CURRENT TRENDS IN ANTIBIOTIC RESISTANCE IN UNIVERSITY COLLEGE HOSPITAL

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ABSTRACT

This is a retrospective study carried out at the department of Medical Microbiology, University College Hospital (UCH), Ibadan. Data retrieved focused on the following organisms - Methicillin resistant *Staphylococcus aureus* (MRSA), *Streptococcus pneumoniae, Klebsiella species, Escherichia coli, Pseudomonas aeruginosa*, Proteus species and Penicillinase producing *Neisseria gonnorhea* {PPNG}.

The frequency of MRSA strains among *Staphylococcus aureus* isolated from wounds was 24.4% at MIC of >8ug/ml while another 24.4% were also seen to be boderline resistant at MIC 4-8ug/ml. All the MRSA strains isolated were sensitive to cancomycin.

Klebsiella specie the commonest gram negative organism was found to have greater thann 80% resistance to amplicillin and cotrimoxazole . *Escherichia coli* showed 91.2% and 100% resistance to amplicillin and contrimoxazole respectively, with 32% being resistant to gentamicin. Pseudomonas aeruginosa showed 100% resistant to ampicillin, tetracycline and cotrimoxazole. Ofloxacin and chloramphenicol were most effective against the gram negative organisms showing resistant rate of about 7%. As at 1996 the incidence of PPNG in Ibadan stood at 92.2%, whereas in 1970 there was virtually no incidence of PPNG. Drugs used nowadays to treat infections by this organism are third generation cephalosporins, quinolones and spectinomycin.

15.6% of the isolated *Streptococcus pneumoniae* were resistant to penicillin, however in Ghana and South Africa the rates reported were 30.6% and 7% respectively.

Data like this play an important role determing the course of rational therapy and all efforts must be made to determine the prevaalence rates of bacterial resistance in each locality oor beetter still each hospital.

INTRODUCTION

Antibiotic resistance has evolved over the past 50 years from a merely microbiological curiosity to a serious medical problem in hospital all over the world. resistance has been reported in almost all species of Gram-positive and negative bacteria to vaarious classes of antibiotics including recently developed ones.

Empiric therapy is common practice and the prevalence of resistance bacteria can lead to erroneous empirical selection of either non-effective or expensive drugs, prolonging hospitalization and resulting in higher mortality. Community acquired pathogen such as Salmonella, Shigella and *Neisseria gonorrhoeae* are often resistant to various antimicrobial agents. Also extended-spectrum betaa lactamase producing *Escherichia coli* and *Klebsiella pneumoniae* has become widespread and even carbapenem resistant *Pseudomonas aeruginosa* is increasing[1].

The emergence and spread of resistant bacteria are unavoidable unless antimicrobial agents are not used at all.

The high prevalence of resistant bacteria seems to be related to antibiotic usage;

1. Easy availability without prescription at drug stores
2. Unjudicious use in hospital
3. Uncontrolled use in agriculture, animal husbandry and fisheris.

Nosocomial infections are also an important factor in the spread of resistant basteria[2].

Bacteria acquire resistance by reducing permeability and intracellular accumulation, by alteration of targets of antibiotic action and by enzymatic modification of antibiotic activity[2].

Previous studies done here at Ibadan has also shown an increase in antibiotic resistance, for example in 1977 the prevalanece of penicillinase producing *Neisseria gonorrheae* was 0%, by 1979, osoba et al found a prevalence rate of 2.7%[3,4,5,6.] by 1981 it was 50% and by 1986 it was 70%. Presently the prevalence rate is about 92.4%[7].

Similar trend is also seen in the prevalence of penicillin resistant *Streptococcus pneumoniae* and methicillin resistant *Staphylococcus aureus* in this hospital.

Since the development of epoch-making new antibiotics is not expected in the near future it has become very important to use existing antibiotics prudently based on mechanism of action and bacterial resistance[3]. This can only be achieved if there are available data in the epidemiology and trends of resistance of various organism because they detrmine our choice for treatment and give direction to empiric therapy[7].

This is even more important in an environment like ours where emphasis is placed on cheap and effective antibiotics as first line drugs and these are the ones easily susceptible to antibiotic resistance. Thus the patient is forced to use more expensive drugs. Thus antibiotic resistance not only has health implications, but also financial implications for the patient in a depressed economy. this study therefore aims to look into the local antibiotic sesceptibility patterns in theis environment so as to enable us give direction to empiric therapy.

MATERIALS AND METHODS

Our study was carried out at the University College Hospital (UCH) Ibadan. It is a referral center which serves a large portion of Western Nigeria. Patients to the hospital represent a broad spectrum of the general population.

Records of the sensitivity patterns of various organism were retreived at the department of Medical Microbiology UCH, Ibadan.

RESULTS

Data retrived focused mainly on the following organisms

- methicillin resistant *Staphylococcus aureus* (MRSA)
- penicillinase producing *Neisseria gonorrheae* (PPNG)
- *Escherichi coli*
- Proteus species
- Klebsiella species
- *Pseudomonas aeruginosa*
- *Streptococcus pneumoniae*

Sources of specimens included surgical wounds, bruns, blood, urine, genital tract, sputum, ear and throat swabs. Concerning isolates from urine, Gram negative bacteria formed 86.2%. Klebsiella (40.9%), was the predominant organism, followed by Pseudomonas specie (22.7%), and *Pseudomonas aeruginosa* (13.6), while *E. coli* and proteus species were 4.5% each. *Staphyloccus aureus* was the only Gram postive isolate from urine and it represented 13.6% (Table 1).

Table 1 Distribution of major groups of gram negative isolates studied.

ORGANISM	PERCENTAGE
Klebsiella specie	*40.9%*
Escherichia coli	*4.5%*
Proteus specie	*4.5%*
Pseudomonas speci	*22.7%*
Pseudomonas aeruginosa	*13.6%*
Staphylococcus aureus	*13.6%*

Table 2 shows the frequency of MRSA strains among *Staphylococcus aureus* isolated from wounds. About 24.4% of the *Staphylococcus aureus* were resistant at an MIC of >8ug/ml while an equal percentage (24.4%) were also seen to be dorderline resistant at MIC between 4-8ug/ml. Only 51.2% were sensitive.

Table 2 Frequency of MRSA strains among Staphylococcus aureus isolated.

CATEGORIES	NUMBER	PERCENTAGE
Methicilling reistant MIC>8ug/ml	19	24.4%
Borderline methicillin Resistant MIC 4-8ug/ml	19	24.4%
Methicilling Sensitive	40	51.2%

Still on MRSA figure 1 shows that no MRSA was sensitive to penicillin, about 10.5% were sensitive to azithromycin while 100% were sensitive to vancomycin, ofloxacin and chloramphenicol.

On urinary tract organism Figure 2 shows the trenss in reistance to klebsiella specie, ampicillin, tetracycline, and contimoxazole were found to have greater than 80% resistance (95%, 80% and 93% respectively) while the organism was more susceptible to nalidixic acid, chloramphenicol and ofloxacin, which had resistance rates of 19.3%, and 5% respectively.

In Figure 3, patterns of resistance of E. coli are illustaarted, ampicillin tetracycline and contrimoxazole had the highest rates of resistance while nalidixic acid, cloramphenicol and ofloxacin had the leasr, this is simmilar to that of Klebsiella, although in this case none of the E. coli strains showed resistance to ofloxacin.

Figure 4 also showed high rate off resistance of Pseudomonas specie to ampicillin, tetracyline , cotrimoxazole, gentamycin

Figure 2

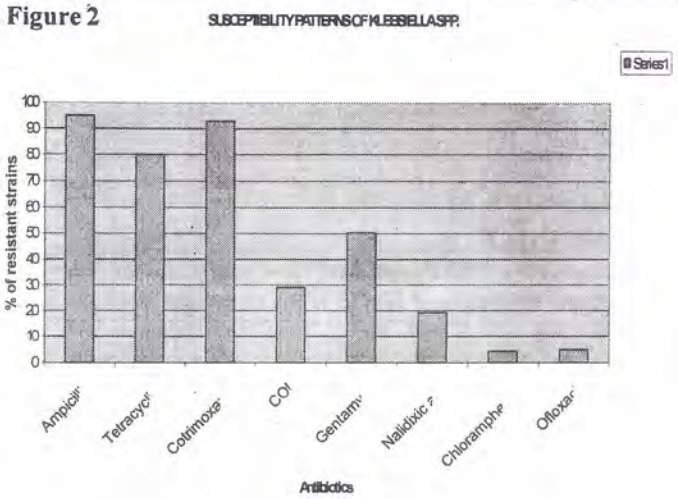


Figure 3

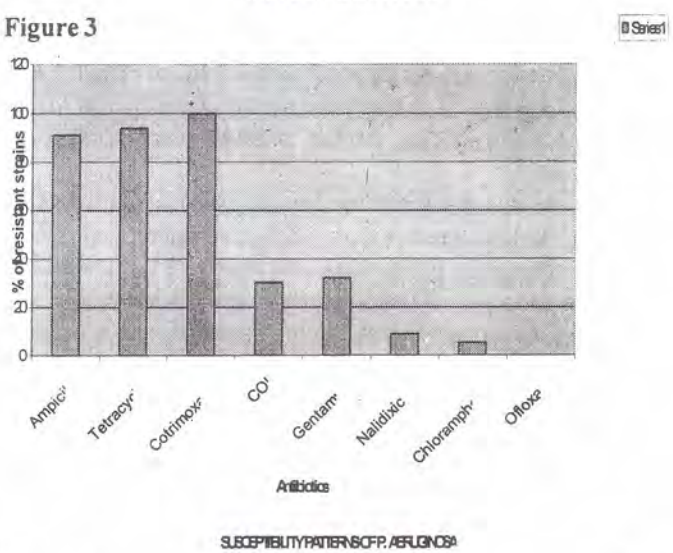
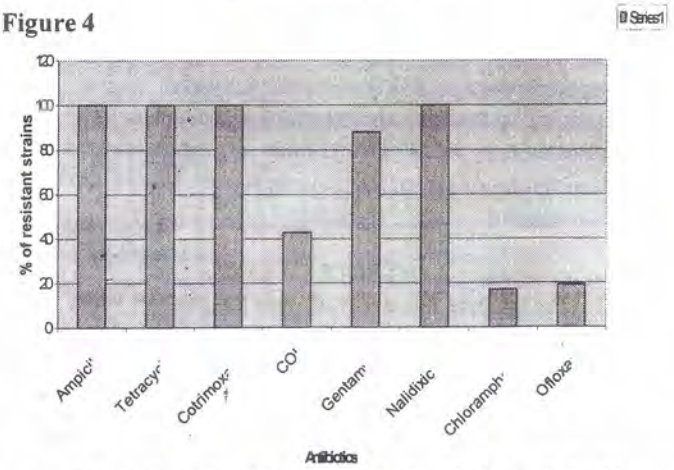


Figure 4



and nalidic acid, while chlotamphenicol and ofloxacin had lower rates of 17% and 19% respectively.

In figure 5, Proteus species showed 100% resistance to tetracycline and COL while none was resistant to chloramphenicol.

The most effective antibiotics chloramphenicol and ofloxacin were effective aagainst 93% of the isolates. In 1977 the incidence of PPNG was 0% as at 1981 it rose 50%, rising further to 92.2% by 1996 (figure 6).

showed less than 50% susceptibility to 3rd generation cephalosporins, ceftazidime, ceftriazone and cefuroxime. Although a study in Ghana by Ohene et al, showd third generation cephalosporins to be very effective against gram negative organism, Klebsiella inclusive[11]. This brings to light the geographic variations in antibiotic sensitivity of various organisms and the need for antibiograms for each locality or better still each hospital.

CONCLUSION.

Antibiotic resistance is a real problem in Nigeria because of the easy accessibility of antibiotics and the presence in the market of many substandard drugs[20]. The trend as has been illustrated is for increasing resistance to all antibiotics. many of the common organisms are already resistant to many of the common and cheaper antibiotics with negative implications for therapy. There is need for a continuous surveillance of antimicrobial resistance trends in the country. If rational therapy is to be applied, then clinicians must be aware of local infecting organisms and their susceptibility and resistance patterns. Also surveillance data if used correctly by health officials is essential in order to achieve cost containment and resist increase in resistance.

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