

Improving Knowledge of General Dental Practitioners on Antibiotic Prescribing by Raising Awareness of the Faculty of General Dental Practice (UK) Guidelines

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Abstract

Objectives: Cases of antimicrobial resistance are increasing, partly due to inappropriate prescribing practices by dentists. The purpose of this study was to investigate the prescribing practices and knowledge of dentists with regards to antibiotics. Moreover, this study aimed to determine whether the prescriptions comply with the recommended guidelines and whether clinical audit can alter the prescribing practices of dentists leading to better use of antibiotics in the dental service.

Materials and Methods: A clinical audit (before/after non-controlled trial) was carried out in two dental clinics in the northeast of England. Retrospective (n=30) and prospective (n=25) data were collected from antibiotic prescriptions, analyzed and compared with the recommended guidelines. Data included patients' age, gender and clinical conditions in addition to type, dosage, frequency and duration of prescribed antibiotics and the reason for prescription. The principles of appropriate prescribing based on guidance by the Faculty of General Dental Practice (FGDP) in the United Kingdom (UK) were discussed with the clinicians. Pre- and post-audit information were then compared using McNemar's test and P<0.05 was considered statistically significant.

Results: After intervention, data revealed that antibiotic prescribing practices of dentists improved, as there was an increase in the percentage of prescriptions that were in accordance with the FGDP (UK) guidelines.

Conclusion: In view of the limited data collected, this study concludes that there are inappropriate antibiotic prescribing practices amongst general dental practitioners and that clinical audit can address this situation, leading to a more rational use of antibiotics in dental practice.

Key words: Antibiotics; Prescribing; Dentistry; Knowledge

Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2015; Vol. 12, No. 3)

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Received: 3 June 2014

Accepted: 22 January 2015

INTRODUCTION

Antibiotics have been used for many years to manage infection [1] and are commonly prescribed by general dental practitioners (GDPs) for certain orofacial infections [2]. However, the increasing rate of microbial resistance to antibiotics especially among the microorgan-

isms in the oral cavity is a significant public health dilemma [3]. In the UK, this has prompted reports from high profile bodies [3]. As inappropriate prescribing of antibiotics is a major cause of antimicrobial resistance in the primary care setting [3], and literature provides evidence of inadequate prescribing prac-

tices by dentists, appropriate measures need to be taken to promote rational prescribing in an attempt to reduce the increasing incidence of antibiotic resistance and other side effects of antibiotic abuse [2]. Such misuse includes the inappropriate selection and the unnecessary prescription of antibiotics in unwarranted clinical situations, and the use of an incorrect dose or inadequate duration of antibiotic therapy [3].

Evidence shows suboptimal prescribing by healthcare workers, as 75% of antibiotic use is of questionable therapeutic value [3]. In a study by Vessal et al. in 2011, more than 40% of dentists responding to a questionnaire would inappropriately prescribe antibiotics for conditions for which antibiotics are not required according to good practice guidelines, and treatment via local measures would be adequate [4]. Patients too, often with regards to self-prescription take inappropriate antimicrobial medications or do not take the prescribed dosage for the entire course of treatment [5]. A study by Thomas et al. states that appropriate prescribing in general practice remains a crucial objective on both clinical and cost grounds and clear protocols on antibiotic prescribing are required [6]. Palmer et al. state that audit along with the use of guidelines and educational initiatives is effective in reducing irrational antibiotic use by changing dentists' prescribing practices [7]. This encourages rational, effective, safe and economic use of antibiotics and simultaneously reduces the possibility of dentists contributing to the problem of antimicrobial resistance [8]. Although in medical practice, antibiotics have been the subject of many audits, in dental practice, audits on antibiotic prescribing have been very few [7]. According to what has been discussed, the purpose of this clinical audit (before/after non-controlled trial) was to assess and evaluate the prescribing practices and knowledge of dentists with regards to antibiotic prescriptions in the dental service. Moreover, this study aimed to determine whether they are complying with

the recommended guidelines and whether clinical audit can alter the prescribing practices of GDPs leading to better use of antibiotics in dental practice.

MATERIALS AND METHODS

Data collection

Data were collected across two community dental clinics in the northeast of England in 2013. The second clinic was chosen in order to obtain more data due to a greater number of unscheduled emergency care appointments and prescriptions given at this clinic. Retrospective data were collected at the initial stage from 30 recent antibiotic prescriptions. Even though a sample size of 30 was then recommended for prospective data, only 25 were available for collection before the deadline of this audit. It is also important to note that community services prescribe antibiotics less frequently as compared to general dental practices.

The antibiotic prescribed, the sex and age of patient, the dosage, frequency and duration as well as the clinical condition and reason behind the prescription were recorded. Both the departmental prescription record sheets and the R4 software were used to obtain the retrospective and prospective data. These were noted in data collection forms and analyzed on data analysis sheets and subsequently processed using Microsoft Excel.

Standards

In the UK, the FGDP recently updated their guidance on the prescription of antimicrobials relevant to dentistry [9]. In order to ensure high standards of patient care and prudent prescribing, compliance to these recommendations is essential. All antibiotic prescriptions should be in accordance with FGDP (UK) guidelines on antimicrobial prescribing for GDPs [9]. For every patient, the prescriptions should include the following:

1. The appropriate antibiotic for the clinical case

2. The correct dosage
3. The correct frequency
4. The correct duration
5. Prescribed for the correct clinical indication and reason

In audits, it is well recognized to use guidelines to set standards and there is evidence to show that the publication of guidelines in medical practice can improve prescribing [7]. The Dental Practitioners' Formulary (DPF) [10], which is commonly used by dentists, is also a very accredited source but unlike the DPF [7], the FGDP (UK) guidelines are more detailed. These guidelines are based on literature review, consultation with dental societies and best practice [11] and can be used together with the DPF.

Procedure

Before the audit, retrospective data were collected, analyzed and compared with the recommended guidelines. The principles of appropriate prescribing based on the guidance produced by the FGDP (UK) were discussed in an expert panel and copies of the guidelines were disseminated amongst the dental clinicians. The aim was to achieve the following action plan:

- Amoxicillin and metronidazole should only be prescribed as an adjunct to the treatment of dentoalveolar infections to limit the spread of infection.
- Metronidazole is the drug of choice for acute necrotizing ulcerative gingivitis and pericoronitis.
- Duration of treatment should be limited to five days for amoxicillin and three days for metronidazole.

Following the instruction of guidelines, prospective data were collected, analyzed and compared with the recommended guidelines. The dentists' prescribing practices before and after the intervention were then compared in order to observe changes, if any, in the number of prescriptions that were in accordance with the recommended standards.

The percentage of prescriptions (in total and for each antibiotic prescribed) that were in accordance with the FGDP (UK) guidelines was calculated for both anonymous retrospective and prospective data.

Changes, if any, were then tested for significance using McNemar's test. P-values less than 0.05 were considered statistically significant.

RESULTS

The only prescribed antibiotics were amoxicillin and metronidazole. Figures 1 and 2 present the retrospective and prospective data for amoxicillin and metronidazole prescriptions. The antibiotic prescribing practices of clinicians improved as there was an increase in the percentage of prescriptions that were in accordance with the FGDP (UK) guidelines post-audit.

For metronidazole, the percentage of prescriptions that were in accordance with the guidelines before and after the dissemination of guidelines was 13.3% and 28.6%, respectively ($P=0.025$).

This difference shows a statistically significant improvement. For amoxicillin, the percentage of prescriptions that were in accordance with the guidelines before and after the dissemination of guidelines was 46.6% and 81.8%, respectively ($P=0.041$). This difference shows a statistically significant improvement. In conclusion, there was a change in the dentists' prescribing practices for amoxicillin and metronidazole during the pre-audit and post-audit period.

In total, there was an increase in the percentage of prescriptions that satisfied FGDP (UK) guidelines from 30 to 52% ($P=0.01$). This change was statistically significant.

DISCUSSION

The antibiotics prescribed pre- and post-audit were either amoxicillin or metronidazole, which shows that these are most commonly prescribed.

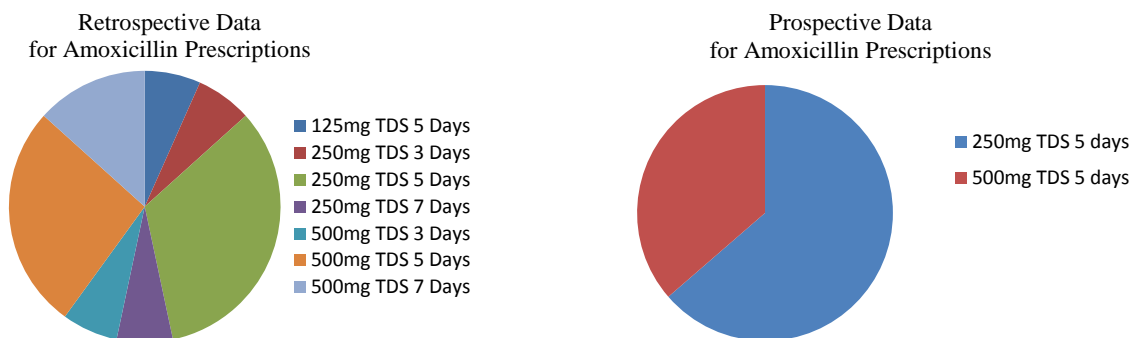


Fig 1. Pie charts representing the retrospective and prospective data for Amoxicillin prescriptions

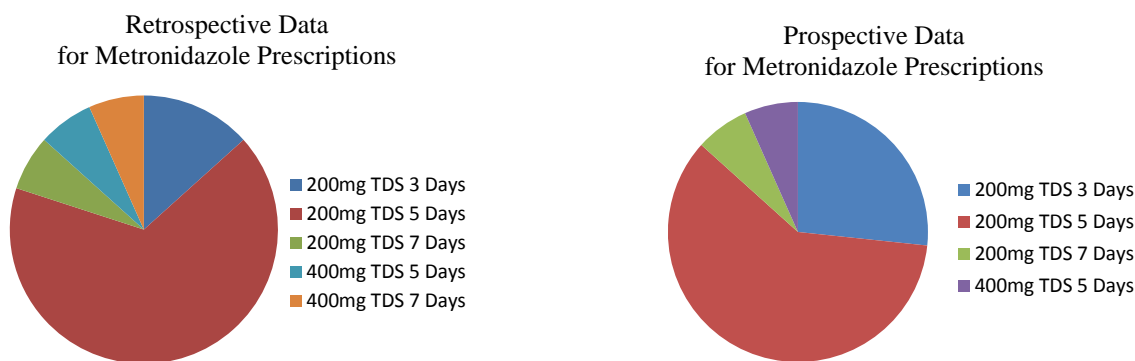


Fig 2. Pie charts representing the retrospective and prospective data for Metronidazole prescriptions

This is similar to the results of a previous study by Palmer et al. and shows that amoxicillin and metronidazole are the antibiotics of choice as the majority (78%) of the prescriptions issued by a large population of National Health Service GPs in England were for these two antibiotics [12]. However, in this audit, a total of 55 prescriptions were analyzed whereas in Palmer’s study a total of 17,007 prescriptions were analyzed [12].

The retrospective data shows a lot of variation amongst the prescriptions especially for amoxicillin. Only 30% of the antibiotics prescribed were in accordance with FGDP (UK) guidelines.

Many did not conform to guidelines in terms of duration and dose of therapy. Amoxicillin was prescribed for more or less than five days and metronidazole was prescribed for more than three days duration. On one occasion when amoxicillin was prescribed for a child of eight years for a dentoalveolar infection, the dose of 125mg was used whereas the recommended dose is 250mg according to the FGDP (UK) guidelines. Moreover, there were instances when metronidazole was not used as an adjunct to other antibiotics. There was only one instance where both amoxicillin and metronidazole were prescribed for severe spreading infection.

There was an instance when amoxicillin was given for pericoronitis whereas metronidazole is the antimicrobial of choice and the dose was doubled. This inappropriate prescribing pre-audit was also evident from the data obtained by Palmer et al. in his audit in 2001 [7] and in the results of a questionnaire study carried out in England in general dental practice [8]. Another investigation by Palmer et al. in 2000 also demonstrated inappropriate antibiotic prescribing practices of GDPs with inconsistent frequency and dose and for prolonged periods [12]. However, all of the prescriptions included the correct frequency. The most common reason for amoxicillin prescriptions was for dentoalveolar abscess while for metronidazole it was acute necrotizing ulcerative gingivitis and pericoronitis along with dentoalveolar abscess. The reasoning behind all the antibiotics prescribed was the definitive clinical indication. From the findings above, it can be concluded that overall, not all of the antibiotic prescriptions conformed to FGDP (UK) guidelines, and there is a need for improvement. Therefore, the findings were shared with the dental clinicians. The results of the second cycle indicated that there was some improvement after the guidelines were introduced. There was an increase in the percentage of prescriptions that satisfied FGDP (UK) guidelines from 30% to 52%. This was a statistically significant improvement. Prescribing of amoxicillin conformed more closely to the guidelines. This finding is similar to the results obtained by Palmer et al. in 2001 [7]. However, in his audit there was an increase from 57.4% to 70.5% of prescriptions that conformed to guidelines for amoxicillin following the issue of guidelines, while for metronidazole there was an increase from 25% to 41.6% [7]. There was still a tendency amongst the dentists to prescribe metronidazole for five days instead of the recommended three. Therefore, implementing change and breaking this habit amongst the clinicians in this area was expected to be difficult and proven to be

the case. All of the prescriptions included the correct frequency.

The most common reason for amoxicillin prescriptions was for dentoalveolar abscess while for metronidazole it was pericoronitis along with dentoalveolar abscess. The reasoning behind all the antibiotics prescribed was the definitive clinical indication. Detailed analysis of the prospective data shows less variation in the doses employed and duration of therapy as compared to the retrospective data, especially for amoxicillin, which is a pleasing result and demonstrates the potential for further improvement with re-audit.

CONCLUSION

Due to the limited data collected, this audit was only carried out as a pilot study. This study supports the conclusion that there is lack of knowledge and inappropriate use of antibiotics in dental practice. To reduce contributions to the worldwide problem of antimicrobial resistance, dentists require clear guidelines on appropriate prescribing. Educating dentists on the principles of appropriate prescribing and encouraging them to prescribe in accordance with the recommended guidelines is valuable in improving antibiotic prescribing in the dental service. Further education seems necessary to increase awareness of the FGDP (UK) recommendations amongst clinicians to reduce inappropriate antimicrobial use. Even though this audit helped identifying and improving prescribing practices, it was partially successful in implementing positive changes. This audit cycle should therefore be repeated and further changes implemented until data analysis shows that 100% of prescriptions are in accordance with the set standards.

RECOMMENDATION

This audit was a starting point for further audit projects of higher quality with additional sampling of antibiotic prescriptions. It is important to continually carry out such projects in order to improve patient care and achieve and sus-

tain high standards of healthcare delivery. To encourage appropriate prescribing, it is recommended to produce a summary of the guidelines in table format and ask clinicians to place this alongside the prescription pads to ensure they are reviewed before any antibiotic is prescribed in dental practice.

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