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Epidemiology of Adult Bacterial Hand Infections at Two Urban Hospitals

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ABSTRACT/REVISED

Background: Hand infections represent a major source of morbidity, which can result in hand stiffness and amputation. Early appropriate empiric antibiotic regimen may reduce the associated morbidity, hence the importance to examine local epidemiology. The aim of this study was to define the current epidemiology of adult hand infections at two urban hospitals in New York City.

Methods: We performed a double center, retrospective study of adult patients hospitalized from March 2018 to May 2020. Patients with positive cultures associated with the hand infections were included. Retrospectively, 100 patients were reviewed. Data on baseline demographic, clinical, surgical, microbiology, and treatment parameters were collected.

Results: Of the 100 patients, 76% were male, with median age of 47.5 years (35, 58.25) and average C-reactive protein (CRP) of 50.66 mg/L (± 64.64) on admission (see Table 1). Previous hospitalization within 1 year (38%), previous surgical procedures (39%) and recent IV medication use (26%) were common. 130 bacterial isolates were identified (see Table 2). The most frequent organisms were Gram-positive, with Methicillin susceptible *Staphylococcus aureus* (MSSA, 25.38%), *Streptococcus* species (20.08%), and Methicillin resistant *Staphylococcus aureus* (MRSA, 15.38%) being the most common. Gram-negative organisms were infrequent, with *Haemophilus parainfluenzae* (3.85%), *Enterobacter cloacae* (3.85%) and *Pseudomonas aeruginosa* (3.08%) being the most prevalent. Of the 100 patients, 27% had polymicrobial infections, associated with trauma (6%), illicit IV use (6%) and unknown (7%) etiologies.

Conclusion: Within our population, the most common organisms associated with hand infections were Gram-positive, with *Staphylococcus aureus* and *Streptococcus* species being the most prevalent. Gram-negative pathogens were infrequently isolated. The results within this study can provide guidance to clinicians on assessing the appropriate empiric antibiotic regimen in patients with hand infections, and can serve as a basis for further studies identifying risk factors associated with isolation of organisms associated with hand infections.

INTRODUCTION AND OBJECTIVES

- Hand infections pose difficult diagnostic problems because of the wide differential diagnosis that must be considered and the complex microbiology and anatomy involved[1,2]
- Neglect or incomplete treatment of hand infections will usually lead to involvement of other parts of the hand resulting in stiffness, loss of hand function, and possibly amputation[1]
- Prompt and accurate diagnosis of the nature, etiology, site of infection and bacteriological results is vital for a good outcome[2]
- It has been reported that approximately 60% of hand infections are caused by *Staphylococcus aureus*, with 86% of cultures growing only a single organism[2]
- More recently, prospective studies have shown that between 60 and 90% of all cultures are mixed, with staphylococci and streptococci present in roughly equal numbers[2]
- The aim of the present retrospective study was to delineate the current epidemiology in established hand infections at two urban hospitals in New York

METHODS

- Double center, retrospective study of 100 adult patients hospitalized from 5/2018 to 5/2020
- Patients were excluded if they were pregnant or breastfeeding

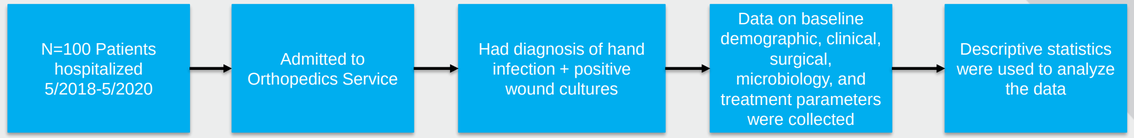


Figure 1. Flow diagram of methods of inclusion of patients into the study

RESULTS

Variable, n (%)	Total N=100
Age, median years (IQ)	47.5 (35, 58.25)
Male	76 (76)
Diabetes	18 (18)
Intravenous drug use	
• History	6 (6)
• Current	23 (23)
HIV	13 (13)
ESRD	0
Resides in prison or homeless shelter	15 (15)
SIRS criteria on admission, median (IQ)	1 (0,1)
WBC on admission, mean (SD)	10.80 ± 4.09
CRP on admission (mg/L), mean (SD, n=86)	50.66 ± 64.64
History of MRSA Infection/Colonization	4 (4)
Previous hospitalization within 1 year	38 (38)
Previous surgical procedures	39 (39)
Previous use of antibiotics within 1 year	45 (45)
Recent IV medication within the last 10 months	26 (26)

Abbreviations: Immunosuppression is defined as HIV+, active chemotherapy, chronic high dose steroids; ESRD, end stage renal disease; CRP, C-reactive protein; MRSA, Methicillin-resistant Staphylococcus aureus; N is the number of patients. Data shown as number of patients and percentage of total, unless stated otherwise.

Table 1: Baseline characteristics

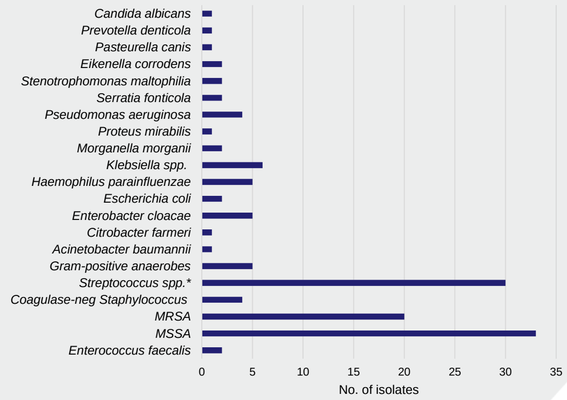


**Figure 4: Organisms isolated from hand infections*

Streptococcus spp. included *S. constellatus, S. pyogenes, S. anginosus, viridans* group *Streptococci.*

RESULTS

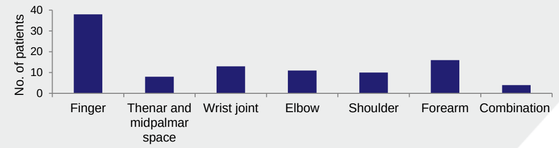


Figure 2. Site of infection

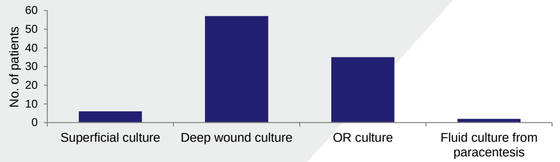
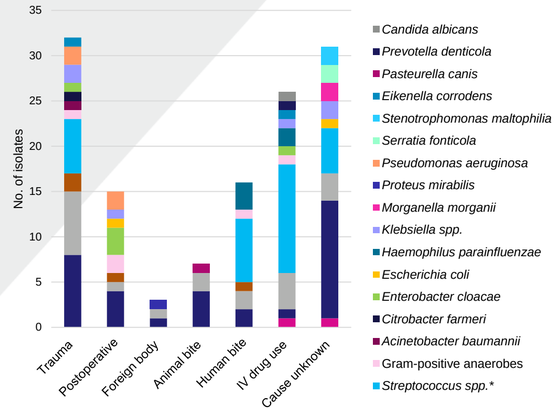


Figure 3. Types of cultures obtained



Streptococcus spp. included *S. constellatus, S. pyogenes, S. anginosus, viridans* group *Streptococci.*

Figure 5: Organisms isolated in relation to etiology

RESULTS

Operation	Number of patients (N=100)
Bedside I/D	43
OR I/D	43
OR debridement	7
Hardware explantation + washout	4
Hardware revision + washout	1
Hardware replacement + washout	1
None	1

Table 2: Types of surgical procedures

Empiric Antimicrobial Used	No. of patients (N=100)
Anti-MRSA	92
Anti-Pseudomonal	24
≥ 2 Antimicrobials use	87
Single Antimicrobial used	12
No empiric antimicrobial used	1

Table 3. Empiric Antimicrobials used

CONCLUSION

- The most common organisms associated with hand infections within this patient population were Gram-positive, with *Staphylococcus aureus* and *Streptococcus* species being the most prevalent
- Gram-negative pathogens were uncommon, with *Klebsiella spp.* Being the most common
- Most patients received 2 or more antimicrobials agents for treatment
- These results can provide guidance to clinicians on assessing the appropriate empiric antibiotic regimen in patients with hand infections
- Further studies are needed to identify risk factors associated with isolation of organisms associated with hand infections

REFERENCES

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2. Houshian S, et al. International Journal of Infectious Diseases, 2006;10:315—319

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