Surgical bacterial infections and antimicrobial susceptibility patterns at Lilongwe Central Hospital

RM Banda, AS Muula, GR Gwaza, DC Namarika, KC Ng'oma, FE Chintolo, H Yamakazi, AP Muyco.

Abstract

A cross sectional study was done between October 1999 and February 2000 to determine antimicrobial susceptibility patterns of consecutive bacterial isolates of 102 clinical samples among surgical in-patients at Lilongwe Central Hospital (LCH), Malawi. Antimicrobial susceptibility was determined using comparative disc diffusion techniques. 83 (81.4%) samples were culture positive for bacterial growth while 19 (18.6%) grew nothing. Of the 93 culture positive specimens, *Staphylococcus aureus* was the predominant organism 43(51.8%) followed by *Proteus species* 8(9.6%) and *E. coli* 7(8.4%). Overall, 98.6% of all isolates tested against ciprofloxacin were susceptible, and against gentamicin and flucloxacin were 84.8% and 66.7% respectively. 59.3% of isolates tested against chloramphenicol were resistant. We recommend a review on the use of chloramphenicol as first-line antimicrobial therapy among surgical in-patients at Lilongwe Central Hospital. We also recommend restricted use of antimicrobials so as to minimise development of drug resistance. Periodic susceptibility studies are necessary to guide judicious use of antibiotics.

Introduction

Bacterial infections are a major cause of morbidity and mortality in the developing countries [1,2]. The continued surveillance of effectiveness of antimicrobial agents to common bacterial pathogens cannot be over emphasised. Bacterial resistance to microbial pathogens vary from between communities and geographical areas [3,4]. Unfortunately studies are not routinely done to determine antibiotic susceptibility in many developing countries[5]. Choice of antibiotic use may thus not be based on local evidence on bacterial susceptibility. Such use of antimicrobials is not only wasteful, but also promotes bacterial resistance and can result in increased mortality and morbidity. Use of ineffective drugs also leads to selection of resistant strains that then proliferate and spread.

We have studied the antimicrobial susceptibility pattern of bacterial isolates among surgical in-patients at Lilongwe Central Hospital. During the study period, all patients undergoing major surgery at LCH were routinely receiving chloramphenicol plus or minus gentamicin in the immediate pre-operative period.

Materials and Methods

A cross sectional study was conducted jointly by the Department of Surgery at LCH and the Community Health Sciences Unit (CHSU) of the Ministry of Health and Population between October 1999 and February 2000. Consecutive specimens were obtained from wounds and abscesses. Blood samples, pleural and peritoneal fluids were collected in febrile post-operative patients, the latter two depending on clinical indication (see below).

Samples were obtained when there was suspicion of infection suggested by any of the following clinical features; purulent discharge, post-operative fever, failure of wound healing, erythema at incision site, pain or tenderness and localised swelling of the incision site. Specimens were collected using sterile procedures and were immediately put in transport media before being taken to (within three hours) CHSU laboratories for culture and sensitivity studies. Culture was done on MacConkey and Blood agars. Plates were incubated in air at 37°c for 48 hours and positive cultures subsequently identified according to Cowen and Steel[6]. Susceptibility was done by comparative disc diffusion techniques[7] against antibiotics commonly used in Malawi. Resistance or susceptibility was noted.

Results

A total of 102 specimens were collected during the study period, of which 83(81.4%) were culture positive and no growth observed in 19 (18%) samples. *Staphylococcus aureus* comprised the bulk of the isolates 43(51%) followed by *Proteus spp* and *E. coli* (9.6% and 8.4% respectively). Other isolates were as shown in Table 1. Sources of samples are as shown in Table 2. Antibiotic sensitivity results are shown in Table 3.

Table 1: Type of bacteria isolated

Organism	*Number of isolates*	*(% of all growths)*
S. Aureus	43	(51.8%)
Proteus spp	8	(9.6%)
E. coli	7	(8.4%)
Klebsiella spp	4	(4.8%)
Bacillus spp	3	(3.6%)
Enterobacter	3	(3.6%)
Serratia spp	2	(2.4%)
Coagulase neg Staph	2	(2.4%)
Other	11	(13,3%)
Total	83	(100%)

Discussion

The high rate of bacterial resistance against chloramphenicol, trimethoprim and sulphamethazole is likely due to indiscriminate use of antibiotics both within hospital and outside[8,9].Overuse of cotrimoxazole, for example, in the outpatient departments is common in adults and children. The wide availability of sulphamethazole pyrimithamine (SP) for treatment of malaria may also be responsible for the antibacterial resistance against sulpha and trimepthoprim observed in this study[10,11].

The ideal strategy for treating infections would be

guided by laboratory diagnosis with antimicrobial susceptibility results. This is not generally possible, especially in the developing countries. The lack of such information can lead to inappropriate antimicrobial use and development of bacterial resistance[12,13]. Surveillance is important from time to time to guide empirical drug choice. Even in the developed countries, a choice of antibiotic may need to be made for serious infection before laboratory results are available

Table 2: Sources of specimens and relationship to presence of *S. aureus*

Source	*Frequency*	*Number with S.aureus*
Abscess	32	12
Open wounds (non surgical)	30	10
Post-operative wounds	24	14
Other sites	16	7
Total	102	43

Note: Other included peritoneal and pleural fluid, and blood. There was no growth from any blood sample.

This study suggests that empirical use of chloramphenicol as first-line perioperative therapy at LCH may not be justified anymore. The effectiveness of ciprofloxacin in virtually all isolates might suggest a change from chloramphenicol to ciprofloxacin. The cost of ciprofloxacillin is several times higher than chloramphenicol and such practice would soon lead to ciprofloxacin resistance being widespread[14].

As many of the isolates were susceptible to Gentamicin, the continued use of the drug in surgical conditions is thus indicated.

Table 3: Antibiotic sensitivity patterns of the isolated strains

Antibiotic	*Sensitive Isolates*	*Resistant isolates*	*Sensitivity Rate (%)*
Ciprofloxacin	69	1	98.6
Gentamicin	56	10	84.8
Flucloxacillin	22	11	66.7
Chloramphenicol	22	32	40.7
Cephalexin	10	15	40.0
Trimethoprim	5	9	35.7
Sulphamethazole	10	24	29.4
Tetracycline	2	8	20
Penicillin V	3	47	6.0
Amoxycillin	0	25	0.0

We recommend continued surveillance of bacterial antimicrobial sensitivities at LCH. There is need to reinforce rational antimicrobial use to limit emergence and spread of resistant bacterial strains[15,16].We also wish to reiterate the need for observance of simple but effective aseptic techniques[17-19] during surgery rather than over-reliance on antibiotics. Further, there may be alternatives to antibiotics. For example, there is evidence that honey has anti-Staphylococcal properties [20-21]. We suggest that its use be promoted in prevention and treatment of local sepsis rather than over-reliance on antibiotics.

The significance, prevention and management of sepsis among surgical patients should remain a high priority issue[22]. The high resistance of isolates against penicillin is not surprising as the majority of isolates were *S.aureus* which has long been penicillin-resistant[23,24].

A limitation of the study was that we were not able to test sensitivities of isolates against all the antimicrobials during the whole study period as was initially planned. This was due to scarcity of antimicrobial discs especially for metronidazole and penicillin V. Specimen collection was also non-random and may not have been representative of all causes of infection among surgical sepsis. It is also possible that some of the specimen that had no growth could have been due to prior antibiotic use. Finally, we did not attempt to culture for Mycobacteria and thus may have missed these infections, especially in deep seated abscesses.

Acknowledgements

We are greatly indebted to the Medical Director, staff in the Surgical Wards and Operating Theatre at Lilongwe Central Hospital for their support. We thank all the staff in the Microbiology Department at Community Health Sciences Unit (CHSU) and Lilongwe Central Hospital, Lilongwe. Many thanks to Dr George Joaki and Ms Mandy Walsh for useful comments on earlier drafts of the paper. The study was funded by Japanese International Agency (JICA)-CHSU Project.

Preliminary findings of this study were presented at the Association of Surgeons in East and Southern African Meeting at Kasungu in 2000. A poster presentation was also made for the Fourth Research Dissemination Conference of the College of Medicine, University of Malawi on 18 November, 2000

[a]Banda RM, [a,b]Muula AS, [a]Gwaza GR, [a]Namarika DC, [a]Ng'oma KC, [c]Chintolo FE, [c]Yamazaki H, [b]Muyco AP [a]Department of Surgery, Lilongwe Central Hospital (LCH), PO Box 149, Lilongwe, Malawi; [b]Department of Community Health, University of Malawi College of Medicine, Private Bag 360, Chichiri, Blantyre 3, Malawi ,[c]Community Health Sciences Unit (CHSU), Private Bag 65, Lilongwe Malawi

Correspondence: Dr Adamson S Muula, Department of Community Health, University of Malawi College of Medicine, Private Bag 360, Blantyre 3, Malawi. Fax: (265) 674 700; E-mail: a_muula@yahoo.com

References

1. Perine PL, Wolde GP, Tassew A. Common bacterial pathogens in Addis Ababa, 1969-1974. Frequency of isoalation. Ethio Med J. 1975, 1975;13:61
2. Wamola IA. Infections (Editorial). East Afr Med J. 1986;63:505-506
3. World Health Organisation. WHO Scientific Working Group. Bull of the WHO, 1983;61:383-394
4. World Health Organisation. Control of antibiotic-resistant bacterial: Memorandum from a WHO meeting. Bull of the WHO, 1983;61:423-433
5. Urassa WK, Mwakagile D, Mohammed K, Msangi V. Susceptibility pattern of uropathogenic gram negative bacilli to antimcrobial chemotherapeutic agents in a national hospital in Dar es Salaam. East Afr Med J, 1997;74: 162-165
6. Malonza IM, Omari MA, Bwayo JJ, Mwatha AK, Mutere AN, Murage EM, Ndinya-Achola JO. Community acquired bacterial infections and their antimicrobial susceptibility in Nairobi, Kenya. East Afr Med J, 1999;74(3):166-170
7. Bauer AW, Kirby WMM, Sherris JC, Turk M. Antibiotic susceptibility testing by a standard single disc diffusion method. Amer J Clinical Pathol 1966;45: 493-496
8. Aseffa A, Desta Z, Tadesse I. Prescribing patterns of antibacterial drugs in a teaching hospital in Gondar, Ethiopia. East Afr Med J, 1995;72:56-59
9. Indalo AA. Antibiotic sale behaviour in Nairobi: a contributing factor to antimicrobial drug resistance. East Afr Med J, 1997;74:171-173
10. NwanyanwuOC, Ziba C, Macheso A, Kazembe P. efficacy of sulphadoxine-pyrimethamine for acute uncomplicated malaria due to Plasmodium falciparum in Malawian children under five years old. Trop Med Int Health, 2000; 5(5), 355-8
11. Feikin DR, Dowelkl SF, Nwanyanwu OC, Klugman KP, Kazembe PN, Barat LM, Graf C, Bloland PB, Ziba C, huebner RE, Schwartz B. Increased carriage of trimethoprim/suplamethazole-resistant Streptococcus pneumoniae in Malawian children

after treatment for malaria with sulphadoxine/pyrimethamine. J Infect Dis, 2000;181(4):1501-5
12. Health Sigal LH. Management of Lyme disease refractory to antbiotic therapy. Rheum Clin N. America, 1995; 21: 217-230
13. Kamiya Y. Experiences and studies on antimicrobial resistance Japan: useful lessons foe developing countries. East Afr Med J, 1997;74:174-176
14. Hooper DC. Mechanisms of flouroquinolone resistance. Drug Resist Update, 1999, 2(1): 38-35
15. Wyatt TD, Ferguson WP, Wilson TS. Defence against bacterial drug resistance. BMJ, 1976;ii:1053
16. Wyatt TD, Passmore CM, Morrow NC, Reilly PM. Antibiotic prescribing: the need for policy in general practice. BMJ, 1990;300:441-444
17. Ojiebe GC, Njoku-Obi ANU, Ojukwu JO. Incidence and parametric determinants of post-operative wound infections in a University Teaching Hospital. C Afr Med J, 1990;36:63-67
18. Edelom EOO, Onile BA. Peri-operative infection in Nigerians: a seven year prospective study. East Afr Med J, 1990;67:172-181
19. Moreea S, Rajah F, Rycken J. Pilot study of post-operative infections in incisional wounds and split skin grafts in a provincial hospital in Zimbabwe. Trop Doctor 1993; 23: 160-164
20. Cooper RA, Molan OC, Harding KG. Antibacterial activity of honey against Staphylococcus aureus from infected wounds. J R Soc Med, 1999;92:283-285
21. Tovey F. Honey and sugar as wound dressing for wounds and ulcers (Editorial). Trop Doctor, 2000;30:1
22. Lavy C, Schmidt C, Kalua E, Phuka J. The resistable rise of surgical sepsis in Malawi. Malawi Med J 2000;13(1):35-36
23. Livermore DM. Antibiotic resistance in Staphyloccoci. Int J Antimicrob Agents, 2000;16 Suppl 1:S 3-10
24. Diekema DJ, Pfaller MA, Tornidge J, Verhoef J, Bell J, Fluit AC, Doern GW, Jones RV. Genetic relatedness of multidrug-resistant methicillin (oxacillin)-resistant Staphyloccocus aureus isolates from SENTR Antimicrobial Resistance Surveillance Centres World Wide 1998. Microb Drug Resist 2000, 6(3): 213-21

MMJ SUBSCRIPTION FORM

Personal details *(Please complete in block letters)*

Name..... Date.....

Occupation.....

(If you work in medicine please also state your speciality)

Address.....

.....

* Please enter my subscription to the Malawi Medical Journal
Starting from the month.....

* I enclose a cash/ cheque @.....

* Signature.....
(your signature is essential)

The Malawi Medical Journal is a quarterly magazine. The price per issue is: **Specialist MK200**
Interns MK 75
Students MK 50

For a one year subsriptions (4 issues) no postage will be charged within Malawi

MMJ, P/ Bag 360, Chichiri, Blantyre 3