

Prevalence And Drug Sensitivity Pattern Of Isolates From Wound Infection In Some Selected Hospitals In Kwara State, Nigeria

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ABSTRACT: This study is designed to determine the prevalence and drug sensitivity of bacteria isolated from wound infection in Kwara States Hospitals. The results obtained from Civil Service Hospitals, Center Igboro and State Specialist Hospital Alagbado show that *Pseudomonas aeruginosa*, *Klebsiella spp* and *Staphylococcus aureus* are the most frequent isolates which sensitive to some antibiotic such as Gentamicin, Ciprofloxacin, Ceftazidime etc. and they also resistant to some antibiotics such as Ampicillin, Chloramphenicol etc.

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INTRODUCTION

Infection is a major cause of morbidity and mortality in patient. Infection is due to the combined effect of impairment of the host natural defence system and systemic dissemination of the colonizing organism (ogunsola et al., 1998).

Wounds can be classified as accidental, pathological or post-operative. Whatever the nature of the wound, infection is the attachment of microorganisms to host cells and they proliferate, colonize and become better placed to cause damage to the host tissues (Collier, 2003). Wound can be infected by a variety of microorganisms

ranging from bacteria to fungus and parasites (Bowler et al., 2001). The common gram-positive organisms are the-hemolytic streptococcus and *Staphylococcus aureus*. The gram negative aerobic rods are *Pseudomonas aeruginosa*.

The facultative anaerobes include *Enterobacter* species, *Escherichia coli*, *Klebsiella species* and *Proteus* species. The fungal organisms are *Candida species* and moulds (*Aspergillus species*) (Gus Gunzalez et al., 2006).

Wound infection is the infection which is caused by damages or injury to the living tissue of the body as a result of attack by some organism e.g. *Staphylococcus aureus*. It can also be defined as a break in the skin or a sutured wound showing signs of infection such as pus or cloudy fluid draining from the wound.

Antimicrobial resistance can increase complication and cost associated with procedures and treatment. An infected wound complicated the post

operative course and results in prolonged stay in the hospital and delayed recovery (Marjorie and Dudas, 1977).

Most bacteria lives on our skin, in the nasopharynx, gastrointestinal tract and other parts of the body with little potential for causing disease because of first line defence within the body. Surgical operation, trauma, burns disease, nutrition and other factors affects the defenses.

The skin barrier is disrupted by every skin incision, and microbial contamination is inevitable, despite the best skin preparation (Howard et; 1980).

Accurate identification of pathogen that causes wound infection may be difficult outside specialist centers owing in appropriate method of specimen collection and inadequate laboratory facilities.

The widespread uses of antibiotics, together with the length of time over which they have been available have led to major problem of resistant organism, contributing to morbidity and mortality. Pathogen that causes wound infections can be parts of the patient normal flora (Endogenous source) or acquired from the environment or from other infected patients (Enterogenous source). The skin bacteria comprise commensals, transients and pathogens. The transient organisms include *Staphylococcus aureus* and *Coliforms*.

Identification of a microbe that has been recovered from a clinical specimen is beneficial to the patient and assists in selection of chemotherapy (Elemer et al., 1977). Wound care is a very important aspect of surgical care. Knowledge of the epidemiology of bacterial pathogens associated with

infected wound is critical in formulating policies on infection control.

Wound infections were significantly more frequent in adults than in children and adolescent. In this study we aimed to determine the prevalence of bacterial pathogens associated with wound infections and their drugs sensitivity pattern in Kwara State, Nigeria.

MATERIALS AND METHODS

The specimens were collected from a total of 1,252 patients attending the general practice clinics, the medical and surgical clinics of this hospitals between may, 2007 and June, 2009. Six hundred and four (48.2%) were from civil service Hospital, 444 (35.5%) were from Centre Igboro Hospital. The remaining 204 (16.3%) were patient from State Specialist Hospital, all in Ilorin metropolis.

The sample collected were wound swab from different site location. The categories of wound infections involved in the study included burns, bruises, bedsores, trauma wounds, post operation sepsis, cellulitis, ulcers, abscesses and

Osteomyelitis. Some of the sample collections were done by the nurses especially from center Igboro Hospital; some by physician from State Specialist Hospital and majority of the collection, regardless of the Hospital were collected by a trained Medical Laboratory Scientist. Wound sample were collected with sterile swab stick from the site of the wound with gentle compression when the sterile swab stick was introduced. Inoculation of blood, chocolate and MacConkey agar was carried out immediately by appropriate cultural technique. The smear were made immediately on clean grease free slide and stained for microscopy, to exclude intracellular organism.

Cultural technique

The various media used included Blood agar (Oxoid No. Cm271), MacConkey agar (Oxoid No. Cm7), Nutrient agar (Oxoid No. Cm2) was used for sensitivity. The agar plates were dried in the oven to remove moisture. Culture was done by streak method Cheesbrough (2000). The plates were streaked aseptically with sterile wire loop to form discrete

colonies. A grease-free glass slide was smeared with the specimen for gram staining. The streaked plates were then incubated at 37°C for 24 h before being observed for any possible growth. Plates were not discarded until after 48 h.

All isolates were identified according to the methods advocated by Cowan and Steel (1993). The specific methods involved were colonial characteristics on media including size, inability to swarm, ability or inability to ferment lactose. Specific tests such as oxidase, catalase, carbohydrate utilization tests, indole formation and citrate tests were done. Susceptibility test was done by the disc diffusion method, a modification of Bauer et al. method (1966). This was a function of the antibiotic initial concentration, its solubility and diffusion rate through agar. Commercially prepared antibiotics discs were placed on the nutrient agar plates that have been inoculated with the test organisms with sterile forceps at least 35 mm apart.

The different antimicrobial agents used and their disc contents were erythromycin 5g, tetracycline 10g, gentamycin 10g, Chloramphenicol 10 g, streptomycin 10g, Ampicillin 10g, Ofloxacin 10g and ciprofloxacin 5g. Plates were incubated for 24 h at 37°C after which the zone of inhibition was measured. In reporting the results, resistance to any antibiotic was represented by R, while S represented sensitivity of the organism to the antibiotic. A standard sensitive strain of *Escherichia Coli* cw3310 was included as the control organism.

RESULT

A total of 1,252 patient aged 0-60 years were examined for different wound infection. Two hundred and eighty (43.2%) accounted for male adolescent and patient in their childhood, while 251 (41.6%) are for female of the same age group from (table 1). Of the 853 isolated from wound swab, *Pseudomonas aeruginosa* account for 182 (21.0%), follow by 151 (18.0%) where Coagulase positive *Staphylococcus aureus*, 148 (17.0%) were for *Proteus species* and 139 (16.0%) were *Klebsiella species*, 124 (15.0 %) were *Escherichia coli* and 109 (13.0%) were *Streptococcus pyogenes*, respectively.

Table 1: Age and sex distribution of patients examined for wound infection

AGE {YRS}	MALE	FEMALE
	NO EXAMINED	NO EXAMINED
< 10	130	115
10-20	150	136
21-40	138	134
41-60	125	116
>60	105	103
Total	648	594

Table 2: Bacterial isolates from wound infection from different site collections

Isolates	Numbers	Percentage
<i>Klebsiella spp</i>	139	16.0%
<i>Pseudomonas aeruginosa</i>	182	21.0%
<i>Staphylococcus aureus</i>	151	18.0%
<i>Proteus species</i>	148	17.0%
<i>Escherichia coli</i>	124	15.0%
<i>Streptococcus pyogenes</i>	109	13.0%
Total	853	100.0%

Table 3: Drug sensitivity pattern of isolates from wound infections.

Organism	Cipro (5 µg)	Gent (10 µg)	Oflo (5 µg)	Chlo (10 µg)	Erthro (10 µg)	Amocil (10 µg)	Strept (10 µg)	Amp (10 µg)	Ceft (10 µg)
<i>S. aureus</i>	S	S	S	R	R	R	R	R	S
<i>Klebsiella sp</i>	S	R	S	R	S	R	S	R	S
<i>Proteus species</i>	S	S	S	R	S	R	S	R	S
<i>Streptococcus sp.</i>	R	S	S	R	S	R	S	S	S
<i>Pseudomonas sp.</i>	S	R	R	R	S	R	R	R	S
<i>Escherichia coli</i>	S	S	S	R	R	R	S	R	S

DISCUSSION

Wound infections are also considered as one of the major health problems in the world. In this study, a high percentage of wound infections occurred in adults than in children and the elderly (>60yrs), this is in agreement with the findings of "Prvitt et al" (1994).

The organisms associated with wound infection were *Klebsiella spp*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus spp*, *Escherichia coli*, *Streptococcus pyogenes*.

The high prevalence of *Pseudomonas aeruginosa* infection in this study may be as a result of its endogenous source of infections.

Staphylococcus aureus was also the most frequent pathogen that causes wound infection according to the result obtained from the culture while *Klebsiella species* was the most frequent pathogen that causes wound infection. Gram negative isolated almost tripled the number of gram positive pathogen that causes the wound infection from the result obtained from the hospitals. This does not agree with the submission of Odugbemi and Coker (1987), but is consistent with the work done by "oni et al. (1997)".

The pre operative antibiotics that the patient received were Gentamicin, penicillin, Ampiclox, Amoxicillin, Ampicillin, metronidazole and others. The most probable reason for their choice being that these antibiotics have been market for long; they are readily available relatively cheap (WHO, 1991).

This study clearly showed that *Pseudomonas sp.* were the most commonly isolated organisms amongst

the Gram negative facultative anaerobic bacilli. This is however contrary to the observations of Kehinde *et al.* (2004) who claimed that *Klebsiella* species were most predominant in burn wounds at 34.4% followed by *Pseudomonas* species (29%) and *Proteus* species the least prevalent (6.5%)

The majority of Gram-negative pathogens isolated were sensitive to Gentamicin, Ceftazidime and Ciprofloxacin. However, most of the Gram-negative pathogen isolated was resistant to Ampicillin, chloramphenicol and Amoxicillin (as shown in table 3). The resistance shown to amoxicillin, Ampicillin, and Chloramphenicol may be due to the antibiotics having been used for so much time and their rate of absorption into the blood stream. Some of them were used as prophylaxis therefore increasing their use in patient. Over use of antibiotic contributes to organisms developing resistance (seppala et al; 1992).

Ceftazidime and ciprofloxacin are third generation cephalosporins that are relatively rare in the hospitals and are expensive. Their high cost and being less readily available to patient means these drugs have not been misused and hence are more effective compared to those that have been in use for quite a long time.

The gram positive isolates were predominantly *Staphylococcus aureus*, which were sensitive to Gentamicin and Ciprofloxacin. All the *Staphylococcus aureus* isolates were resistant to Ampicillin and Erythromycin. This finding is similar to the study done in Mulago Hospital by Wewedru et al (2001)

where *Staphylococcus aureus* is sensitive to Gentamicin and Methicillin. The resistance observed in *Staphylococcus aureus* could also be attributed to irrational use of antibiotics for conditions that may not clinically indicate their use, over the counter sales of antibiotics in pharmacies without prescription by authorized practitioners, some new drug formulations which may be of poor quality and dumping of banned products into the market where the public may get access to them.

The presence of *Escherichia Coli*, *Proteus species* and *Coliforms* can be due to contamination of wound with patient's endogenous flora. *Escherichia Coli* and *Coliform* are normal flora of gastro-intestinal tract (Brown, 1990). The prevalence of antimicrobial pathogens often varies dramatically between communities, hospitals in the same community, and among different patient populations in the same hospital Sexton et al (2000).

CONCLUSION AND RECOMMENDATION

At the end of the research it could be concluded that *Klebsiella spp*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* are predominant pathogens associated with wound infection from the result obtained from Civil Service Hospital, Center Igboro Hospital and State Specialist hospital, Sobi. Ilorin, Kwara State. Nigeria

Some of the pathogens are resistant to some antibiotic due to inappropriate use of the drugs.

It is recommended that Gentamicin, Ciprofloxacin, and Ceftazidime should be used in preference to Ampicillin and Amoxicillin for treatment of wound infection.

Both medical and paramedical staff must be educated regarding the rational use of antibiotics. Similarly, the community at large must be enlightened through proper health education programme about the dangers inherent in self medication. Faced with these variations, the physician in clinical practice has the responsibility of making clinical judgments about likely pathogen(s) involved in the infection process.

To effectively and correctly make such judgments, they should have access to up-to-date data on the prevalence and antimicrobial resistance pattern of commonly encountered pathogens in their practice setting. It is therefore important to institute a system for the surveillance of antimicrobial resistance that will involve the collection and collation of both clinical and microbiological data WHO 2001, Olayinka et.al.2004.

REFERENCES

1. Bauer WA, Kirby MW, Sherris JC, Truck MM (1966). Antibiotic susceptibility testing by standardized single disc method *Am. J. Clin. Pathol.* p. 454.
2. Bowler P, Duerden B, Armstrong D (2001). Wound microbiology and associated approaches to wound management. *Clin. Microbiol. Rev.* 14(2): 244-269. Calvin M (1998). Cutaneous wound repair. *Wounds* 10(1): 12-32.
3. Brown, A.D [1990]: Bacteriology of wound infection in surgical ward in Teaching Hospitals. *West African Journal of medicine.* Pp. 4285-4290.
4. Cheesbrough M (2000). District Laboratory practice manual in tropical countries. Part 2. Cambridge University Press, pp. 178-179.
5. Collier M (2003). Understanding wound inflammation. *Nurs. times* 99(25): 63-64.
6. Cowan ST, Steel KJ (1993), Manual for the identification of medical bacteria. 2nd edition. Cambridge University Press London, pp. 205-209.
7. Duguid JP, Marmion BP, Swain RHA (1978). Medical Microbiology. 13th ed.1 Churchill Livingstone London, pp. 332-333.
8. Elemer, W.K., Stephen, D.A; William M.J; Schreckenberger, P.C; and Winn, W.C; [1997]: Antimicrobial susceptibility testing in, Colour atlas and textbook of diagnostic microbiology. 5th edition. 227 test Washington square, Philadelphia: raven publisher. Pp. 69-120.
9. Gus Gonzalez Bronze MS, Drevets DA, Glatt A, Mylonakis E, Burke AC (2006). <http://www.emedicine.com/MED/topic1929.htm>.
10. Howard, R.J; Ravitch M.M; and Steichen F.M [1980]: Host against infection. Current problems in surgery. *New English Journal of medicine* Pp 1823-1830.
11. McManus, A.T., Mason, A.D., Jr., McManus, W.F and Privitt, B.A., (1994): A decade of reduced Gram – negative infections and mortality associated with improved isolation of burned patient. *Arch surg.*, Pp 1306-1309.
12. Odugbemi T. and Coke A.O (1987): Prevalent hospital-acquired infection in Nigeria: Prevention and cure. *Postgraduate doctor Middle East* Pp. 332-339.
13. Ogunsola, F.T., Oduyebo, O., Iregbu, K.C., Coker, A.O. and Adetuji, A., (1990): A review of nosocomial infections at LUTH: Problems and strategies for improvement. *J. Nigerian infection control association. Vol. 1 Pp14-20.*
14. Okesola, A.O., Oni, A.A and Bakare, R.A (1999): Prevalence and antibiotic sensitivity pattern of methicillin-resistant *Staphylococcus aureus* in Ibadan, Nigeria. *J. Hospital infect* Pp 74-75.
15. Olayinka, A. T; Onile, B.A and Olayinka, B.O (2004). Prevalence of multi-drug resistant in surgical units of Ahmadu Bello University

- Teaching Hospital, Zaria, Nigeria: An indication for effective control measure. *Annals of African medicine* vol3(1):13-16.
16. Olorunfemi P.O, Onaolapo J. A.(1988) Comparative activities of some commonly used antibacterial agents on *S. aureus*, *E. coli* and *P. aeruginosa*. *Nigerian Journal of Pharmaceutical Sciences* 4: 53-57.
 17. Oni AA, Bakare RA, Okesola AO, Ogunlowoha Ewete AF (1997). Pattern of bacteria pathogens in surgical wounds infections. *Afr. J. Med. Sci.* 26:185-186.
 18. Sexton D. J.(2000) The impact of antimicrobial resistance on empiric selection and antimicrobial use in clinical practice. *J Med Liban* ; 48(4): 215-220.
 19. Wewedru, I.C., Godfrey, p. and Fred, K. (2001): *Staphylococcus aureus* antibiotic type at Mulago Hospital. *Mulago Hospital Bulletin* Vol. 4 Pp 62-64.
 20. WHO, author (1991): Basic laboratory procedure in clinical Bacteriology Pp 62-64.
 21. World Health Organization. Surveillance standards for antimicrobial resistance. WHO, Geneva. WHO/CDS/CSR/DRS/2001.5.

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