Profile of the dental surgeon related to the recommendation of individual preventive strategies

Abstract
Aiming to evaluate the acquisition of scientific evidence by Dental Surgeons (DSs) and verify whether they applied it clinically, a questionnaire was sent to 223 DSs in Lavras (Minas Gerais, Brazil), containing 9 objective questions relative to confidence to recommend individual preventive strategies in Dentistry. The response rate to the questionnaires was 54.26% (n = 121). After performing logistic regression analysis (Wald Test, $\alpha = 0.05$), it was found that male DSs graduated from state universities, even though they did not read text books, were more confident of prescribing and applying fluoride gel, while the DSs graduated up to 10 years and who attended in private dental office, were more confident of indicating and applying sealants. Chlorhexidine was better recommended and applied by DSs post-graduated. The male DSs indicated and made better use of the Atraumatic Restorative Treatment (ART). The DSs graduated from state universities and who had not discussed technical matters with their colleagues over the last 12 months were shown to be more confident of monitoring white stain lesions with a view to the non-progression of dental caries. Thus, it was concluded that only a segment of the DSs evaluated are adequately applying the knowledge based on scientific evidence.

Key Words: evidence-based dentistry, preventive dentistry, social dentistry

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Introduction
At present efforts and resources are being allocated to the development of a therapeutic approach to health, based on scientific evidence, and this has resulted in a clear improvement in its quality. In order to Dental Surgeons (DSs) to successfully adopt new techniques or adapt existent ones, it is imperative to provide adequate scientific knowledge. This movement, Dentistry Based on Evidence (DBE), which seeks to acquire new knowledge supported by scientific evidence and its later clinical application, is something relatively new1.

Decisions based on scientific evidence assure solid clinical practices, at all times with a view to the best outcome for each case. Scientific evidence is a fundamental tool in the process of determining the effectiveness of a diagnostic method, a treatment or an intervention, in relation to other methods used under the same circumstances2.

DSs play and important role in realizing health education, and are considered by their patients as the main source of preventive knowledge in oral health, joining patients to the sources of information on oral health, represented by universities, industries and other organizations3,4.

The reviews of literature, notably the systematic reviews associated with meta-analysis, are very important to clinics and those who formulate public health policies, in the process of synthesis and dissemination of scientific research evidence. The biases of publication, deviations of inferences of the truth, caused as a result of the tendency of researchers, reviewers and editors to present manuscripts for publication, based on the direction of their results, may generate systematic review with results that are systematically different from reality. To accept these results and adopting inefficient procedures is a waste of financial resources, and may unnecessarily expose the patient to suffering and unsuccessful treatment.

In recent times, informatics has brought about great advances in health research, facilitating the filing of scientific articles and reducing the financial cost and time of disseminating scientific knowledge5. In Brazil, access to Internet among DSs attains 70.8%6. In spite of the current facilities for disseminating scientific knowledge7 there is a gap between the time when scientific evidence is made available and its clinical application, and in dentistry, this may be over 10 years7.

The most evident barriers to implementing scientific evidence are as follows: maintenance of the status quo, difficulty in accessing quality scientific knowledge, the non-existence/inconsistency of scientific evidence, deterioration of knowledge and performance over the course of time, knowledge and attitude of clinicians, patient factors, clinical, educational and social environment, as well as the health systems8,9,10.

The systematic review9 and the continuous medical education (CME)11 are important for reducing this gap between the acquisition of scientific evidence and its clinical application.

The standard evidence for the recommendation and individual applications of fluoride (fluoridated dentifrice, fluoride gel and fluoridated varnish) originated from the systematic reviews of Marinho et al.12-14. The standard evidence for monitoring white spot lesions with a view to preventing cavitation by dental caries originated from the systematic review of Bader et al.15 while the recommendation and individual application of sealants, chlorhexidine and ART originated from the systematic review of Ahovuo-Saloranta16, the meta-analysis of Rijkm et al.17 and the narrative review of Mjör and Gordan18.

On the basis of these presuppositions, this study endeavored to evaluate the level of Dental Surgeons’ (DSs) knowledge and clinical application of scientific evidence in Dentistry, in the city of Lavras (Minas Gerais, Brazil).

Material and Methods
After approval by the Institute’s Ethical Committee on Research (Protocol No. 951), the data were collected by means of a previously evaluated questionnaire, sent to the 223 DSs, registered with CROMG (June/2002) and resident in the municipality of Lavras (Minas Gerais, Brazil), their confidence to recommend the rational use of fluorides, the application of sealants to pit and fissure and the use of chlorhexidine was measured, with a view to reducing the incidence of dental caries; the use of ART in children as well as monitoring white spot lesions with the aim of preventing dental caries progression.

To reduce bias and the non-reply rate, the following precautions were taken19: a letter of invitation/explanation was sent, the questionnaire was formatted in an esthetically pleasing manner, stamped envelopes were provided for returning the replies, anonymity and the exclusive use of the data for research purposes was guaranteed.

Through the questionnaire, the independent variables were raised: time since graduation, sex, type of institution where undergraduate study was done (state or private), exercise of clinical activity, professional activity system (public service or private), age group attended, whether a post-graduation course was done, whether technical matters had been researched on the Internet during the past 12 months, whether scientific articles or text books had been read, whether technical subjects had been discussed with colleagues or whether any course of lecture had been attended.

The study delineation was transversal and the participants replied to the questionnaire on the Likert scale19 composed of the following categories: “Don’t Know = 0”, “None = 1”, “Very Little = 2”, “Average = 3”, “Very Much = 4” and “Completely = 5”.

The pattern of replies with evidence was obtained from the systematic reviews, narrative reviews and meta-analyses,
relative to the questionnaire items. For the incompletely filled out questionnaires, the *pair wise technique* was used. The degree of DSs up-to-dateness was measured by the agreement/disagreement with the scientific evidence, verified in the degrees 4 and 5 of the *Likert scale*, and for some of the questions, these values represented complete agreement with the scientific evidence, and for others, complete disagreement in an attempt to minimize bias in the replies to the questionnaire.

To analyze the logistic regression of the data the *Wald test* was used, and the level of significance of 5% ($\alpha = 0.05$) was adopted.

**Results**

The rate of reply to the questionnaires obtained was 54.26% (n = 121).

Table 1 shows the distribution of the Dental Surgeon sample according to the socio-demographic and professional characteristics in absolute frequencies (N) and in relative frequencies (%). Code 1 refers to male DSs, DSs with affirmative reply to the question (“yes”) or DSs that graduated “over ten years ago”. Code 0 refers to female DSs, DSs with negative reply to the question (“no”) and DSs that graduated “up to ten years ago”. “Blank” indicates questionnaires

### Table 1 - Distribution of the 121 Dental Surgeons in the sample with regard to socio-demographic and professional variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Code 1*</th>
<th>Code 0**</th>
<th>Blank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N %</td>
<td>N %</td>
<td>N %</td>
</tr>
<tr>
<td>Years since graduation</td>
<td>48</td>
<td>39.7</td>
<td>73</td>
</tr>
<tr>
<td>Sex</td>
<td>54</td>
<td>44.6</td>
<td>67</td>
</tr>
<tr>
<td>Graduated from State University</td>
<td>22</td>
<td>18.2</td>
<td>97</td>
</tr>
<tr>
<td>Engaged in clinical activity</td>
<td>116</td>
<td>95.9</td>
<td>5</td>
</tr>
<tr>
<td>Engaged in professional activity in public service</td>
<td>45</td>
<td>37.2</td>
<td>76</td>
</tr>
<tr>
<td>Engaged in professional activity in private dental office</td>
<td>111</td>
<td>91.7</td>
<td>9</td>
</tr>
<tr>
<td>Attends only children</td>
<td>3</td>
<td>2.5</td>
<td>118</td>
</tr>
<tr>
<td>Attends only adults</td>
<td>16</td>
<td>13.2</td>
<td>105</td>
</tr>
<tr>
<td>Attends all ages</td>
<td>100</td>
<td>82.6</td>
<td>20</td>
</tr>
<tr>
<td>Has post-graduation</td>
<td>83</td>
<td>68.6</td>
<td>37</td>
</tr>
<tr>
<td>Researched technical subjects on the Internet (in the last 12 months)</td>
<td>101</td>
<td>83.5</td>
<td>20</td>
</tr>
<tr>
<td>Read scientific article (in the last 12 months)</td>
<td>115</td>
<td>95.0</td>
<td>5</td>
</tr>
<tr>
<td>Read chapter of book (in the last 12 months)</td>
<td>116</td>
<td>95.9</td>
<td>5</td>
</tr>
<tr>
<td>Discussed technical subjects with colleagues (in the last 12 months)</td>
<td>113</td>
<td>93.4</td>
<td>8</td>
</tr>
<tr>
<td>Frequented technical courses or lectures (in the last 12 months)</td>
<td>108</td>
<td>89.3</td>
<td>12</td>
</tr>
</tbody>
</table>

*Code 1: group “OVER 10 YEARS”, group “MEN” or group “YES”;
**Code 0: group “UP TO 10 YEARS”, group “WOMEN” or group “NO”.

The use of sealants on pit and fissure to prevent dental caries,

The use of atraumatic restorative treatment (ART) in children

With regard to “Monitoring white spot lesions to prevent cavitation by dental caries”, dentists that graduated from state university presented 3.3 (p = 0.023) times more chance (p < 0.05) respectively of being in agreement with the scientific evidence in relation to those that did not fit into this socio-demographic profile.

As will be observed in Table 1, 60.3% of the DSs graduated up to 10 years ago, from private university (80.2%), there being a predominance of women in the sample assessed (55.4%) and post-graduate DSs (68.6%). In relation to professional activity, 95.9% of the DSs were engaged in clinical activity, mainly in private dental office (91.7%), attending individuals of all ages (82.6%). With regard to knowledge up-to-dateness, 83.5% of the DSs used the Internet as an auxiliary source for acquiring scientific knowledge, 95.0% and 95.9% of the dentists, respectively, related to read some scientific article and at least one chapter of a book in the last 12 months. Furthermore, 93.4% of the DSs discussed technical matters with colleagues and 89.3% frequented courses or lectures.

Table 2 presents the variables in which statistical significance was found according to the logistic regression analysis. When interpreting the *odds ratio* (OR), it is observed that in relation to the “Application of fluoride in children with low and medium caries prevalence”, male dentists that graduated from state university or those that read a chapter of books in the last 12 months presented 2.7; 7.2 and 0.09 times more chance (p < 0.05) respectively of being in agreement with the scientific evidence in relation to those that did not fit into this socio-demographic profile.

With regard to “Monitoring white spot lesions to prevent cavitation by dental caries”, dentists that graduated from state university presented 3.3 (p = 0.023) times more chance of being in agreement with scientific evidence than those whose socio-demographic and professional characteristics were not replied to.

### Table 2 - Logistic regression analysis of the dependant variables with regard to the items in the questionnaire

<table>
<thead>
<tr>
<th>Variable</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical application of fluoride gel in children with low and medium dental caries prevalence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>0.038</td>
<td>2.655</td>
<td>1.057 to 6.668</td>
</tr>
<tr>
<td>Graduated from State university</td>
<td>0.001</td>
<td>7.221</td>
<td>2.360 to 22.089</td>
</tr>
<tr>
<td>Read chapter of book (in the last 12 months)</td>
<td>0.045</td>
<td>0.087</td>
<td>0.008 to 0.943</td>
</tr>
<tr>
<td>Monitoring white spot lesions to prevent cavitation by dental caries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>p</td>
<td>OR</td>
<td>CI 95%</td>
</tr>
<tr>
<td>Graduated from State University</td>
<td>0.023</td>
<td>3.363</td>
<td>1.184 to 9.484</td>
</tr>
<tr>
<td>The use of sealants on pit and fissure to prevent dental caries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>p</td>
<td>OR</td>
<td>CI 95%</td>
</tr>
<tr>
<td>Years since graduation</td>
<td>0.002</td>
<td>2.065</td>
<td>1.011 to 4.619</td>
</tr>
<tr>
<td>Engaged in professional activity in private dental office</td>
<td>0.016</td>
<td>6.302</td>
<td>1.374 to 28.912</td>
</tr>
<tr>
<td>The use of chlorhexidine to prevent dental caries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>p</td>
<td>OR</td>
<td>CI 95%</td>
</tr>
<tr>
<td>Has post-graduation</td>
<td>0.035</td>
<td>3.152</td>
<td>1.085 to 9.160</td>
</tr>
<tr>
<td>Use of atraumatic restorative treatment (ART) in children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>p</td>
<td>OR</td>
<td>CI 95%</td>
</tr>
<tr>
<td>Sex</td>
<td>0.079</td>
<td>2.640</td>
<td>1.176 to 5.928</td>
</tr>
</tbody>
</table>
who responded negatively to this question. The use of sealants for pit and fissure to prevent dental caries is done on the basis of scientific evidence by DSs who worked in private dental office (OR = 6.3; p = 0.018). The time elapsed since graduation had little influence on the use of this strategy on the basis of scientific evidence (OR = 0.2; p = 0.002). As regards the use of chlorhexidine to prevent dental caries, being post-graduated represented a 3.1 greater chance of being in agreement with scientific evidence (p = 0.035).

The indication of Atraumatic Restorative Treatment (ART) in children presented agreement with the evidence in Male DSs (OR = 2.6, p = 0.019).
The use of fluoridated dentifrice and application of fluoridated varnish did not present statistical significance for any of the DS profiles evaluated.

Discussion
Preventive strategies used for controlling the prevalence and incidence of dental caries has been related in scientific literature since the decade of the 1930’s, and has present a growing and important accumulation of knowledge over the last few decades. In this context, this study aimed to evaluate the acquisition and use of these strategies by DSs in the municipality of Lavras (MG, Brazil), on the basis of currently available scientific evidence and advances12-18.

For this purpose questionnaires were used, to which the reply rates of 54.26% was sufficient to trace a profile of the DSs in the sample in relation to the dissemination of scientific evidence in Dentistry, and it was in agreement with that obtained in studies that used the same methodology20-22.
The topical application of fluorides in different vehicles and in different concentrations, allowed the action of these agents on the tooth surface23. The most rational method for using the fluoridated compounds, dentifrices presented a rate of reduction in the disease of 24%13, irrespective of the fluoridated compound used (sodium fluoride – NaF or sodium monofluorophosphate – MFP), and brushing should be done at least twice a day, once at night and the other at any time during the day24. A “number of individuals necessary to be treated in order to obtain an improvement” (NNT) equal to 1.6 for child population with an increase in caries in permanent dentition of 2.6 teeth attacked per year and an NNT equal to 3.7 for a child population with an increase in caries of 1.1 teeth attacked in a year. NNT is the value required for obtaining the benefit in an individual, that is, in a population with caries prevalence equal to 1.1 it is necessary to treat 3.7 individuals to obtain the intended benefits in one of them. Thus, it allows the conclusion that the regular use of fluoridated dentifrice by children and adolescents is effective, and is the commonest form of controlling caries as a result of its favorable cost/benefit ratio14.

In Brazil the annual consumption of fluoridated dentifrices, approximately 508 grams per capita25, is one of the highest in the world, and the regular use of these methods, together with fluoridated water supplies and decentralization of the Brazilian health system, have been pointed out as the factors responsible for the decline in dental caries prevalence in the country. Fluoridated dentifrice is recommended with a high degree of confidence (values 4 and 5 on the Likert scale), by 74.38% of the DSs in Lavras (Minas Gerais, Brazil).

Fluoride gel has been recommended only for individuals at high risk of developing caries, for whom the cost/benefit ratio is favorable26. This method helps to control caries, substantially reduces the disease in children and adolescents, a reduction of 21% having been found in the DMFT index, and an NNT equal to 2 having been obtained for a child population with an annual increase in caries of 2.2 teeth affected per year, and an NNT equal to 2.4 for a child population with an annual increase in caries of 0.2 teeth affected per year2.

The fluoridated varnishes that have been developed and introduced since the 1960’s, appeared alternatives to the conventional topical methods of fluoride application, in an attempt to reduce the immediate loss of fluorides, and consequently increase their caries prevention efficiency27. The best indication for varnishes has been for preventing occlusal caries in individuals at high or medium risk of caries14. The reduction in DMFT is, on an average, 46%, an NNT equal to 1.4 having been obtained in a child population with an increase in caries of 1.6 teeth affected per year and an NNT equal to 3.2 for a child population with an increase in caries of 0.7 teeth affected per year. In primary dentition, a 33% reduction in dft was found. The frequency of 2 to 4 times a year for applying fluoridated varnishes is directly associated with a substantial reduction in caries development in children and adolescents14. However, no statistically significant proof of the up-to-dateness of DSs as regards this mode of topical fluoride application was found in this study. During the 1980’s, use of sealants for pit and fissure to control the initiation and progression of the disease increased in community programs and private dental office. The prevention fraction found for the self-polymerizing resinous sealant was 71%27.

In the short term, the cost/benefit ratio of sealants for children at low and medium risk of caries has been unfavorable, thus they have been recommended only for children or adults classified as being at high risk of caries28. The effectiveness of sealants depends on their retention and integrity on pit and fissure. Resinous sealants are 86% effective at 12 months and 57% at 48 to 54 months after being applied, however, as evidence of effectiveness of sealing pit and fissure with glass ionomer cement is still questionable, and has hardly been related in scientific literature29. Bis-biguanide chlorhexidine, an antimicrobial agent with special affinity for oral structures, selectively suppresses the growth of microorganisms, especially the S. mutans,
associated with initiating caries disease. The caries reduction rate by treatment with chlorhexidine is 46% and it is effective in individuals classified at any dental caries disease risk level\textsuperscript{15}.

The Atraumatic Restorative Treatment (ART) operative approach alternative for caries lesion management by the use of manual instruments and restoration with glass ionomer cement is a simple option with a favorable cost/benefit ratio that is very import for reducing the inequalities relative to access to dentistry services in developing nations and in attending children with conditioning problems, institutionalized patients, the elderly or the physically or mentally handicapped\textsuperscript{18}.

The degree of up-to-dateness of the group that graduated professionally the longest time ago (“over 10 year”) with regard to the application of fluoride gel in children with low and average caries prevalence\textsuperscript{12} reinforces the hypothesis that the greater professional experience, frequenting courses or technical lectures more often, and longer study time (reading scientific books and articles) are important for disseminating scientific knowledge. The greater degree of up-to-dateness of the group that “graduated up to 10 years ago” about the use of sealants\textsuperscript{16} suggests that the content of recent undergraduate programs is up to date as regards the indication of this preventive strategy.

Male DSs, a minority in Brazil (42.5\%)\textsuperscript{6} and in Lavras-MG (44.6\%), were shown to be more up-to-date as regards fluoride gel application in children with low and medium caries prevalence\textsuperscript{12} and the use of ART in children\textsuperscript{18} than the female DSs. This trend may be explained due by the fact that the monthly income of 70\% of Brazilian DSs does not exceed US$ 2,200.00, and there is a difference of up to 33.3\% between the incomes of men and women\textsuperscript{29}, that may result in less possibility of women dentists being able to participate in courses, since the main barrier to frequenting post-graduation courses is their high financial cost\textsuperscript{6}.

DSs who had state academic education were shown to be up-to-date as regard the topical application of fluoride gel for caries prevention\textsuperscript{12} as well as monitoring white spot lesions to prevent disease progression\textsuperscript{15}, suggesting that much emphasis is probably given to teaching these preventive strategies at these institutions.

The DSs that worked in private dental office were shown to be more up-to-date as regards the use of sealants\textsuperscript{16}, indicating that “prevention” is no longer an exclusive concern of public service, and now occupies an outstanding place in private dental office, exercising an important competitive mechanism in the work market as a result of the population’s demand for preventive care\textsuperscript{30}.

The DSs that did not read technical-scientific literature over the last 12 months were shown to be up-to-date as regards fluoride gel application\textsuperscript{12}. This result deserves cautious interpretation and generalization, as an overestimated number of DSs may have answered this question affirmatively, since they might have felt embarrassed to answer negatively, in spite of the guaranteed secrecy and anonymity\textsuperscript{30}.

Among the assessed professionals, the post-graduates are up to date as regards the use of chlorhexidine for caries prevention\textsuperscript{17}, and this suggests that the matter is adequately approached in post-graduation. Non-specification of the DSs post-graduation area may have some influence on the results found, as many DSs prefer courses such as Bucco-Maxillo-Facial Surgery and Traumatology or Prosthesis, setting aside courses that approach prevention in Dentistry\textsuperscript{17}. The DSs specialists in Brazil\textsuperscript{6} are distributed as follows: Endodontics (18.3\%), Orthodontics (16.4\%), Pediatric Dentistry (14.9\%), Periodontics (13.9\%), Prosthesis (12.5\%), Dentistry (12.5\%) and Public/Collective Health (6.7\%).

In view of the data obtained and analyzed in this research, it was concluded that the Dental Surgeons: 1- men, graduated from state university, even though they had not read scientific books in the last 12 months, were shown to be confident about prescribing and applying fluoride gel in children as a result of the diagnosed risk of dental caries; 2- those graduated up to 10 years ago and who attended in private dental office, were shown to be confident about prescribing and applying sealants to pit and fissure for the prevention of dental caries; 3- those that have post-graduation courses were shown to be confident to prescribe and apply chlorhexidine with a view to preventing dental caries; 4- those that graduated from state universities were shown to be more confident of monitoring white spot lesions with a view to the non-progression of dental caries; 5- men were shown to be confident about prescribing and applying ART in children for the treatment of cavitated dental caries lesions.

References


