité– Universitätsmedizin Berlin, CMCS und Department of Infectious Diseases and Critical Care Medicine

³QUT (Queensland University of Technology), Brisbane, Australia

Introduction

Severe infections of the hand typically require surgical debridement and extended antimicrobial therapy (1,2). However, the optimal surgical approach and the ideal duration of antimicrobial therapy remain unclear. This study aimed to characterize the injury mechanisms, pathogen spectrum, treatment strategies and clinical outcomes of patients with severe hand infections that were treated at a single tertiary trauma center.

Methods

Electronic data records were retrospectively screened. All patients with severe infections of the hand requiring either surgery or intravenous antibiotics in our surgical department from September 2022 to October 2023 were retrospectively included. Patient demographics, mechanism of injury and potential prior interventions were assessed. Microbiological analysis, antibiotic therapy and surgical interventions were analyzed.

Results

A total of 120 hand infection episodes were included. Infection type was classified as cellulitis in 91 cases (75.8%), abscess in 22 cases (18.3%), and other entities in 7 cases (5.8%, including thrombophlebitis). The median patient age was 44.5 years, and 40.8% of patients were female.

Posttraumatic infections were the most common mechanism (n=41,34.2%), followed by animal bites (n=30,25.0%), iatrogenic infections (n=21,17.5%), infections with other or unknown entry sites (n=17,14.2%), intravenous drug use–associated infections (n=6, 5.0%), and insect bites (n=5,4.2%).

Surgical intervention was required in 85% (n=102) of patients, with 38.2% (n=39) requiring multiple procedures. Of the 22 patients with an abscess, 90.9 % (n=20) underwent surgical debridement, and 50% (n=10) of these required additional surgery.

Intraoperative cultures were positive in 89.2% (n=91) of surgically treated patients. Infections were monomicrobial in 48.35% (n=44) and polymicrobial in 51.65% (n=47) of cases.

The most frequently isolated pathogens were *Staphylococcus aureus* (*S.aureus*) (47.3%, MSSA n=39, MRSA n=4) followed by *Streptococcus pyogenes* (n=21, 23.1%), coagulase-negative staphylococci (n=25, 27.5%), anaerobes (n=15, 16.5%), *Pasteurella* spp. (n=9, 9.9%), and other Gram-negative rods (n=33, 36.3%). Percentages are based on the 91 positive intraoperative cultures; multiple pathogens per patient were possible.

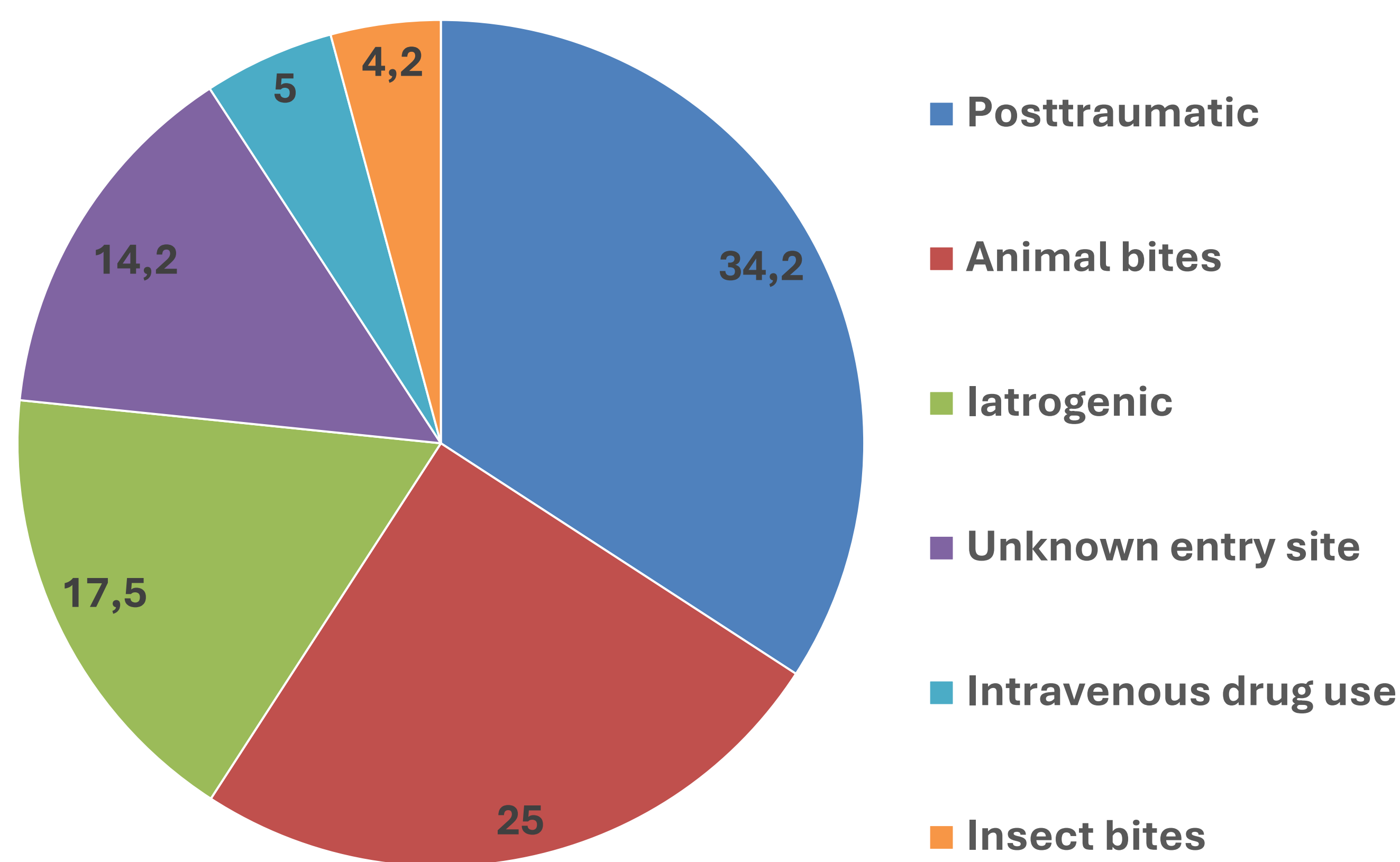
Animal bite–associated infections demonstrated a polymicrobial spectrum of Gram-positive, Gram-negative, and anaerobic organisms, with *Pasteurella* spp. as the most frequent pathogen (n=9, 30.0%), followed by anaerobes (n=5, 16.7%). Traumatic infections showed a predominance of *S. aureus* (n=18, 43.9%) and streptococcal species (n=17, 41.5%), with a relevant proportion of Gram-negative organisms (n=10, 24.4%).

Antimicrobial therapy consisted of empirical intravenous ampicillin/sulbactam or piperacillin/tazobactam, followed by oral step-down therapy, most commonly with amoxicillin/clavulanic acid or clindamycin plus ciprofloxacin. The median treatment duration was 4 weeks (range 3–6 weeks).

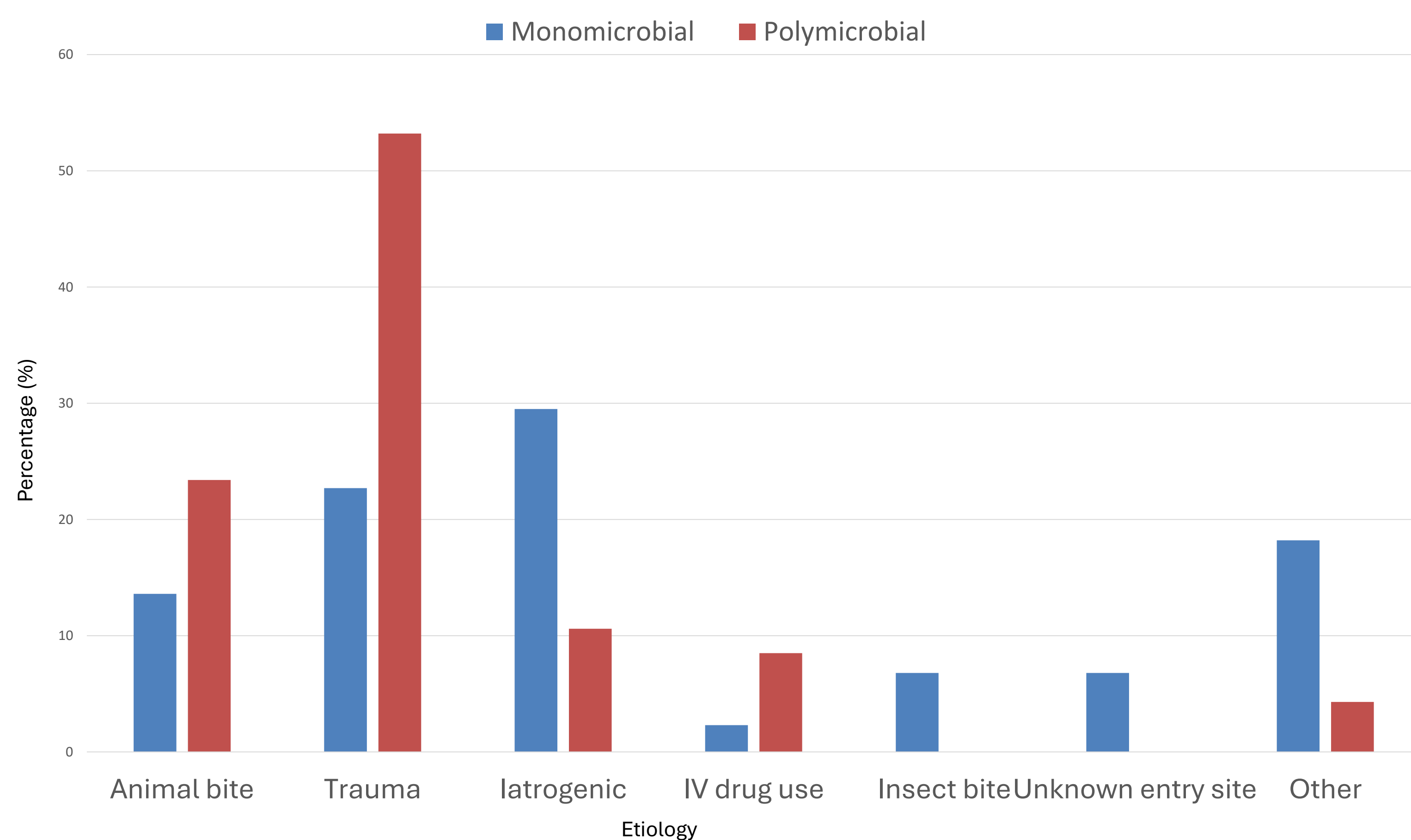
Conclusion

In a cohort of 120 severe hand infections, most patients were managed with combined surgical and antimicrobial therapy. Cellulitis was mainly caused by *S. pyogenes*, while abscesses were mainly caused by *S. aureus*. In the majority of cases, multiple pathogens were identified, with a high proportion of anaerobes and Gram-negative bacteria among polymicrobial infections, highlighting the need for broad-spectrum empiric therapy.

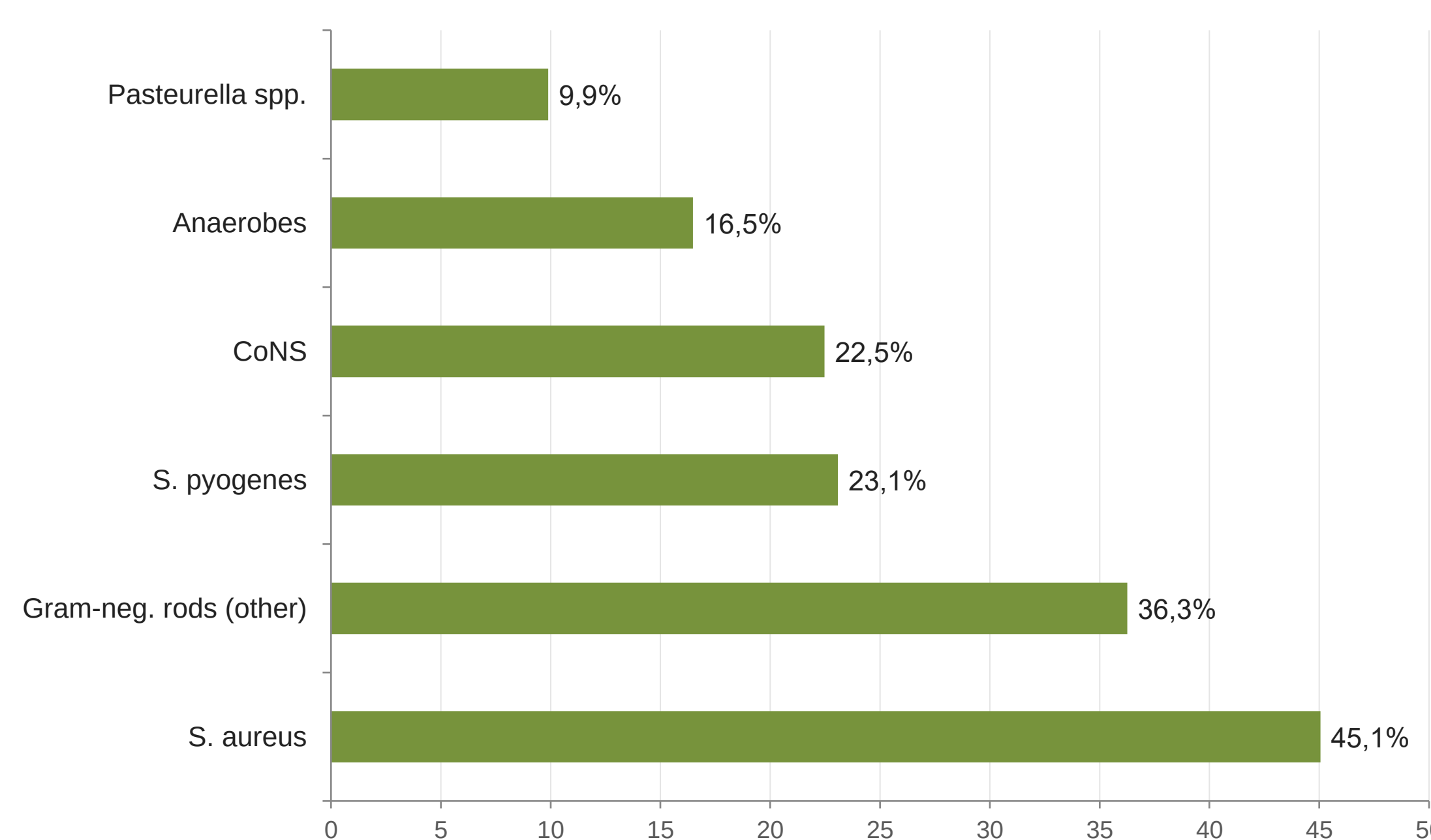
Etiology of Hand Infections



Etiology Distribution by Microbiological Pattern (Mono- vs. Polymicrobial)



Isolated Pathogens



References

1. Stevens DL, Bisno AL, Chambers HF, et al. Practice Guidelines for the Diagnosis and Management of Skin and Soft Tissue Infections: 2014 Update by the Infectious Diseases Society of America. *Clin Infect Dis*. 2014;59(2):e10–e52.
2. Smittenberg MN, et al. Hand infections. *J Am Acad Orthop Surg*. 2014.