

ABSTRACT

Use of antibiotics by dental health care professionals

Background and aim – Current theories suggest that antibiotic use in dentistry should be limited to specific prophylactic regimens, systemic infections, and severely immunocompromised patients. This study aims to collect data to evaluate common uses of antibiotics by dentists.

Methods – A survey containing 14 questions was disseminated to dental students, faculty and dentists in private practices in spring 2015. The questions focused on practitioners' use of antibiotics in prophylactic regimens, surgical and non-surgical procedures, and treatment of dental infections. The participants were also asked about continuing education and familiarity with American Dental Association (ADA) and American Heart Association (AHA) recommendations.

Results – 157 surveys were completed with 73% of participants being General Dentists.

22% of participants reported to routinely prescribe antibiotics for non-surgical treatments, 17% for endodontic therapy. 66% after complicated extractions, 54% for treatment of dental abscesses after extraction and 45% prescribed antibiotics for patients with previous joint replacements. 97% reported familiarity with AHA and ADA guidelines but only 42% follow them.

Conclusion – The results of this survey show most dentists would not use antibiotics routinely for simple and non-surgical procedures but their adherence to the guidelines for prophylactic treatments is low.

Diversity of the participants and their professional background can be considered as a determining factor.

Assessment of the use of antibiotics by dentists

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A steady increase in the number of antibiotic resistant bacteria has brought the frequent prescribing of these drugs into question. Contemporary theories largely attribute antimicrobial resistance to inappropriate use of antibiotics, inadequate diagnosis, and insufficient patient compliance. Current evidence-based theories suggest that antibiotic use in dentistry should be limited to specific prophylactic regimens, systemic infections, and high-risk or severely immunocompromised patients (1,2).

Clinical guidelines recommend that the first-line treatment for teeth with symptomatic apical periodontitis or an acute apical abscess should be removal of the source of inflammation or infection by local measures. Systemic antibiotics are currently only recommended for patients with compromised immune system, severe cardiac conditions, or if there is risk of spreading infection (cellulitis, lymph node involvement, diffuse swelling) or systemic involvement (fever, malaise) (3-5).

There is insufficient support in the literature with regards to prophylaxis with penicillin/amoxicillin as an effective agent against bacterial endocarditis in high risk patients undergoing invasive dental procedures (5,6). A report from American Heart Association (AHA) in 2007 concluded: "In patients with underlying cardiac conditions associated with the highest risk of adverse outcomes from Infective Endocarditis, prophylaxis for some dental procedures is reasonable, even though we acknowledge that its effectiveness is unknown"

EMNEORD

Antibiotics;
infection;
prophylaxis;
guidelines;
clinical protocols

(5). Some definitive scientific evidence questions the use of prophylactic antibiotics for insulin-dependent diabetic patients (1). Some experts suggest that patients with uncontrolled, insulin-dependent diabetes should



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receive prophylactic antibiotics for invasive dental procedures due to compromised immunity and high risk of poor wound healing (7). Evidence based reports confirm that dental procedures do not raise the risk of infection of prosthetic hip or knee joints, nor does antibiotic prophylaxis for dental procedures lower the likelihood of joint infection (8,9).

According to current literature, there is a relatively small patient population which needs antibiotic prophylaxis prior to certain dental procedures (10). However, new evidence does not always translate into immediate changes in dental practice.

Antibiotics Survey Dental Abscess with No Immediate Extraction Antibiotics

Which antibiotics would you TYPICALLY prescribe to treat a dental abscess when immediate extraction or drainage is not possible?

(Please select all that apply)

- Amoxicillin
- Ciindamycin
- Cephalixin
- Metronidazole
- Augmentin
- Clarithromycin / Azithromycin
- Other (please specify)

What dosage would you TYPICALLY prescribe?

(Please select all that apply)

- 150 mg
- 250 mg
- 300 mg
- 500 mg
- 800 mg
- Other (please specify)

What's the frequency of the dosage?

(Please select all that apply)

- Every 6 hours
- Every 8 hours
- Every 12 hours
- Every 24 hours
- Other (please specify)

Fig. 1. Example of the survey questions.

Fig. 1. Eksempel på undersøgelsesspørgsmål.

es. This study aims to collect data to evaluate common uses of antibiotics by dentists and the need for better dissemination of information and guidelines.

Methods

Prior to the study, IRB approval (HSC-DB-15-0316) and informed consent from all participants were obtained.

This study was designed as an online survey - using Survey Monkey - and performed at The University of Texas School of Dentistry at Houston in spring 2015 (Fig. 1). The survey was sent out via e-mail [3 times in two months] to 3rd and 4th year dental students, all dental faculty (part-time, full-time, volunteer), private practicing dentists and School of Dentistry Alumni in Houston, Texas.

- The survey contained 14 clinical questions regarding the participants' typical use of antibiotics in dental treatments including: 1- surgical and non-surgical procedures (extractions, endodontic and periodontal treatments), 2- treatment of dental infections when drainage or extraction not possible, 3- prophylactic regimens. The questions included the choice of antibiotic type, dosage, regimen and duration.
- The participants were also asked about their familiarity with AHA recommendations for use of antibiotics, partici-

Post procedural antibiotic use by procedure and type of practitioner

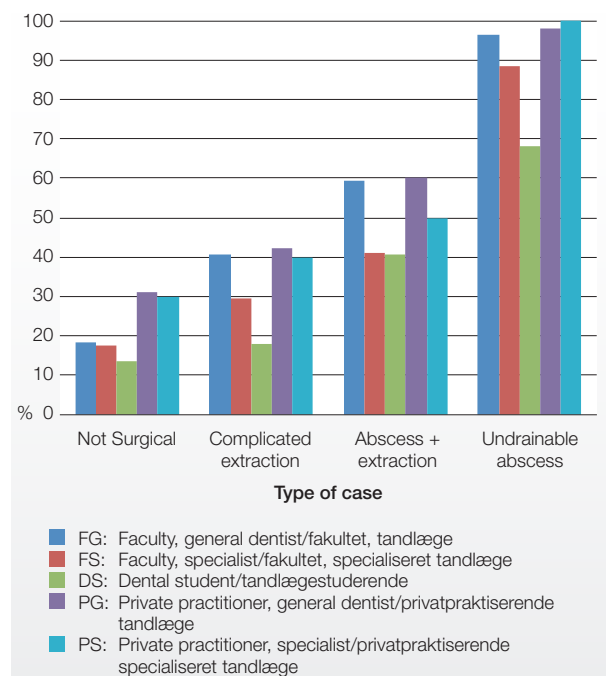


Fig. 2. Percentage of use of antibiotics by type of practice.

Fig. 2. Procent af brug af antibiotika ved praksistype.

Practitioners who report they know AHA antibiotic guidelines & correct AHA regimens

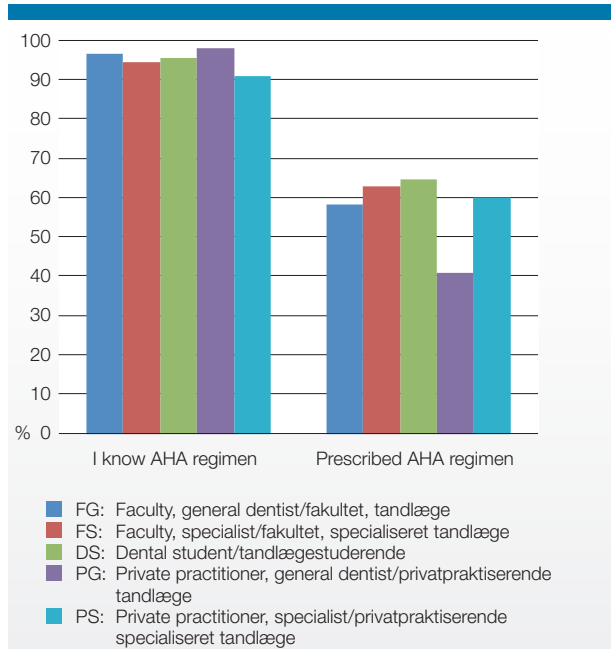


Fig. 3. Percentage of the dentists who know and follow AHA guidelines and regimen.

Fig. 3. Procent af tandlæger, der kender og følger AHA's retningslinjer og regime.

pation in continuing education courses on use of antibiotics and their demographics.

- All participants were de-identified in terms of personal data and identified only by their type of practice, title and years of experience.

The responses were collected and analyzed by the authors using McNemar test and Cochrane Q-test.

Results

The survey was sent out to approximately 400 people via e-mail (the exact number of e-mails not clear since some surveys were distributed through Alumni association). One hundred fifty-seven (n=157) surveys were completed with 73% of respondents being general dentists and 25% specialists; 52 dentists in private practice, 44 dental school faculty, 22 dental students, 4 residents, 3 retired dentists, 1 hygiene faculty and 31 unspecified participants. Dental students were counted as general dentists and residents were counted as specialists. The results do not include responses from unspecified participants and the hygiene faculty.

- 78% replied that they do not routinely prescribe antibiotics for non-surgical treatments (such as endodontic and periodontal treatments and simple extractions), while 17% would prescribe antibiotics for endodontic therapy and less than 8% would use it for periodontal treatments (Fig. 2).
- 66% would prescribe antibiotics after complicated or surgical extractions (Fig. 2).

Possible conditions for prophylactic antibiotics

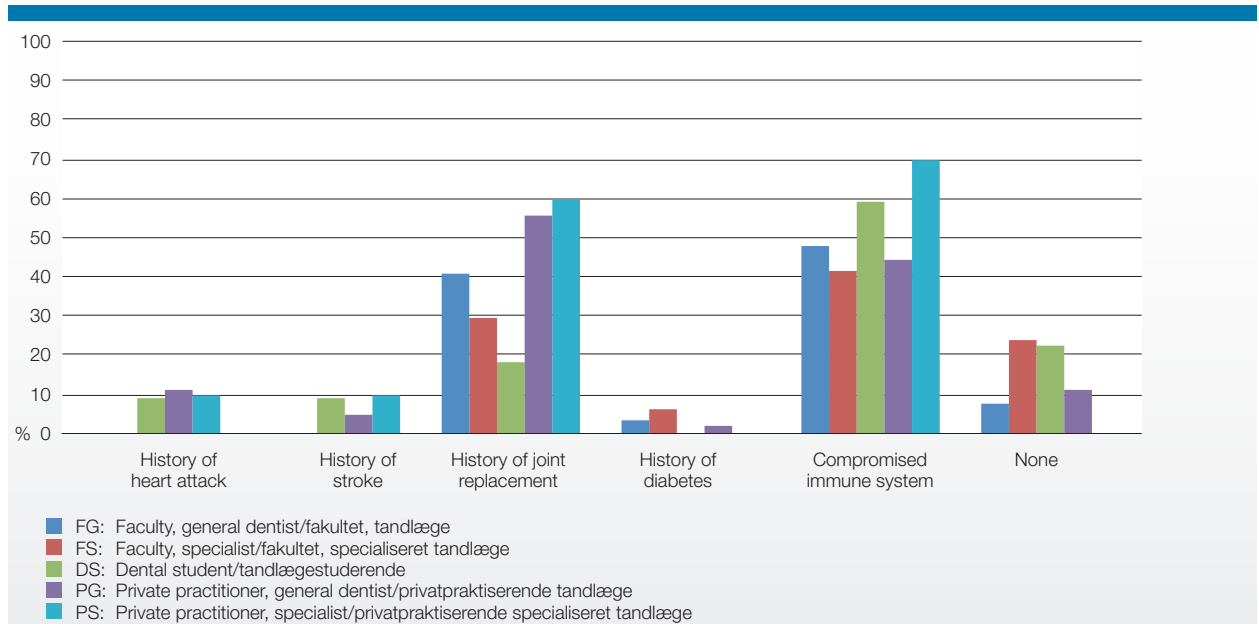


Fig. 4. Percentage of dentists who use prophylactic antibiotics for different conditions.

Fig. 4. Procent af tandlæger, der anvender antibiotika profylaktisk mod forskellige tilstande.



CLINICAL RELEVANCE

When discussing antibiotic use in dentistry, both clinical and non-clinical factors should be considered. With today's aging population living longer, dentists see patients with more complex medical conditions and more demanding treatment needs. Although antibiotics have not always proven to be effective, they have often been used as

an extra precaution. Patient expectations, time, convenience and demand are other factors that may influence the dentists' tendency towards over-prescribing antibiotics. In order to propose how to better educate the dentists for a better practice, it should be determined if the pattern of prescribing antibiotics is evidence-based or anecdotal.

- 91% would use antibiotics to treat dental abscess when extraction or drainage not possible whereas 54% would do it even after extraction was completed (Fig. 2).
- 96% reported being familiar with current AHA and American Dental Association (ADA) guidelines (97,7% general dentists) but only about half of them prescribe prophylactic antibiotics according to AHA and ADA guidelines; general dentists being lowest at 40,9%. Dental students with 64,7% seem to follow the guidelines more than other groups (Fig. 3).
- 40%-70% use antibiotic prophylaxis for patients with compromised immune system, 45% continue to use prophylaxis for patients with previous joint replacements and less than 11% of all groups prescribe prophylactic antibiotics for patients with history of diabetes, heart attack or stroke (Fig. 4).
- General dentists in private practices seem to have greater discrepancies in the prescribed regimens than other groups; only 10% followed the correct regimen for the prescribed drugs (Fig. 5).
- Amoxicillin seems to be the most popular drug of choice - used by 82%-85% - but there is a great discrepancy in dosage, frequency and duration.

**Abscess with extraction:
respondants with expected regimen
Amoxicillin 500 mg every 8 hours for seven days or
Clindamycin 300 mg every 6 hours for 7 days**

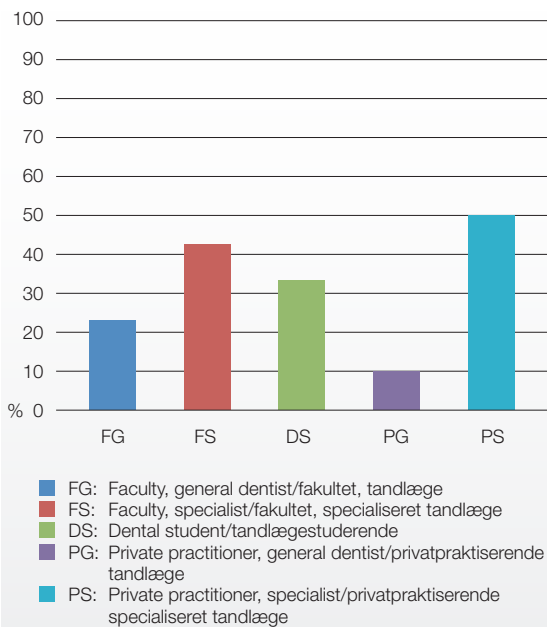


Fig. 5. Percent of dentists who chose the recommended regimen.

Fig. 5. Procent af tandlæger, der valgte det anbefalede regime.

- 97% reported no complications after extraction without prophylactic antibiotics.

Chochrane Q-tests and Mc Nemar test confirm statistical differences between knowing and following AHA/ADA guidelines among the study groups.

Discussion

One hundred fifty-seven (n=157) surveys were completed with 73% of respondents being General Dentists. The majority of practitioners (78%) replied that they do not routinely prescribe antibiotics for non-surgical treatments, while 17% generally prescribe antibiotics for endodontic therapy.

Many respondents also prescribe antibiotics after complicated extractions and for treatment of dental abscesses after extraction was completed (66% and 54%, respectively). Additionally, a large number of practitioners (45%) continue to prescribe antibiotics for patients with previous joint replacements, although the 2012 and 2014 ADA studies concluded that prophylactic antibiotics are not recommended for these patients (2).

The data showed that only 42% of participants are currently following AHA and ADA treatment regimens when prescribing antibiotics, although nearly all respondents (97%) reported being familiar with current AHA and ADA guidelines (10,11). This is especially surprising, considering respondents self-reported attending an average of seven continuing education courses on antibiotic usage, and an average of 22 years practicing dentistry. Specialists seem to follow the recommended regimens more accurately than the other groups but generally we found no statistical difference between responses from private practitioners and UTSD Faculty. Analysis of the collected data shows that UTSD dental students tend to follow the current guidelines better and prescribe antibiotics less frequent than

practicing dentists and faculty, although there are discrepancies in the prescribed regimen. This may be due to more current guidelines taught at the school or patients with more complex medical histories and treatment needs in private offices.

Variability in execution of recommended guidelines could be related to participant's time and location of education or graduation, so is the diversity of Houston population and the educational background of the practitioners. Some of the common drugs and regimens that were used 40 years ago have changed over time and some common practices in other countries do not always match the guidelines in that particular state.

Another aspect of antibiotic over-prescribing is prescribing based on non-clinical factors. Patient's expectation of an antibiotic prescription, convenience, and demand necessitated by the social background of the patients are considered as the unscientific reasons for antibiotic prescription. For example, English and Scottish dentists would not prescribe antibiotics for non-clinical factors (12), whereas dentists in the Eastern Mediterranean region have shown a tendency to prescribe on a patient's demand, especially when short of time (13,14).

The guidelines for antibiotic use in dentistry have changed over time; recommendations for prophylactic coverage for prosthetic joints or diseases that may increase the risk of infection (such as diabetes or immune-deficiencies) have come and gone. Some dentists may not be keeping up with the new recommendations or are confused about what to do. The dentists treat patients seen by other health practitioners who may use antibiotics in various ways for various conditions. Antibiotics may be misused by patients who use them casually or obtain them from non-traditional sources such as foreign sources, counterfeit sources, illegal internet suppliers, relatives etc. Also industrial use of antibiotic [for increasing weight gain of food animals] may alter the susceptibility of organisms for the drugs we use.

While dentists cannot solve all of these problems alone, this study suggests that they could be doing a better job of post-graduation education and increasing awareness among themselves and general public.

Practicing dentists have a responsibility to their patients and the profession to remain on the forefront of scientific research and best practice guidelines. With better dissemination of current research findings to dental professionals [through continuing education sessions, seminars, newsletters, publications] and a thorough education on these topics in the undergraduate dental curriculum, we may improve the disparity among dentists over time and decrease the contribution to antimicrobial resistance.

Conclusion

The survey results indicate that while majority of the participating dental health professionals do not use antibiotics routinely for simple and non-surgical procedures, only 42% are following the most current AHA and ADA guidelines when prescribing antibiotics although 97% of the participants have reported to be familiar with the guidelines. This variability may be related to the type of practice, (e.g. oral surgery or general practice), patients with more complex health conditions or medical history, diversity of the participants in this research and their professional background.

Acknowledgement

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ABSTRACT (DANSK)

Vurdering af tandlægenes brug af antibiotika

Baggrund – Aktuelle teorier tyder på, at antibiotikabrug inden for odontologi bør begrænses til specifikke profylaktiske regimer, systemiske infektioner og alvorligt immunkompromitterede patienter. Denne undersøgelse har til formål at indsamle data til at evaluere almindelige anvendelser af antibiotika af tandlæger.

Metoder – En undersøgelse med 14 spørgsmål blev formidlet til tandlægestuderende, fakulteter og tandlæger i private praksis i foråret 2015. Spørgsmålene fokuserede på praktiserende tandlægers brug af antibiotika i profylaktiske regimer, kirurgiske og ikke-kirurgiske procedurer og behandling af dentale infektioner. Deltagerne blev også spurgt om efteruddannelse og fortrolighed med American Dental Association (ADA) og American Heart Association's (AHA) anbefalinger.

Resultater – 157 undersøgelser var besvaret med 73 % af deltagerne som tandlæger. 22 % af deltagerne rapporterede rutinemæssigt at foreskrive antibiotika til ikke-kirurgiske behandlinger, 17 % for endodontisk behandling. 66 % efterkomplerede ekstraktioner, 54 % til behandling af dentalabscesser efter ekstraktion, og 45 % ordinerer antibiotika til patienter med ledproteser. 97 % rapporterede bekendtskab med AHA og ADA's retningslinjer, men kun 42 % følger dem.

Konklusion – Resultaterne af denne undersøgelse viser, at de fleste tandlæger ikke vil anvende antibiotika rutinemæssigt til enkle og ikke-kirurgiske procedurer, men deres overholdelse af retningslinjerne for profylaktiske behandlinger er lav. Deltagerens mangfoldighed og deres faglige baggrund kan betragtes som afgørende faktor.

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