

Patterns of Wound Infections and their Antibiotic Susceptibility Profiles among Orthopedic and Trauma Patients in A Tertiary Institution in Southwestern Nigeria

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ABSTRACT

Background: Wound Infection has been a burden in the medical profession causing extended hospital stay, increased cost and increased patient morbidity and mortality.

Aim: To determine the pattern of micro-organism responsible for wound infections in this hospital and their antibiotic susceptibility

Method: Isolation, identification, antimicrobial susceptibility screening and analysis of 49 wound specimens from the orthopedic and trauma department over a period of 1 year (May 2016- May 2017).

Result: A total of 5 isolates were recovered from 49 wound specimen. *Staphylococcus aureus* was the most frequent organism isolated accounting for 23 of a total number of 49 wound specimen, followed by *Pseudomonas aeruginosa* (16), *E. coli* (9), *Klebsiellasp.*(4) and *Proteusspp.*(1).

Sensitivity of the organisms to antibiotics varied but all the organisms were susceptible to Ceftazidime and Ceftriaxone.

Conclusion: *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *E.coli* were the predominant micro-organisms isolated from wound specimens.

Based on the sensitivity pattern, Ceftazidime and Ceftriaxone were the most sensitive antibiotics for therapy and should be used as drugs in management of orthopaedic wound infections at the hospital.

Key words: wounds infections, orthopaedics, antimicrobials

INTRODUCTION

Wound infection has been a burden in the medical profession right from the inception of medicine with Hippocrates the father of medicine (great physician & surgeon 460-



377 BCE) till this day. The effects of wound infections were most evident in times of war¹. World War I resulted in new types of wounds from high velocity bullet and shrapnel injuries in addition to contamination by the mud from the trenches¹.

A World Health Organization (WHO) sponsored survey revealed a prevalence of nosocomial infections in the range of 3-21% with wound infections accounting for 5-34% of the total¹. A 2002 Nosocomial Infection National Surveillance Service (NINSS) survey report for the period between October 1997- September 2001 indicated that the incidence of hospital acquired infection related to surgical wounds in the UK is as high as 10%¹. Data on the incidence of wound infections most likely underestimates the true incidence because most wound infections occur when the patient is discharged and are treated in the community without hospital notification¹.

A wound is a damaged area of the body, usually involving a break to the skin. Wounds can be surgical or due to trauma². All wounds are contaminated by microbes but infections usually do not develop because of the host innate defense which is quite effective in the eradication of contaminants¹. The prevention or establishment of wound infection has to do with the host, microbial factors and the mechanism of trauma.

The most common micro-organism involved in wound infection include *Staphylococcus aureus* (being the most common), coagulase negative *Staphylococcus*, *Enterococcus spp.*, *E.coli*, *Pseudomonasaeruginosa*,

Enterobacter spp., *Proteus mirabilis*, *Klebsiella pneumonia*, *Candida albicans*, Group D *Streptococcus* and *Bacteroides fragilis*¹.

Other risk factors that can affect the establishment of wound infections include:

- Systemic factors like age, malnutrition, hypovolemia, poor tissue perfusion, obesity, diabetes, steroids, and other immunosuppressants¹.
- Wound characteristics: non-viable tissue in wound, hematoma, foreign material (e.g. drains and sutures), dead space, poor skin preparation (e.g. shaving) and pre-existent sepsis (local or distant)¹
- Operative characteristics: poor surgical technique, lengthy operation(>2hrs), intraoperative contamination (e.g. from infected theater staff and instruments or inadequate theatre ventilation), prolonged preoperative stay in the hospital and hypothermia¹.

The aim of this study is to know the incidence of wound infections in a tertiary institution in southwestern region of Nigeria. Furthermore, it aims to know the most common organism causing wound infection in this institution.

METHODS AND SAMPLE SIZE

This is a cross sectional study conducted between the period of May 2016 to May 2017 from the Orthopedic and Trauma department in a Federal Government funded tertiary



institution located in Abeokuta, South West, Nigeria. This hospital serves the needs of those in Ogun State and the surrounding states. There were 202 patients who were admitted during the period of this study and of this amount, 49 patients had wound infections while on admission. Wound swabs were taken from these patients and cultured.

SPECIMEN COLLECTION AND IDENTIFICATION OF MICRO-ORGANISM

Specimens were obtained using standard collection techniques from the wound and transported to the laboratory immediately for microbiological investigations. Subsequently, the samples collected were cultured and inoculated on various media at

37°C for 24-48 hrs. Isolates were subsequently Gram stained and identified using a myriad of biochemical tests. Antimicrobial susceptibility tests were also carried out on the isolates using the modified Kirby bauer method. The antibiotics tested against include: Ampicillin, Augmentin, Cefuroxime, Ceftazidime, Ceftriaxone, Cefuroxime, Ciprofloxacin, Cloxacillin, Erythromycin, Gentamycin and Ofloxacin.

RESULTS

Of the 49 wound specimen cultured, the most common organism isolated was *Staphylococcus aureus*(23), followed by *Pseudomonas aeruginosa* (16), *E.coli* (9), *Klebsiella* spp.(4) and *Proteus* spp.(1).

TABLE 1. DISTRIBUTION OF WOUND ISOLATES

| Isolates | Antibiotics Susceptibility | | | | | | |
|------------------------|----------------------------|-------------|------------|------------|-----------|---------------|------------|
| | Ceftriaxone | ceftazidime | Augmentin | Gentamycin | Ofloxacin | Ciprofloxacin | Cefuroxime |
| <i>Staph Aureus</i> | 16 (32.6%) | 18 (36.7%) | 11 (22.4%) | 7 (14.2%) | 5 (10.2%) | 3 (6.12%) | 0 (0%) |
| <i>Proteus</i> | 0 (0%) | 1(2%) | 1 (2%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |
| <i>Pseudomonas A.</i> | 7 (14.2%) | 6 (12.2%) | 0 (0%) | 2 (4.0%) | 2 (4.0%) | 0 (0%) | 1 (2%) |
| <i>E.coli</i> | 7 (14.2%) | 4 (8.16%) | 4 (8.16%) | 5 (10.2%) | 1 (2%) | 1(2%) | 0 (0%) |
| <i>Klebsiella Spp.</i> | 1 (2%) | 3 (6.12%) | 3 (6.12%) | 1 (2%) | 1 (2%) | 0 (0%) | 0 (0%) |

Staphylococcus Aureus was most sensitive to ceftazidime, ceftriaxone and Augmentin, gentamycin, ofloxacin and ciprofloxacin respectively.

Pseudomonas was most sensitive to ceftriaxone, ceftazidime and least sensitive to gentamycin, ofloxacin, and cefuroxime.

E.coli was most sensitive to ceftriaxone, gentamycin, augmentin and ceftazidime and least sensitive to ciprofloxacin and ofloxacin.



Klebsiella was most sensitive to augmentin, ceftazidime and least sensitive to ceftriaxone, ofloxacin and gentamycin.

Proteus was sensitive to augmentin and ceftazidime.

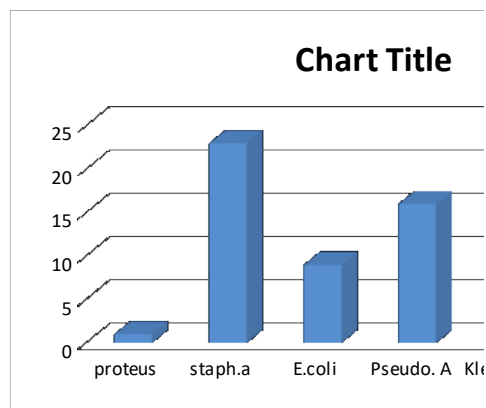


FIGURE 1: showing the most common isolate

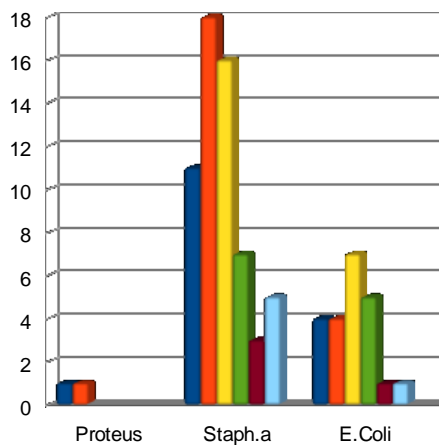


FIGURE 2: SHOWING THE ANTIBIOTICS SENSITIVITY PATTERN OF THE ISOLATES.

DISCUSSION

This study gives an insight to the rate of wound infections and the causative pathogens in this hospital. There were 202 patients who were admitted during the period of this study and of this amount, 49 patients had wound infections while on admission. This shows that the rate of wound infection in this hospital is on the low side (24.2%) given that a high number of patients seen in this department usually have breaches on their skin either from trauma like road traffic accident or from surgery which predisposes them to infections.

Organisms from 5 different microbial genus were found to be responsible for wound infections in the hospital. *Staphylococcus aureus* was the most common pathogen isolated followed by *Pseudomonas Aeruginosa*, *E. coli*, *Klebsiella spp.*, and *Proteus spp.* respectively. These findings are in keeping with other studies conducted in like Ibadan³, Benin City⁴, Maiduguri⁵, Ekpoma⁶, and Abuja⁷.

The prevalence of *Staphylococcus aureus* in wound infections has been associated with the high rate of nasal carriage of this



organism in patients and health care workers involved in the treatment of the patients⁸. *Pseudomonas aeruginosa* is a typical example of opportunistic nosocomial pathogens which is responsible for a wide range of infections and leads to a considerable amount of morbidity and mortality⁸. The incidence of *pseudomonas* infection in this study is the second highest in comparison to other pathogens cultured. Studies have shown that *pseudomonas spp.* has become an important cause of infection especially in patients with compromised host defense mechanisms. It is the fourth most common cause of surgical site infection and the fifth most common isolate overall from all sites⁹.

Of all the antibiotics tested, ceftazidime was shown to be the one most likely to be effective in treating wound infection followed by ceftriaxone when compared to other antibiotics tested in this study. Augmentin and gentamycin were also noticed to be sensitive to most of the pathogens while ciprofloxacin and ofloxacin were the least sensitive. Cefuroxime though amongst the least sensitive, was sensitive only to *pseudomonas A*. In comparison to another study also done in southwestern Nigeria (Ile-Ife) which suggested that quinolones, ciprofloxacin and ofloxacin were quite effective in the management of surgical wound infections in the hospital⁸, the converse was the case in this study where Ceftazidime and ceftriaxone had better outcomes in management of wound sepsis.

CONCLUSION

This study revealed *Staphylococcus aureus*, followed by *Pseudomonas aeruginosa* and enteric organisms as the most commonly isolated microorganisms from wound swabs collected within the retrospective one year period of this study in Federal Medical Center, Abeokuta.

In this study erythromycin and cloxacillin showed an alarming rate of resistance with no organism being sensitive to it. Findings also revealed a high rate of antimicrobial resistance to commonly used antibiotics such as Gentamycin and Ciprofloxacin. Thus, there is a need for enlightenment and development of guidelines on rationale use of antibiotics within the hospital. Further, regular surveillances should be done in various departments of the hospital in order to identify the patterns of wound infections and their antimicrobial sensitivities. It is recommended that continuous communication between the clinical microbiology unit and the managing physicians is advised as this would help to guide empirical treatment of wound infections in the future thereby curtailing the emergence and further spread of resistant bacterial pathogens.

References

1. Wound Infection: Background, Pathophysiology, Etiology- Emedicine by Medscape. Emedicine.medscape.com. Article188988



2. Dr Mary Harding. Wound infection. [HTTPS://Patientinfo/Health/Wound-Infection](https://patientinfo/health/wound-infection). Document ID 29189 (V1)
3. Okesola A.O, Kehinde A.O. Bacteriology of Non-Surgical Wound Infections in Ibadan, Nigeria. *Afri J Med Sci*; 2008; 37: 261-4
4. Egbe C.A, Omoregie R., Igbarumah I.O, Onemu S. Microbiology Of Wound Infections And Its Associated Risk Factors Among Patients Of A Tertiary Hospital In Benin-City, Nigeria. *Journal of Research in Health Sciences* 2011; 11: 109-113.
5. Gadazama G.B, Zailani S.B, Abubakar D, Bakari A.A., Bacteria Pathogens Associated With Infections At The University Of Maiduguri Teaching Hospital, Maiduguri, Nigeria. *KGMS*. 2007, 1:6-9
6. Emele F.E., Izomoh M.I., Aliufohai E. Micro-organism Associated with Wound Infections in Ekpoma, Nigeria. *West Afr J Med*: 1999; April -June 18(2) 97-100.
7. Iregbu K.C., Uwaezuoke N.S., Nwajiobi P.P., Eze S.O., Medugu N., Shettima S., Modibbo Z. A Profile of Wound Infections in National Hospital Abuja. *Afr. J. CLN. EXPER. MICROBIOL.* 14(3): 160-163.
8. Ezekiel O.A., Abdul-Rahid A., Adebayo L. Patterns of Pathogens from Surgical Wound Infections in a Nigerian Hospital and Their Antimicrobial Susceptibility Profiles. *Afr Health Sci.* 2014 Dec; 14(4): 802-809.
9. Pseudomonas Aeruginosa Infections: Practice Essentials, Background, Pathophysiology- Medscape eMedicine.
10. [Emedicine.medscape.com](http://emedicine.medscape.com). Article 226748.



SAFETY PRACTICES AMONG HEALTHCARE INSTITUTION TOWARDS LASSA FEVER PREVENTION IN ESAN WEST LOCAL GOVERNMENT AREA OF EDO STATE NIGERIA

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Abstract:

Background: Lassa fever is an acute viral hemorrhagic fever of significant public health importance which is highly contagious and commonly results in death. It is endemic in Nigeria with outbreaks that often affect health care workers.

Objectives: To assess safety practices of general and private healthcare practitioners towards Lassa fever prevention in Esan West LGA of Edo State

Methods: It was a descriptive cross-sectional study done using a self-administered semi structured questionnaire. It was a total

