

## Retrospective Survey of Antibiotic Prescriptions in Dentistry

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### Abstract

**Objective:** To evaluate dentists' prescription writing patterns and their appreciation of the characteristics of antibiotics.

**Design:** Evaluation of drug prescriptions written over a six-month period.

**Setting:** Dental Hospital, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria.

**Subjects:** Retrospective analysis of 313 prescriptions written by dentists attending to outpatient dental patients.

**Results:** The total number of drugs on one prescription ranged from one to seven with Penicillins being the most commonly prescribed drug. Some prescriptions were found to be incorrect with regards to dose, frequency, and duration. Instructions as to the best time of administering drugs with regards to meals were not stated in any prescription.

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**Conclusion:** Improvement through continuing education is desired on the part of prescribers to ensure a good standard of care and avoid practices that may increase antimicrobial resistance. Drug information services including side effects and drug interactions for professionals and consumers at the hospital is highly desirable.

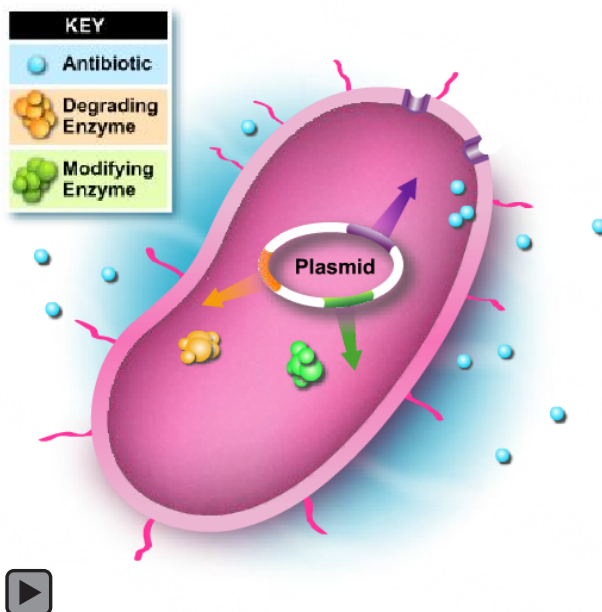
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## Introduction

Infections are the most common underlying causes of many morbid states.<sup>1</sup> Pathogenic microorganisms (bacteria, viruses, and fungi) are vast and varied, making infections a challenge to the medical practice, and antibiotics important in the prophylaxis and management of infection. The challenge is made more complex by the issues of emerging new diseases, resistance of existing conditions to traditional drug treatment, and the socio-economic indices that are on the decline.<sup>2</sup> Although there are an increasing number of antibiotics available to combat oral infections, the advantages of these agents are tempered by undesirable side effects.

There are many oral diseases that require the use of antibiotics<sup>3</sup>; this is a good indication dental practitioners need to (1) be cautious and (2) continuously update their knowledge about antibiotics. As with other classes of drugs, antibiotics have not only side effects but the ability to interact with themselves and other drugs used concomitantly. Most antibiotics have to be taken on an empty stomach because of the effect of food on their absorption and, consequently, on bioavailability.<sup>4</sup> Adequate appreciation of the characteristics of antibiotics will lead to their rational prescribing and, therefore, to optimal benefit for the patients.<sup>5</sup>



Rational antibiotic use has become imperative in order to stem the emergence of new diseases or resistant strains of pathogens to current therapy. The present study reports on the prescription patterns and the state of appreciation of the characteristics of antibiotics at the Dental hospital, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife in the South Western part of Nigeria. This study (1) investigated compliance with prescription writing ideals, identifying gaps and lapses, (2) investigated the correctness of doses, and (3) made recommendations to clinicians and other prescribers.

## Materials and Methods

A retrospective study of prescriptions over a six-month period at the outpatient unit of the Dental hospital, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife was carried out. An analysis of the frequency for each antibiotic prescribed was done using the SPSS statistical

version 9.0 package (SPSS Inc.1990). The prescriptions were analysed for entry of relevant demographic data, date, type of antibiotic, dose, frequency, duration, compatibility of concurrently prescribed drugs, and relevant dosing instructions. The legibility of and the omissions in the prescriptions were also noted.



in 50 (16.0%) cases. Cotrimoxazole (Septrin®) was prescribed in seven (2.2%) cases, Ampiclox capsules in 25 (8.0%), Ampicillin capsules in 39 (12.5%), Erythromycin tablets in 22 (7.0%), and Tetracycline capsules in 13 (4.2%) of the prescriptions.

Penicillin and Erythromycin tablets and Ampiclox and Ampicillin capsules were prescribed in the correct dosage in all cases. The dosage for 18 (36.0%) of the 50 Metronidazole prescriptions were incorrectly written.

### Results

Three hundred and thirteen prescriptions were included in the study. The gender was not indicated in 117 (37.4%) of the prescriptions, and of the remaining 196, 101 (51.5%) were females and 95 (48.5%) were males. The mean age was found to be  $30.2 \pm 17.7$  (range one to eighty) years. The mean number of drugs prescribed was  $2.03 \pm 0.95$  (range one to seven) with a mode of two (153 prescriptions or 48.9%). The instructions as to the best time of administering the drugs (before or after meal) were not included in any of the 313 prescriptions.

Antibiotics were included in 247 (82.1%) of the 313 prescriptions. Forty-three prescriptions (13.8%) did not include the address of the patients, while three (1.0%) were not signed by the prescribing dentists.

As shown in Table 1, Penicillin tablets were prescribed in 114 (36.4%) of the 313 prescriptions. Metronidazole tablets were prescribed

Of the 13 prescriptions for Tetracycline and 7 prescriptions for Cotrimoxazole, one prescription dose was found to be incorrect for each product.

All the seven prescriptions for Procaine Penicillin and Streptomycin had the correct dosages.

### Discussion

The mean age of the patients was  $30 \pm 17.7$  years. Some of the antibiotics prescribed are broad-spectrum in nature. In the likely event any of the female patients were on oral contraceptive pills, there could be contraceptive failure.<sup>6</sup> The interaction between antibiotics and the oestrogenics has been known for some time; prescribers should not underestimate this possible complication. Even though the use of oral contraception is not an obstacle to the administration of antibiotics, it calls for a cautious prescription as well as informing the patient of the risks involved.<sup>7</sup> The dentist should, therefore, be cautious when prescribing antibiotics for this group of women patients.

**Table 1. Distribution of antibiotic prescriptions and dosage errors.**

Drug	Number (% of 313 Rx)	Dosage Errors
Penicillin V tablets	114 (36.4%)	0
Metronidazole	50 (16.0%)	18
Ampicillin capsules	39 (12.5%)	0
Ampiclox capsules	25 (8.0%)	0
Erythromycin	22 (7.0%)	0
Tetracycline capsules	13 (4.2%)	1
Procaine Penicillin and Streptomycin	7 (2.2%)	0
Cotrimoxazole (Septrin®)	7 (2.2%)	1
<b>Total</b>	<b>277</b>	<b>20</b>

\* Multiple antibiotics were prescribed in some cases, hence, the total number is more than 247.



While it is true prescribers do an in-depth clerkship of their patients, prescriptions were generally empirical based on the knowledge that oral infections are caused by the normal commensals in the oral cavity, which are generally sensitive to the penicillins. Another probable reason why penicillin was favoured is for reasons of low-cost because a large percentage of the patients belong to the lower socio-economic class. The patients seen at the dental hospital are out patients so laboratory tests were not done to establish either patients' bacterial culture and microbial sensitivity or renal and hepatic functions. Some of the prescribed antibiotics have different therapeutic outcomes depending on the status of both the renal and hepatic functions of the patient.<sup>8</sup>

From the results of the present study, eight antibiotics were frequently prescribed either singly or in combinations. Penicillin tablets were the most frequently prescribed (36.4%), followed by Metronidazole tablets (16.0%), Ampicillin capsules, Ampiclox capsules, Erythromycin tablets, Tetracycline capsules, Cotrimoxazole tablets, and Procaine Penicillin

and Streptomycin sulphate injections. The Penicillins are the first line of drugs for odontogenic infections, while Metronidazole is prescribed for ulcerative gingivitis. Each of the drugs has some characteristics, which present prescribers with the challenges of side effects, contraindications, precautions, and interactions. Metronidazole tablets and Cotrimoxazole tablets should be taken after food. Their absorption is not affected by food, while they have the propensity to cause gastric irritation.<sup>9</sup> All the other antibiotics prescribed should be taken on an empty stomach for optimal absorption and effect.<sup>9</sup> Nausea, vomiting, diarrhea, stomatitis, and drug rash may occur with Cotrimoxazole and Metronidazole.<sup>10</sup> Oral Metronidazole interacts with alcohol, producing disulfiram-like reactions such as flushing, headache, and hypotension. Patients should be educated about these side effects. Penicillins may produce a hypersensitivity reaction in allergic patients; therefore, there is a need for a consistent family/drug history.<sup>11</sup> Asthmatic patients with dental diseases should not be given penicillin products.

The results of the study show Tetracycline and Penicillin tablets were prescribed together in three (1.0%) of the 313 prescriptions. These prescriptions are not rational, as Tetracyclines and the B-lactain antibiotics (Penicillins, Cephalosporins) interact.<sup>11</sup> Tetracycline is a bacteriostatic agent, while the B-lactains are bactericidal. The bactericidal activity of the B-lactains require actively replicating cells, while the bacteriostatic activity of Tetracycline will prevent the cell replication, leading to possible failure of the bactericidal activity of the B-lactains. The possibility of serious complications resulting from drug interactions should be borne in mind when combination drugs are being prescribed.

Discrepancies were noted in the prescriptions. While the doses prescribed for Penicillin, Ampiclox, and Erythromycin were correct, the doses of Metronidazole, Tetracycline, and Cotrimoxazole were often incorrect. Appropriate and correct use of antibiotics has been advised to ensure effective and safe treatment is available and practices that may enhance microbial resistance are avoided.<sup>12</sup> Dosages should conform to accepted pharmacokinetics and take into consideration



the patient's age, as well as, the presence of kidney and liver disease.<sup>13</sup> All these are essential to securing optimal therapeutical success with reduced risks. No case of over-prescription was noted. Issues of correctness of doses across the ages and interactions are pertinent to antibiotic use. Where only one drug is prescribed, necessary information to ensure compliance and benefit should still be of interest to the prescriber.

### Conclusion

Prescription writing patterns of antibiotics in the hospital that was studied need to be improved. For optimal care, dentists need an adequate knowledge of and continuing

education in therapeutics. Professionals are often faced with the decision of whether to use a time-honored antibiotic or a new drug. They also need to consider the economic as well as clinical outcomes of these drugs, especially in an economy like Nigeria. The provision of pharmaceutical services at the hospital will help alleviate these problems, especially in choosing the most effective therapy for common dental infections.

For more information on this subject readers can visit the Internet Drug Index at <http://www.rxlist.com/>.

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