Auditing of the prescription of antimicrobials in a dental school: perspective to rational use

Auditoria da prescrição de antibacterianos em uma faculdade de odontologia: perspectiva para o uso racional

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ABSTRACT

Objective: To audit the prescriptions of antimicrobials in the School of Dentistry of the Federal University of Goiás in order to identify the most prescribed ones, which doses were used for prophylactic and therapeutic measures and the patients' clinical pictures that justified the prescriptions. Methods: From the patients' records and prescriptions the following information was collected: prescribed antibiotic; dose; duration of treatment; patients' clinical pictures and medical histories; dental clinic where the patient was treated and clinical procedure performed. Results: Seven hundred and eighteen patients' records were analyzed and 180 antimicrobial prescriptions were identified. The results showed that the Emergency Clinic was responsible for the highest number of prescriptions. When we consider the type of antimicrobial prescribed, the amoxicillin, amoxicillin in association with clavulanate acid or in association with metronidazole represent the majority of the prescriptions. Conclusion: The treatment of dentistry emergencies was responsible for the highest number of prescriptions and amoxicillin was the most prescribed antibiotic. Variations regarding duration of treatment and the moment of the prescription were identified.

KEYWORDS: Anti-Bacterial Agents; Drug Resistance; Microbial; Dentistry.

INTRODUCTION

The bacterial resistance is a serious emerging problem around the world and many factors may contribute to its development, being determinant the abusive and inappropriate use of antimicrobial substances. A program for the rational use of antimicrobial substances in health facilities is understood as an action set destined to rationalize prescription of such drugs, varying from the simple evaluations of global consumption to complex processes of consultancy, conduct standardization and interventional measures (1, 2).

A growing problem, in the context of the microbial resistance, is probably related to the increasing use of broad spectrum drugs such as cefalosporin and fluoroquinolones. This indiscriminate drug use has the potential of decreasing the drugs' efficacy, in situations when they are really needed (3). In this context, there is a tendency in questioning which antimicrobial substance should be used, instead of which one will be most useful to a particular situation at the time (4). The bacterial resistance to the antibiotics can be defined, genotipically, when the bacteria carries genetic elements of resistance or phenotipically, when the bacteria can survive and grow under certain levels of antibiotics in a lab or even clinically and when the bacteria is able to replicate in humans in the presence of large concentrations of drugs during therapy (5, 6).

When a patient undergoes antibiotic therapy, both the pathogen and the individual microbiota will be affected. The ideal antibiotic would be the one that would effectively eliminate the microorganisms responsible for the infection without causing, at the same time, damage to the individual's microbiota. This ideal antibiotic does not exist and the continuous use of broad spectrun agents can contribute to the pathogenic bacteria and normal bacteria antibiotic resistance. These bacterias can transfer resistance genes to other pathogens passing through the body and be spread to other individuals, likely increasing the virulence of other pathogens (5). In order to contemplate the microbial resistance in a prescription one has to consider the previous use of antimicrobials by that patient. This is what is known as anamnesis directed to the risk of infection by selected microbiota (1).

In dentistry, a smaller number of antimicrobial prescriptions are filled, comparing to the medical class. However, there is a dissemination of the use of broad spectrum drugs based on the prescription of antibiotics in an empiric way, due to the complexity of the oral microbiota that has had more than 500 species of different microorganisms identified (6, 7).

The use of antimicrobials in dentistry is based on probabilistic reasoning, considering the pathogens that are more likely to be observed in epidemiological studies (8, 9). In this context, the planning and implementation of clinical protocols is needed in order to avoid the unnecessary use of such drugs when they are not needed.

Dental schools that provide services to the community should implement a policy of rational use of antimicrobials when considering the global issue of microbial drug resistance. It is also im-

portant to establish a connection between the basic knowledge of pharmacology and microbiology, during the clinical training of the professional, so that the proper training in antimicrobial prescription is achieved.

When considering an internal audit procedure, the analysis of the prescriptions aims at the identification of the most prescribed antimicrobials, the dosage used for prophylactic and therapeutic measures, the clinical indications that justified their use, and in this way, identify if there is improper and abusive use of such drugs. For the institution, this would be the first step towards the establishment of a prescription protocol that would comprise certain individualizations, needed for certain cases, and also provide for a continuous educational process for the prescribers (10).

MATERIAL AND METHODS

This analytical-based cross-sectional study analyzed the patient's records from Dental clinics located at the School of Dentistry of the Federal University of Goiás (SD/FUG) during the period from 2009 to 2010. This investigation was approved by the Research Ethics Committee of the Federal University of Goiás (Nº 033/2009).

The data collection was carried out preserving the identity of both the patients and prescribers, and one copy of each prescription was filed with the patient's information. The files that did not have information regarding the identification of the patient or the procedures, or those that did not include a copy of the prescription, or had illegible prescription or did not contain antimicrobial prescription were excluded from the study.

The data collected from the prescriptions and patients' records included: prescribed antimicrobial; dosage, that comprehends the concentration, dose and treatment duration; antimicrobial recommendation, if it was therapeutic or prophylactic; clinic condition that justifies the prophylactic use of the antimicrobial (when applied), and finally the clinical procedure. All the data was compiled in specific file and analyzed using the statistical software Epi-Info (version 3.5.1).

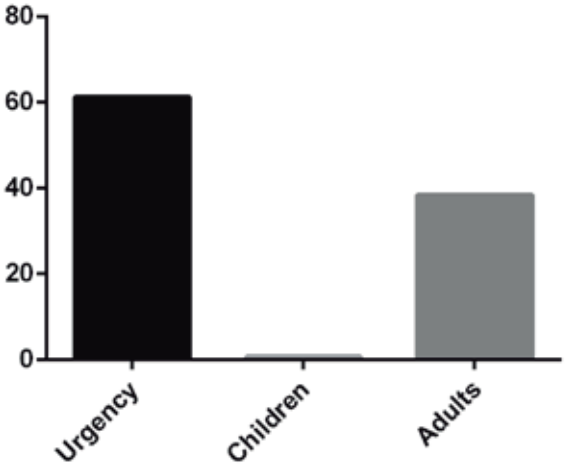

Figura 1 - Antimicrobial prescriptions in the Dental clinics.

RESULTS

A total of 718 prescriptions of patients from SD/FUG were analyzed and 180 antimicrobial prescriptions were identified. The Emergency Clinic had issued the highest number of antimicrobial prescriptions. The Basic Care Clinic and the Integrated Clinics, that receive adult patients, had also issued a significant percentage of the prescriptions (Figure 1).

When we consider the type of antimicrobial, the amoxicillin, amoxicillin in association with clavulanate acid or in association with the metronidazole, accounted for most of the prescriptions in distinct dosage schedules (Figure 2). In nine cases it was observed that there was no indication of the treatment duration.

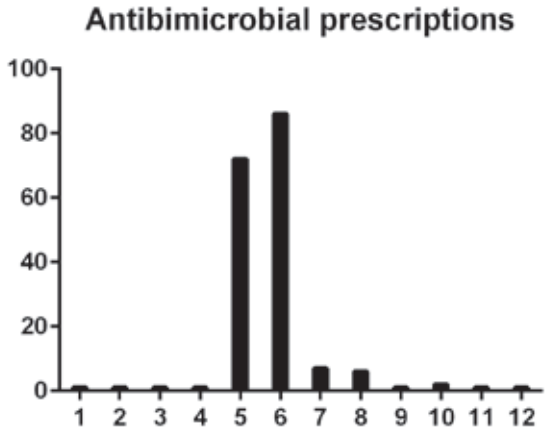

Figura 2 - Number of prescriptions per medication and dosage.1. Amoxicillin + metronidazole 3 times daily for 5 days; 2. Amoxicillin + clavulanic acid 3 times daily*; 3. Amoxicillin + clavulanic acid 3 times daily for 7 days; 4. Amoxicillin + clavulanic acid 2 times daily*; 5. Amoxicillin 3 times daily for 7 days; 6. Amoxicillin 3 times daily for < 7 days; 7. Amoxicillin 3 times daily*; 8. Amoxicillin 1 dose (2-4 capsules); 9. Azithromycin once daily for 3 days; 10. Amoxicillin 3 times daily for 5 days; 11. clindamycin 3 times daily for 5 days; tetracycline 3 times daily for 5 days. *the number of days was not specified. n=180

Table 1. Cases of antimicrobial prophylaxis and the dosage used in prescriptions.

N	Clinical status / procedure	Prescription
1	lupus; pericoronitis / Extraxion	Amoxicilin, 4 capsules, 1h before the procedure
1	subgingival scraping *	Amoxicilin, 2 capsules, before the procedure
1	Abscess / Extraction*	Amoxicilin, 2 capsules before the procedure
1	Extraction*	Amoxicilin, 2 capsules before the procedure
1	Extraction*	Amoxicilin, 4capsules before the procedure
1	Extraction*	Amoxicilin, 2capsules before the procedure

*systemic disease has not been reported

Table 2. Time of prescription in the surveyed clinics.

Prescriptions	n	%
1 hour before the procedure	6	3,3%
1day before the procedure	1	0,6%
7 days before the procedure	1	0,6%
Immediately after the procedure	172	95,5%
Total	180	100,0%

The prophylactic use was observed in six cases, in two distinct dosages (Table 1). Considering the prescription moment, three distinct times were observed and the most frequently prescription was immediately after the dental procedure (Table 2).

DISCUSSION

The antibiotics prescriptions in the Dental Clinics are justified when used for: (1) therapeutic reasons in the surgical treatment of acute or chronic infections; (2) treatment of active infections and (3) prophylactics of metastatic infections such as infectious endocarditis (6, 8). The prophylactic practice in dentistry is very common and widely accepted in order to prevent surgical infections and their possible post-surgery sequels, and also as prophylactics to bacteremy (11, 12)

The therapeutic use of antimicrobials in dentistry, according to the literature, would be recommended in cases of: endodontic infections of pulpar origen, chronic gengivitis, necrotizing ulcerative gengivitis (NUG), periapical abscess, periodontitis, pericoronitis, periimplantitis, and in serious infections of the fascial lining of the deep tissues of the head and neck. In some cases, besides the antimicrobial therapy it is also need to perform debridation, irrigation and draining (12).

The amoxicillin was the most prescribed drug compared to others, and it was prescribed in different dosages. This substance is an aminopenicillin of broad spectrum that belongs to the beta lactamate group. It has high digestive absorption reaching high blood levels with lower latency. The amoxicillin should be administered in regular and proper intervals in order to achieve therapeutic blood concentrations. Furthermore, the duration of treatment should reflect the type of infection (13).

The beta-lactam drugs are derivatives of antibiotics of choice for the odontogenic infectious processes, as long as the patient is not allergic or intolerant to these drugs; however, there is no consensus about which antimicrobial should be prescribed. Some professionals prefer amoxicillin as their first choice of drug, whereas others choose amoxicillin in association to clavulanate, due to the increasing bacterial resistance [8]. The clindamycin should be the alternative drug of choice in cases of treatment failure with amoxicillin alone or in association with clavulanic acid, or even when the patient is allergic to penicillin (14).

The absence of information about duration of treatment could lead to self-medication for indeterminate periods of time, which usually corresponds to the number of capsules present in one box. Furthermore, different capsule content per box of antimicrobial are often observed, depending on the manufacturer. The exact determination of the number of capsules needed for each treatment would avoid that patients keep leftover medication, decreasing the possibility of side effects and intoxication due to self-medication.

Individuals with conditions that would increase risk factors for local or systemic infection, patients with oncologic conditions, and that are undergoing or that recently underwent radiotherapy in the head or neck areas, immunosuppressed individuals, cardiopats, individuals that had total articular substitution, patients with metabolic illness such as diabetes, splenectomized patients or under immunosuppressive therapy should receive antibiotic before undergoing any invasive procedure. In such cases there is an increased risk for the occurrence of infections at distant sites, such as infectious endocarditis and infection of osteoarticular prosthesis (1, 8-10).

The prophylactic treatment should be restricted to procedures that would increase the risk for bacteremy such as: dental extractions, periodontal procedures like dental probes, gum scaling, surgery and maintenance, dental implant, single tooth reimplant, endodontic instrumentation or surgery, placement of orthodontic bands, intraligament injections of local anesthetic and debridement of teeth or implants (1, 3).

In those high risk patients there are certain procedures that do not need antimicrobial prophylaxis such as: dental restoration, local anesthetic injections, intraroot canal procedures, suture removal, placement of orthodontic braces or prosthetics, orthodontic brace adjustment, and placement of orthodontic brackets (1).

The antibiotics prophylaxis is questionable because it is known that bacteria that cause odontogenic infections and those that cause endocarditis are frequently resistant to the antibiotics used as prophylaxis. Furthermore, transient bacteremy does not only occur after odontological treatments such as tooth extraction or periodontal surgery, but also in everyday situations such as dental brushing or chewing, and it is directly proportional to the trauma and to the number of microorganisms colonizing the affected area [8, 16]. Nevertheless, the prophylaxis is recommended for high risk patients due to minimal risk of illness caused by odontological procedures (8).

According to the American Heart Association (2007), the prophylactic treatment is recommended in the following cases: patients with artificial heart valve or those with valves repaired with artificial material, patients with history of endocarditis, or those who underwent heart transplant with abnormal heart valve function, patients that have congenital cardiopathy harboring unrepaired heart valve or valve that was repaired in the last six months before prophylaxis, and also those patients with repaired congenital cardiopathies, but with residual defects. In all these cases, the treatment of choice is 2g amoxicillin, one hour before the procedure for adults or 50mg/kg one hour before the procedure is done in pediatric patients (3).

In our study, the prophylactic use of antimicrobial drugs were mainly observed in patients who underwent extractions, nevertheless we could not establish a relationship between the patient's systemic conditions to the prophylactic use of the antimicrobials, because of the lack of data in patients records. We

encourage further investigations with special focus on endocarditis prophylaxis to investigate those important features.

In conclusion our results showed a wide variation regarding duration of treatment and the moment of the prescription. The majority of the prescriptions occurred in the treatment of dentistry emergencies and amoxicillin was the most prescribed antibiotic, used in 12 different prescriptions. In nine cases the duration of therapy was not explicit in the prescription.

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RESUMO

Objetivo: O objetivo deste estudo foi avaliar as prescrições de antibacterianos na Faculdade de Odontologia da Universidade Federal de Goiás para identificar os medicamentos mais prescritos, as doses utilizadas para medidas profiláticas e terapêuticas e as indicações clínicas que justificaram a prescrição. Material e método: As seguintes informações foram extraídas dos prontuários odontológicos e prescrições dos pacientes: antibiótico prescrito, dose, duração do tratamento, indicação clínica e o procedimento clínico realizado. Resultados: Setecentos e dezoito prontuários foram analisados e 180 prescrições de antibacterianos foram identificadas. Os resultados mostraram que a Clínica de Emergência emitiu o maior número de prescrições. Quando consideramos o tipo de antibacteriano, a amoxicilina, amoxicilina em associação com ácido clavulanato ou em associação com o metronidazol, corresponderam a maior parte das prescrições. Conclusões: A maioria das prescrições ocorreu no tratamento de emergências odontológicas e amoxicilina foi o antibacteriano mais prescrito. Foram identificadas variações na duração do tratamento e no momento da prescrição.

PALAVRAS-CHAVE: Antibacterianos; Resistência microbiana a medicamentos; Odontologia.

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