

Analysis of clinical records of dental patients attending Jordan University Hospital: Documentation of drug prescriptions and local anesthetic injections

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Objectives: The aim of this study was to analyze clinical records of dental patients attending the Dental Department at the University of Jordan Hospital: a teaching hospital in Jordan. Analysis aimed at determining whether dental specialists properly documented the drug prescriptions and local anesthetic injections given to their patients.

Methods: Dental records of the Dental Department at the Jordan University Hospital were reviewed during the period from April 3rd until April 26th 2007 along with the issued prescriptions during that period.

Results: A total of 1000 records were reviewed with a total of 53 prescriptions issued during that period. Thirty records documented the prescription by stating the category of the prescribed drug. Only 13 records stated the generic or the trade names of the prescribed drugs. Of these, 5 records contained the full elements of a prescription. As for local anesthetic injections, the term “LA used” was found in 22 records while the names and quantities of the local anesthetics used were documented in only 13 records. Only 5 records documented the full elements of a local anesthetic injection.

Conclusion: The essential data of drug prescriptions and local anesthetic injections were poorly documented by the investigated group of dental specialists. It is recommended that the administration of the hospital and the dental department implement clear and firm guidelines for dental practitioners in particular to do the required documentation procedure.

Keywords: dental records, documentation, prescriptions, local anesthesia

Introduction

Dentists prescribe certain drugs for a number of conditions such as: orofacial pain, oral infections, oral ulceration, dry mouth and nutritional deficiencies. Moreover, local anesthetic injections are administered by dentists for intraoperative pain management and less commonly for diagnostic purposes. Although the number of these drugs may seem to be limited compared to those prescribed by other health care providers, the use of these drugs has important implications and extreme care should be taken upon prescribing to make the best use of these drugs and prevent their side effects. Since drug use – either by prescription or administration – might be associated with certain systemic complications, all drug prescriptions and local anesthetic injections should be documented in patients’ records.

Antibiotic use is sometimes associated with unfavorable side effects. A serious side effect which is a major concern worldwide is the emergence of new multidrug-resistant bacteria. This has escalated at an alarming rate (Epstein et al 2000). Resistance to antibiotics among bacteria of the oral microflora was shown to be increasing as well (ADA 2004).

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Although it has been stated that dentistry's contribution to the development of antimicrobial resistance is unknown (Haas et al 1998), recent surveys reported that dentists have a tendency towards: over-prescribing, using lower dosage of antibiotics, using broad spectrum antibiotics, a lack of knowledge of the incidence of adverse reactions, and very poor medical history record taking (Murti and Morse 2007). They also showed that dentists have less knowledge about antibiotic prescribing (Demirbas et al 2006). An alarming finding was that in certain countries, up to 84% of dental practitioners were likely to prescribe an antimicrobial agent when there was no clinical indication (Al-Haroni and Skaug 2006). On the other hand, some countries such as Norway show a different pattern of antibiotic prescription among dentists where it was found that dentists prefer to prescribe narrow-spectrum antibiotics and that their prescribing is conservative and relatively low compared with that of physicians (Al-Haroni and Skaug 2007). Furthermore, one survey among dental practitioners conducted in Canada found that recent graduates appeared to prescribe at a lower rate than earlier graduates after dental treatment in general (Epstein et al 2000).

Of a similar significance is the prescription of analgesics. Pain management is inherent to dental practice (Haas 1999). Most analgesic drugs in common use by dental practitioners fall into three categories: paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs), and opioid analgesics. The safest of these is paracetamol, however, one should consider liver damage in case of drug overdose. There is sufficient evidence to support interactions between NSAIDs and certain classes of antihypertensives and anticoagulants (Haas 1999). Moreover the prolonged combination of paracetamol and aspirin might cause serious damage to the kidneys (Haas 1999).

A substantial number of local anesthetic injections is used in most dental practices on a daily basis. The use of local anesthesia is extremely safe (Orr and Curtis 2005), however a number of complications can arise (Peñarrocha-Diago and Sanchis-Bielsa 2000; Blanton and Jeske 2003; Dogan and Dora 2005). Although controversial, the issue of obtaining a patient's consent prior to administering local anesthesia has been suggested (Orr and Curtis 2005).

There are a number of adverse drug interactions associated with local anesthetics. These drug interactions can happen between local anesthetics themselves, or between local anesthetics on one hand and on the other with certain antibiotics, inhibitors of metabolism, and opioid drugs (Moore 1999). These drug interactions combined with

the systemic effects of drug toxicity make it essential to document all local anesthetic injections given to patients including the drug given with its dose and quantity along with the injection technique and the concentration of vaso-constrictor when relevant.

An important aspect of clinical dentistry is the documentation – in patients' records – of clinical procedures and all the related aspects of treatment such as drug prescriptions, local anesthetic injections and requested investigations. This aspect becomes even more essential when the patient is being treated by a number of practitioners either in the same specialty or in different specialties for medicolegal reasons. Another important factor to be considered when looking at dental patients is the growing number of ageing patients and patients with medically compromising conditions.

The aim of this study was to analyze clinical records of dental patients attending University of Jordan Hospital, a teaching hospital in Jordan. This was to investigate the implementation by dental specialists working in that hospital of the documentation procedures of their drug prescriptions and local anesthetic injections.

Materials and methods

Dental records

Dental records at the University of Jordan Hospital were collected over the period of April 3rd to April 26th. The Dental Department included 32 dental specialists at the time of collecting and reviewing the records. However, for travelling and leaving reasons the records from only 28 specialists were available. All dental specialists were informed about the prospective nature of data collection by means of a memorandum distributed in January 2007.

The memorandum explained that all dental records of their patients will be checked to collect information about documentation of prescriptions and local anesthetic injections.

The ethical committee in the hospital gave its consent to this study late March and the collection of records started on April 3rd and ended on April 26th when 1000 records were collected.

Clinical records of patients treated under sedation or general anesthesia were excluded. Furthermore, patients who were seen in their review visits were excluded. The dental records were analyzed twice a day: at midday and at 5:00 pm, which are the times patients' files are collected every day from the clinics. Data were summarized on a form specially designed for this purpose. The form included entries for: specialist name; patient's relevant information: the name, date of birth, medical history, dental procedure

carried out, and details of prescription and local anesthetic injection if present.

Prescriptions

Patient's name, doctor's name, date of the prescription, drug prescribed and its quantity are regularly recorded on the pharmacist's computer. The saved data of all prescriptions that were issued from the dental department for the period of the study (April 3rd–26th 2007) were obtained from the Computer and Data Department which is responsible for all computerized data pertinent to the hospital, including pharmaceutical data. These information included trade name, pharmaceutical form, dose and quantity. Information on frequency of prescribing and duration in days was not available.

Local anesthetics

Data on the department's consumption of anesthesia during the same period of the study was obtained from the Dental Supplies Office which is responsible for supplying Dental Clinics with all dental materials, instruments and machines. Dental materials are usually delivered to each specialty clinic which is shared by a number of practitioners having the same specialty.

Results

The total number of collected records between April 3rd and April 26th 2007 was 1000. However, the first 1000 records were included in this study. The age range of the patients in the records was 4–89 years with a mean age of (32.8 ± 17.6) years. Of those, 831 records (83.1%) were recorded as medically fit. Medical history was not recorded in 13 records (1.3%). In 156 records (15.6%) one or more medical problems were documented. Of the 156 records: 78 records (50%) reported cardiovascular disease in the form of hypertension or prosthetic heart valve; 47 records (30%) reported diabetes and in 31 records (20%) other medical problems were recorded.

Of all records reporting medical conditions (156), there were 49 (31%) reporting more than one medical condition. The types of reported conditions and their frequencies are summarized in (Table 1).

A total number of 53 prescriptions were issued during the period of the study ie, about 3.9% of the visiting patients received prescriptions. However, reviewing the records showed that only 30 (56.6%) records mentioned a prescription of "antibiotic", "analgesic", "mouthwash" etc, without giving any further details. Only 13 (24.5%) records mentioned the names of the drug prescribed either in its

Table 1 Frequency of medical conditions as reported in the records

Medical condition	Frequency
Cardiovascular disease (hypertention, prosthetic heart valve, hyperlipidemia, cerebrovascular accident)	79
Endocrine disease including diabetes, hyperthyroidism, hypothyroidism and others	55
Pulmonary disease and asthma	14
Musculoskeletal disease	9
Skin disease	8
Hematological disease and vitamin B12 deficiency	6
Neurological disease (epilepsy, migraine, facial palsy)	6
Gastrointestinal disease	4
Autoimmune disease	4
Psychological illness	3
Allergy	3
History of cranial surgery	3
Cancer	2
Kidney disease	2
Mental retardation	1
Eye disease	1

generic or trade name. Of these, 5 records (9.4%) described the full elements of a prescription.

The 53 prescriptions were issued in the Dental Department by 17 dentists (about 50% of dentists working in the department). Of all prescriptions, 27 (51%) came from oral surgeons, 7 (13.2%) from endodontists, 5 (9.4%) from prosthodontists, 5 (9.4%) from oral medicine specialists, 4 (7.5%) from conservative dentistry specialists, 4 (7.5%) from periodontists, and 1 from a paedodontist (1.9%).

Table 2 shows the ratio of prescriptions to patients according to department.

Seven types of antibiotics were issued in 38 prescriptions. Amoxicillin with clavulanic acid (375 mg tablets) was prescribed 29 times (76.3%).

Table 2 Ratio of prescriptions/patients according to specialty

Specialty	No of prescriptions/ no of patients \times 100%
Oral surgery	13.6
Endodontics	8.4
Oral Medicine	5.2
Periodontics	4.4
Conservative dentistry	3.7
Pediatric dentistry	3.2
Prosthodontics	3.1
Orthodontics	0

The rest of prescriptions were for metronidazole (11 times: 29%), first generation cephalosporins (4 times: 10.5%), second generation cephalosporins (3 times: 7.9%), and fluoroquinolone in one prescription only.

NSAIDs were prescribed 27 times, while paracetamol was prescribed 14 times. Three prescriptions of opioid agents were issued by 2 dentists for three different subjects (one prescription of 10 tablets and two prescriptions of 20 tablets).

The rest of prescriptions (9 in number) were for topical agents namely diclofenac sodium emulgel, chlorhexidine mouth wash and solcoseryl oral gel.

Table 3 shows the types of prescribed drugs according to specialty.

Procedures were classified according to their need to local anesthesia into: 1. procedures not requiring anesthesia (such as: patient examination, removal of sutures, removable prosthetic procedures, cementation of crown and bridge work, investigations, application of fissure sealant, periodontal splinting of teeth with resin composite) 2. procedures that might require anesthesia (such as: cavity preparation and endodontic treatment, scaling and implant prosthodontics) 3. procedures that definitely require anesthesia (such as: dental extraction), and 4. procedures that were not stated in the records (60 procedures).

For procedures not requiring anesthesia ($n = 506$), one patient's record indicated that anesthesia was used. For procedures that might require anesthesia ($n = 328$), 11 records (3.4%) indicated the use of anesthesia. For procedures that definitely require anesthesia ($n = 105$), 28 patients records indicated the use of anesthesia (26.7%). The term "LA used" was found in 22 records without giving any details of the anesthetic procedure. The name and quantity of the local anesthetic were documented in 13 records. Only 5 records

documented the full elements of a local anesthetic injection. It was observed that only one type of anesthetic was documented which was lidocaine 2% with 1:100,000 epinephrine. All injections mentioned used minimal amounts of local anesthetic solutions ranging from 2–6 ml.

Discussion

This study was performed on a prospective basis. A memorandum was distributed to all dental specialists in the department explaining the aim of the study and its prospective nature. This was to allow all concerned dentists to express their opinions and to measure their compliance with documenting the required information. The work on collecting the records started April 3rd and it was decided to end it on April 26th after collecting 1000 records. It was thought that this number of records was a representative sample and was still collected randomly. About 15.6% of patients had one or more medical problems. Furthermore, medical history was not mentioned at all in 13 records. It is worth mentioning that dental records constitute part of the patient's medical file at the University of Jordan Hospital.

Patients had a wide age range including the young children and the elderly. The medically compromised patients, children and elderly patients should be managed in a cautious approach. Needless to say that dental procedures are stressful to healthy as well as medically compromised patients. In the elderly the hepatic metabolism of many drugs is reduced, in some cases in the order of 30%–50% (Le Coureur et al 2004). Altered physiology leads to altered pharmacokinetics, so the most appropriate dose in an elderly person may not be the dose that is typically used in the general population (Faulkner et al 2005). Aging of the population involves many parts of the world. As the population becomes older and drug consumption subsequently increases, adverse drug

Table 3 Types of prescribed drugs according to specialty

	Amoxicillin-clavulanic acid	First generation Cephalosporin	Metronidazole	Paracetamol	NSAID	Opioid analgesics	Topical analgesics	Mouth wash
Oral surgery	16	2	2	12	13	1	3	5
Endodontics	6			2	1	2		
Oral medicine	1		2		2			
Periodontics	2		2		1			1
Conservative dentistry	3	1	1		3			
Pediatric dentistry		1						
Prosthodontics	1	4	4		4			

interactions will become an even greater concern in dental practice (Moore 1999).

This study showed that the investigated sample of dentists had a tendency towards neglecting documentation of essential clinical data, in spite of the fact that they knew in advance about the nature of the study. The full elements of a prescription include generic name of the drug, its form, dose, frequency, and quantity. These elements were absent. Instead, information recorded was the category of the drug. I.e, either antibiotic, analgesic, mouthwash, etc. This is not sufficient to prevent certain issues that might complicate the treatment plan and proceed to unfavorable consequences. A comprehensive treatment plan should be documented for future reference of the treating doctor and other members of the health care team. Since it is not known whether a certain patient obtained a prescription from a dentist, that this patient might try to get the same prescription from other dentists. When prescriptions issued during the period of study were analyzed, there was a case of a patient who has been seen by three different specialists, and each prescribed a different analgesic.

The only satisfactory way to obtain detailed prescriptions issued by the dental department was through the computer database of the pharmaceutical department. However, this is not adequate, since the clinical indications for such prescriptions were not documented. There was no indication in any record for patients to whom antibiotics were prescribed as to whether the prescribed antibiotics was prophylactic or therapeutic.

It was not the aim of this study to analyze the prescriptions or the local anesthetic injections given by the study sample of dental practitioners. However, analysis of the prescriptions was essential to obtain enough data about the pattern of record keeping in the department. It was noted that the pattern of antibiotic prescription was similar to what was observed in a previous study on the same sample of dental practitioners (Dar-Odeh et al 2008). Antibiotic prescription by dentists has been given great attention worldwide (Epstein et al 2000; Al-Mubarak et al 2004; Salako et al 2004; Demirbas et al 2006; Chate et al 2006; Murti and Morse 2007). Contributing to the very high dentist-based prescriptions of certain antimicrobials (Al-Haroni 2008), broad-spectrum antibiotics (amoxicillin-clavulanic acid and cephalosporins) were mainly prescribed in this study. Amoxicillin may encourage emergence of resistant organisms (Dental Practitioner's Formulary 2006). The number of prescriptions was limited (about 2 prescriptions per day). A recent study estimated that a dental practitioner could be

prescribing on average 3 prescriptions a week (Sweeney et al 2004). Dentists tended to issue long prescriptions. It is advised that short prescriptions replace long ones for justifiable reasons. Patients usually conform to short rather than long prescriptions. Short-course oral therapy for the dental abscess according to Dental Practitioner's Formulary (2006), is 3 gram amoxicillin, repeated after 8 hours.

In third world countries antibiotic resistance represents a major health problem, and there are still many countries where antibiotics are available over the counter (Handal and Olsen 2000). In Europe, antimicrobial resistance appears to be increasing (Goossens 2005). Reduction in antibiotic resistance can only occur following a significant reduction in antibiotic use (Sweeney et al 2004). Single or combined drug therapies have become more important in dental practice, but whenever possible, single drug therapies should be prescribed to reduce the incidence of side effects, emergence of resistant bacteria, and cost of therapy (Al-Haroni 2008).

The Medication Appropriateness Index depends on 10 important questions (Hanlon et al 1992; Samsa et al 1994) among which are: is there an indication for the drug? And is there unnecessary duplication with other drugs? These requirements can simply be fulfilled by documenting the patient's clinical condition and the prescribed medications in the patient's record.

Most analgesics prescribed were NSAIDs. Paracetamol was prescribed to a lower degree and opioid analgesics were the least prescribed. Most dental pain is relieved effectively by NSAIDs (Dental Practitioner's Formulary 2006). However, paracetamol is the preferred analgesic for children, elderly patients, patients with bleeding tendency and patients with peptic ulcer. It is a safe drug when taken in recommended dosages for a short duration, consistent with the management of acute pain in dentistry (Haas 1999).

Based on data collected by this study, it seems that non-clinical rather than clinical reasons still affect prescribing. Inappropriate reasons for prescribing include uncertainty of diagnosis, pressure of time, patient expectation, pain, and localized swelling (Palmer et al 2001).

Although a number of dental practitioners documented the use of local anesthesia, the full elements of a local anesthetic injection were not documented except in a very limited number of records. Describing the local anesthetic procedure includes the type and concentration of local anesthetic agent, the type and concentration of the vasoconstrictor if used, the anesthetic procedure and the quantity of the local anesthetic solution given to the patient. Any resulting local or systemic complication should also be documented. An unusual or

severe drug response that occurs in a dental office might not be well-documented, because the practice of dental medicine often is isolated within a community (Moore et al 1999).

Only one type of local anesthetic solution was used. Indeed, the records of the Dental Supplies Office showed that only one type of local anesthetic solution (Lidocaine 2% with 1:100,000 epinephrine) was dispensed to the dental clinics during the period of the study. Lidocaine 2% with 1:100,000 or 1:80,000 epinephrine is the most appropriate local anesthetic solution for most dental procedures owing to its safety and suitable duration of action (Malamed 1997). The most common anesthetic solution used by a group of general dental practitioners in the UK was found to be lidocaine/epinephrine (Corbett et al 2005).

Lidocaine and prilocaine have the best Food and Drug Administration ranking (Haas 2002). However, local anesthetics used in dentistry may be associated with a number of adverse reactions. Serious side effects include: allergy, toxicity leading to respiratory depression or cardiovascular collapse, methemoglobinemia (Haas 2002). Some of the well-known drug interactions are those between lidocaine with cimetidine and those between lidocaine and propranolol, however, increased risk of lidocaine toxicity after administration of a single dose for dental anesthesia resulting from coadministration of cimetidine or propranolol is unlikely and unreported (Moore 1999).

Despite the fact that lidocaine is a relatively safe drug for most dental patients, a dental clinic should have various local anesthetic agents to cover different durations of dental procedures and to fulfill patients' requirements according to their medical conditions, and age difference. It is the responsibility of the practitioner to order the required materials and instruments. However, when the dentist works in a hospital, other factors play an important role in availability of these materials. Until now, and despite the progress in Jordanian drug manufacture, local anesthetics are imported from Europe or regional countries, which makes the dental profession dependent on local drug stores policies.

Audits used to ascertain the numbers of prescriptions written and their appropriateness (Sweeney et al 2004) and educational audits aiming at providing dental practitioners with prescribing guidelines (Palmer et al 2001) are important measures to improve clinical dentistry and to reduce problems arising from drug use.

Education on the pathophysiology of clinical problems; on the pharmacology of the drugs used to treat them, on adverse drug reactions and interactions; on the devising of dosage regimens; on monitoring drug therapy; and on

patients' attitudes to drug therapy (Aronson 2004) are essentially required for improving clinical dental practice whether the practitioner is a specialist or a general practitioner. Raising the standard of record keeping in a hospital setting is a joint responsibility of both the hospital central system and the dental department.

Conclusions

Drug prescriptions and local anesthetic injections are documented poorly in the clinical records of patients treated by the study sample of dentists. However, it seems that this sample is conservative in the drug prescriptions and the local anesthetic injections delivered to their patients. Certain measures are recommended to improve documentation technique of drug prescriptions and local anesthetic injections by dentists. Administration of the hospital and the dental department need to do a joint effort to improve record keeping practices by dentists and other specialties when applicable.

Disclosure

The authors report no conflicts of interest in this work.

References

- [ADA] American Dental Association Council on Scientific Affairs. 2004. Combating antibiotic resistance. *J Am Dent Assoc*, 135:484–7.
- Al-Haroni M. 2008. Bacterial resistance and the dental professionals' role to halt the problem. *J Dent*, 36:95–103.
- Al-Haroni M, Skaug N. 2006. Knowledge of prescribing antimicrobials among Yemeni general dentists. *Acta Odontol Scand*, 64:274–80.
- Al-Haroni M, Skaug N. 2007. Incidence of antibiotic prescribing in dental practice in Norway and its contribution to national consumption. *J Antimicrob Chemother*, 59:1161–6.
- Al-Mubarak S, Al-Nowaiser A, Rass MA, et al. 2004. Antibiotic prescription and dental practice within Saudi Arabia; the need to reinforce guidelines and implement specialty needs. *J Int Acad Periodontol*, 6:47–55.
- Aronson JK. 2004. Rational prescribing, appropriate prescribing. *Br J Clin Pharmacol*, 57:229–30.
- Blanton PL, Jeske AH; ADA Council on Scientific Affairs, ADA Division of Science. 2003. Avoiding complications in local anesthesia induction: anatomical considerations. *J Am Dent Assoc*, 134:888–93.
- [BDA] British Dental Association, British Medical Association, Royal Pharmaceutical Society of Great Britain. 2006. Dental Practitioner's Formulary. London, UK: British Medical Association and the Royal Pharmaceutical Society of Great Britain.
- Chate RA, White S, Hale LR, et al. 2006. The impact of clinical audit on antibiotic prescribing in general dental practice. *Br Dent J*, 201:635–41.
- Corbett IP, Ramacciato JC, Groppo FC, et al. 2005. A survey of local anaesthetic use among general dental practitioners in the UK attending postgraduate courses on pain control. *Br Dent J*, 199:784–7.
- Dar-Odeh NS, Abu-Hammad OA, Khraisat AS, et al. 2008. An analysis of therapeutic, adult antibiotic prescriptions issued by dental practitioners in Jordan. *Chemotherapy*, 54:17–22.
- Demirbas F, Gjermo PE, Preus HR. 2006. Antibiotic prescribing practices among Norwegian dentists. *Acta Odontol Scand*, 64:355–9.
- Dogan EA, Dora B. 2005. Transient partial ophthalmoplegia and Horner's syndrome after intraoral local anesthesia. *J Clin Neurosci*, 12:696–7.
- Epstein JB, Chong S, Le ND. 2000. A survey of antibiotic use in dentistry. *J Am Dent Assoc*, 131:1600–9.

- Faulkner CM, Cox HL, Williamson JC. 2005. Unique aspects of antimicrobial use in older adults. *Clin Infect Dis*, 40:997–1004.
- Goossens H. 2005. European status of resistance in nosocomial infections. *Chemotherapy*, 51:177–81.
- Haas DA, Epstein JB, Eggert FM. 1998. Antimicrobial resistance: dentistry's role. *J Can Dent Assoc*, 64:496–502.
- Haas DA. 1999. Adverse drug interactions in dental practice: interactions associated with analgesics, Part III in a series. *J Am Dent Assoc*, 130:397–407.
- Haas DA. 2002. An update on local anesthetics in dentistry. *J Can Dent Assoc*, 68:546–51.
- Handal T, Olsen I. 2000. Antimicrobial resistance with focus on oral beta-lactamases. *Eur J Oral Sci*, 108:163–74.
- Hanlon JT, Schmader KE, Samsa GP, et al. 1992. A method for assessing drug therapy appropriateness. *J Clin Epidemiol*, 45:1045–51.
- Le Couteur DG, Hilmer SN, Glasgow N, et al. 2004. Prescribing in older people. *Aust Fam Physician*, 33:871.
- Malamed SF. 1997. Handbook of local anesthesia. 4th ed. St. Louis: Mosby.
- Moore PA. 1999. Adverse drug interactions in dental practice: interactions associated with local anesthetics, sedatives and anxiolytics. Part IV of a series. *J Am Dent Assoc*, 130:541–54.
- Moore PA, Gage TW, Hersh EV, et al. 1999. Adverse drug interactions in dental practice: Professional and educational implications. *J Am Dent Assoc*, 130:47–54.
- Murti A, Morse Z. 2007. Dental antibiotic prescription in Fijian adults. *Int Dent J*, 57:65–70.
- Orr DL 2nd, Curtis WJ. 2005. Obtaining written informed consent for the administration of local anesthetic in dentistry. *J Am Dent Assoc*, 136:1568–71.
- Palmer NA, Dailey YM, Martin MV. 2001. Can audit improve antibiotic prescribing in general dental practice? *Br Dent J*, 191:253–5.
- Peñarrocha-Diago M, Sanchis-Bielsa JM. 2000. Ophthalmologic complications after intraoral local anesthesia with articaine. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*, 90:21–4.
- Salako NO, Rotimi VO, Adib SM, et al. 2004. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. *J Dent*, 32:503–9.
- Samsa GP, Hanlon JT, Schmader KE, et al. 1994. A summated score for the medication appropriateness index: development and assessment of clinical properties including content validity. *J Clin Epidemiol*, 47:891–6.
- Sweeney LC, Dave J, Chambers PA, et al. 2004. Antibiotic resistance in general dental practice – a cause for concern? *J Antimicrob Chem*, 53:567–76.

