RESEARCH

302  Is dental caries contagious?

305  Dentists in the mirror of Dentists: A survey on peer assessment of dental ethics in Iran

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The python is a constrictor and is not venomous, and is Aglyphpous: no grooved teeth to carry venom. There are rows of sharp re-curved teeth, four in the upper jaw, two in the lower, securing a firm grip on prey. The quadrate bone is short and massive, the mandible relatively small.
Most people would see this as a straight line. The rare ones have the ability to turn it into a heartbeat.

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A rather cursory search of the Web revealed that on offer during 2017 were some 25 major international Dental Conferences. The venues ranged from Philadelphia to Osaka, from Budapest to Auckland, Dublin to Madrid. The themes seemed mainly to be around Dental Care but there were some more focussed Congresses: Research, Polymere Science, Dental Marketing, Dental Education. The dedicated Congress attender would have his/her work cut out just to select which of this plethora of options should be included on his/her busy schedule!

This level of Congress activity speaks favourably of the profession from an epistemological point of view. The word epistemology nicely encompasses the essential rationale for organising congresses in the first place. Derived from the Greek epistēme ‘knowledge’, from epistasthai ‘know, know how to do’, epistemology now implies the theory of knowledge, especially with regard to its methods, validity, and scope, and the distinction between justified belief and opinion. Is that not the best of reasons to attend?

In the endeavour to ensure that there is indeed a transference of knowledge, Congress organizers normally invoke a variety of methods to deliver new understandings, be these through lectures, round table discussions, small group presentations (including practical experiences), and posters. Whatever the medium, Abernathy et al emphasized that the message should focus on the “Five C’s” namely:

- **Clear**: a message is easy to understand
- **Concise**: a message is easy to read
- **Consistent**: a message is related to information that is consistent with other existing information
- **Continuous**: a message has follow-up to make sure it is not forgotten or overlooked

We could readily add another C, **Compelling**: a message should focus the attention of the audience.

A message requires a messenger, who must be seen as a credible expert on the information at hand. It is suggested that audiences respond to familiarity and their level of receptivity is enhanced if the messenger is someone who may be seen as being in a position similar to their own. The World Bank describes key characteristics for an ideal messenger, patience, humility, flexibility and ability to listen. These might also be descriptive of an apostle, the messengers of various religions (Christianity, Islam, Latter Day Saints, Ahmadiyya, Ba Hai, among others) and there we find that the root of the word is _apostolos_ (a messenger or ambassador) which derives from _apostellein_, to send forth. The apostle may depend on an epistle (_epistola_, Latin, a letter, from Greek, _epistole_, a message, letter, command, commission).

A successful Congress mixes apostles, epistles and epistemology to produce a time when receptive audiences absorb new knowledge, interact with the lecturers, debate amongst themselves the merits of the new knowledge and determine how they will transfer that knowledge into practical effect. That is the recipe for a successful Congress.

Oh yes, and just by the way, the Cape Town SADA 2017 Congress held at Centurion City made that mix and was hugely successful!! Glad you were there.

**References**


Bill Evans: Managing editor, E-mail: bill.evans@wits.ac.za
What a Congress Success of 2017 this was!

August started off on an extremely high note with an impressive and successful SADA 2017 Congress, held at the Century City Convention Centre in Cape Town from 4th to 6th of the month. The organisation was an enormous challenge as this was my first experience of managing the vast Congress project.

We enjoyed full subscription, with the venue being totally occupied and unable to accommodate any more heads. We had 600 delegates, representing nearly 300% increase over the 2016 Congress. The delegates included 451 dentists, 43 Oral Hygienists, 58 Dental Assistants and 15 Dental Therapists. The practitioners came from both the public and private sectors. Some hands-on-sessions in the programme were oversubscribed, prompting us to make immediate arrangements for additional opportunities.

The majority of exhibition stands were sold shortly after opening the online application process with all stands taken up before commencement of the Congress. Furthermore there was an increase in the number of participating traders this year.

We were very honoured and privileged to have wonderful international and local speakers and the feedback from attendees reflected their appreciation for the content that the SADA Operations Committee, together with the Scientific Team had worked hard to provide. The organisation was impeccable and ran smoothly throughout the Congress, I heard only compliments! The backdrop of the venue was stunning and the venue organisers were outstanding in their efforts to accommodate our requests. We believe our guests felt warmly welcomed and well-nourished both in terms of knowledge and …..yes….food!

The success of the SADA Congress involved a lot of work and we believe made a significant contribution to the educational needs of the dental community in South Africa. It provided us an opportunity to showcase the talents of the organisation and its members.

News of the Congress was broadcast and promoted far and wide across the country through social media and various Branch and national opportunities. I appreciate the concentrated efforts of the Head Office Communications Team in achieving such spectacular results. All worked tirelessly in calling, encouraging and assisting members to register for the Congress. The members of the SADA Western Cape Branch Committee were incredible and were indefatigable in their commitment to assist the staff and Congress Organiser in ensuring flawless operations. The Scientific Convenor must be congratulated on presenting an incredible programme. We also are very appreciative of the invaluable support of our sponsors.

Our Congress 2018 will be even more powerful – I thus encourage everyone to make a plan to attend. We are provisionally looking to host this in Pretoria, Gauteng in the first week of August 2018 at a stunning and functional venue…. to be announced later. We are restoring the SADA Congress as the undisputed Premier Dental Congress in Africa!

See all of you there.

KC Makhubele: SADA CEO, E-mail: kcmakhubele@sada.co.za
SADA CONGRESS HIGHLIGHTS

The South African Dental Association presents
Century City Conference Centre
CAPE TOWN
Congress & Exhibition
04 - 06 August 2017

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SADA CONGRESS HIGHLIGHTS

The South African Dental Association presents:

Century City Conference Centre
CAPE TOWN
Congress & Exhibition
04 - 06 August 2017

www.sada.co.za / SADJ Vol 72 No. 7
SADA CONGRESS HIGHLIGHTS
Marilize van der Linden...
Congress Convenor supreme.

That smile says it all... and seldom was Marilize to be seen at Congress SADA 2017 without a welcoming and rejoicing laugh. That confidence was doubly well earned as our Conference Convenor had devoted indefatigable and enormous effort to ensure every aspect of this vast undertaking was considered, scheduled, planned and confirmed. Her team rallied to her call and example and the sincere appreciation and congratulation of the Association is accorded to all.

KC Makubele

KC was prominent at the Congress with his camera, recording special instances and interactions. He enjoyed every moment of a Congress into which he had poured enthusiasm, guidance and thought. A fine example and the Association is impressed and grateful.
SUMMARY

Dental caries is one of the most common childhood diseases, affecting up to 80% of all individuals at some stage of their lives. It is a debilitating and painful condition which impacts on mastication, speech, aesthetics and psychosocial behaviour. The prevalence of caries in South African children is around 40% and almost half of this burden goes untreated. The end results are pain, swelling and abscess formation, all of which have negative effects on aspects of the lives of the patients.

Although dental caries is preventable, the prevalence continues to remain relatively high.

This paper discusses the spread of caries and some of the methods by which it can be reduced and/or prevented.

INTRODUCTION

Dental caries (DC) can be defined as the localized destruction of dental hard tissues due to acidic by-products arising from bacterial fermentation of dietary carbohydrates.1 Although DC is one of the most common preventable childhood diseases, individuals and communities are susceptible to the disease throughout their lifetime.1,2 DC is classified according to the site of the tooth on which it occurs (occlusal, interproximal and root) and the number of teeth it affects (rampant or localized). In young children, early childhood caries (ECC) is very common, as shown in Figures 1 and 2 and the high incidence may be attributed to poor diet and poor oral hygiene practices.1

DC, as with many other diseases, depends on the state of balance between the attacking agents, which cause the initial lesion and acquired factors which modify the susceptibility or resistance of the tissues. In caries, the balance is between the character of the enamel and the modifying resisting factors, which are present in the immediate environment of the teeth, the plaque and the saliva.3

Aetiology of dental caries

It is accepted by authorities such as the American Association of Paediatric Dentists that DC is an infectious and transmissible disease which is multifactorial and is strongly modified by diet.3-6 The aetiopathological factors include direct agents such as cariogenic bacteria and diet, the oral environment (saliva flow and composition) and personal factors (including oral hygiene) as reported by Selwitz et al (Figure 3).7 The personal factors also include education, socioeconomic status and immunological factors.5,6 Therefore, to control the spread of DC, there needs to be a multipronged approach targeted at both the direct and indirect etiological agents. This paper examines some of these etiological factors and provides practical solutions that could be implemented in the endeavour to control and prevent DC.

Cariogenic bacteria

The bacteria implicated in DC belong to the Streptococci mutans (SM) group, which has been shown to have a positive correlation with dental caries.3,8 There are no SM in the mouth at birth but studies show that once the teeth erupt, the prevalence of SM increases.3 The bacterium requires
a non-shedding surface such as enamel to which it may adhere. With eruption of the teeth, the bacteria are provided an ideal environment in which to thrive.3

**Origin of SM**

Since SM are found in the mouth, transmission is likely mediated via the saliva. The primary caregiver of the child (mother, father, guardian, siblings) has been implicated through genetic analysis as a donor, and studies have reported a strong positive correlation between the presence of SM in the saliva of mothers and their children.8,9 The other bacterium implicated in dental caries is *Lactobacillus* (LB) which is found in large proportions in cavitated lesions, suggesting that its role in dental caries is not in the initiation of the disease but rather in its progression.10

SM is part of the normal flora and as a result probably cannot be completely eliminated. However, the levels can be controlled by adequate oral hygiene and removal of plaque. Literacy and socioeconomic factors also play vital roles in the prevention and spread of DC, as these considerations affect access to oral health services and to oral hygiene necessities such as toothbrushes and fluoridated toothpaste.

**Diet: Fermentable carbohydrates and time**

There is overwhelming evidence that sugars and other fermentable carbohydrates, such as highly refined flour, play a role in the initiation and development of DC. Sucrose metabolism produces dextran, which promotes superior bacterial adhesion to teeth. As a result it is considered the most important substrate in the establishment of cariogenic bacteria. The frequency of sucrose intake has been shown to be more important than the total amount consumed.5,6 An increased frequency results in a decrease of the pH of the oral cavity, which enhances the establishment and dominance of SM. The duration of the sugar in the mouth directly increases the potential for enamel demineralization and reduces the time for remineralization by saliva, with the result that demineralization becomes the predominant activity.

Hence, nutritional advice is essential for the prevention of DC. However, healthy food is often more expensive and indeed inaccessible to many individuals from a low socioeconomic background. Dietary advice therefore needs to be practical and relevant for the individual and the community. The implementation of a tax on sugar sweetened beverages (SSBs) may go a long way in creating awareness of the harms of excessive sugar ingestion.11 The use of sugar free chewing gum and of xylitol as a sweetener, have also been shown to be effective in the prevention and reduction of DC.12

**Susceptible tooth**

A tooth is most susceptible to caries immediately after eruption. The process of enamel maturation continues following tooth eruption, the teeth becoming less susceptible to decay over time. Disturbances during embryological development can result in defects on the surface enamel which could render the enamel more susceptible to DC compared with healthy enamel. These disturbances could be caused by premature birth or low-birth weight, pre- and postnatal infection/illness, nutritional deficiencies and a variety of environmental pollutants such as maternal smoking.6,13 Many of these disturbances can be prevented with adequate knowledge, access to health care and an improvement in education and literacy. As oral health practitioners, it is our duty to provide nutritional and educational advice to pregnant mothers to reduce the possibility of these defects.

**Saliva flow and composition**

Saliva is often referred to as “liquid gold” in the oral environment.13 It consists of a complex composition having, amongst other components, ions, enzymes and antibodies. The ions include calcium, fluoride, and magnesium, all of which are essential for tooth remineralisation. As long as the saliva is saturated with these ions, remineralization of the tooth is possible which would result in the reversal of the initiation of early DC.13 Saliva also has the ability to buffer the pH of the oral cavity, and to shift it from an acidic (demineralization) to a basic environment which promotes remineralisation. As a result, salivary flow and favourable composition are essential in the natural prevention of DC.14 Studies have also shown that children with a low saliva buffering capacity and high counts of SM and LB were more likely to develop severe DC compared with controls with
lower bacterial counts and better saliva buffering capacity. Hence, oral health practitioners should test patients’ saliva flow and composition with chair side saliva test kits which would then allow them to provide tailor made oral hygiene and diet instructions for each individual.

A reduced salivary flow could be the result of side effects of certain medications, old age, dehydration and other genetic factors. High-risk patients should have their saliva flow and composition monitored regularly and if necessary, saliva substitutes and stimulants (sugar free chewing gum) can be discussed and recommended. Clinical signs of a dry mouth include rampant caries, burning mouth, dry tongue, and halitosis.

Fluoride and fissure sealants
Fluoride, whether administered systemically or topically, has incontrovertibly been shown to reduce DC. The introduction of fluoridated toothpaste has indeed been shown to be the major factor in the reduction of the incidence of DC over the past ten years. Fluoride in drinking water, at concentrations between 0.5 and 0.7 parts per million (PPM), has been proven to reduce dental caries drastically without any side effects such as fluorosis. This has been the most effective public health measure in controlling DC.

Another effective prevention strategy is the placement of fissure sealants (FSs) on permanent molars. These sealants protect the most vulnerable surface of the tooth (occlusal pits and fissures), and as a result have reduced the global prevalence of DC. The placement of FSs is simple and cost effective, and sealants have been proven to reduce both the initiation and progression of DC. Indeed, it may be argued that all children should receive FSs on their permanent molars as soon as these teeth erupt in the mouth.

Behavioural and psychosocial causal mechanisms
The importance of the interactions between biological, behavioural, cultural, social, and environmental factors in understanding health and disease is vital. Although DC can be linked to specific actions or behaviours, socio-economic status (SES) and income levels also play an important role in the prevalence of DC. A systematic review identified strong evidence of a consistent and significant inverse relationship between SES and the incidence of caries in children under 6 years. Children from poor backgrounds had more DC when compared with children who had a high SES.

CONCLUSION
There is strong evidence that SM is transmitted from mother to infants and therefore DC is indeed a contagious disease. The affliction, however, has multiple etiological factors and if at least one or more of these factors can be controlled, then the prevalence would be reduced or the disease altogether prevented. The prevalence of DC is still relatively high, and only a multifactorial approach will be effective in its prevention and reduction. Thus, there are a host of factors that need to be addressed, and preventive programs focusing on as many of the etiological agents as possible should be initiated and this may suppress transmission of the bacteria.

A few general approaches that can be used include:

- Community based strategies that focus on educating mothers regarding their dietary habits may also influence the habits of their infants. Also included should be water fluoridation policies, and personal and community preventive programmes in high risk communities. These initiatives should incorporate oral health education to all communities using a variety of media campaigns, including mass media campaigns, as well as one-to-one counselling at a private practice level.
- Provision of examination and preventive care in dental clinics and private practices. This includes screenings, early detection of caries, and the early identification of high risk patients such as young children, geriatrics, patients on medication, drug users, pregnant mothers, and mentally and physically handicapped individuals.
- Encouraging private practitioners to focus on preventive rather than curative care, by increasing the financial remuneration and incentives received from Medicaid Aids Schemes.
- The delivery of oral health education and instruction on improving oral hygiene and dietary practices at schools, homes, crèches and other public areas.

References
Dentists in the mirror of Dentists: A survey on peer assessment of dental ethics in Iran

ABSTRACT

Background: Dental Ethics is still in its infancy. More research investigating ethical issues in dental practice is required, and subjecting dentists to critique by their peers is one available strategy.

Methods: A prioritized list of ethical issues had been derived in a previous qualitative study aimed at examining the concerns of a group of Iranian dentists about ethical issues in dental practice. The current study used the most highly ranked issues to develop a series of ethical vignettes and accompanying questionnaire. Dentists were asked to rate each of four or five possible actions in response to every vignette, according to the expected prevalence of behaviour among Iranian dentists and its degree of ethical soundness. Two hundred and four Iranian dentists, predominantly general practitioners, participated in the study.

Results and Conclusions: The three top themes, all directly related to clinical dental practice, were: not taking responsibility for one’s errors, performing procedures without adequate competence, and over-treatment (or unnecessary treatment). Less important issues included: unprincipled behaviour towards disadvantaged patients, unprofessional discussion of a colleague’s work, and inappropriate manners towards patients. The female respondents showed more concern regarding the prevalence of unethical behaviour of dental professionals than did their male peers.

INTRODUCTION

Ethics is an intrinsic component of dental practice. The situations dentists face every day call for ethical judgement and behaviour. The changes in conditions of practice, along with the increased expectations of health care consumers, third-party payment systems, infection control requirements and the escalation of litigation, have given rise to ethical issues that have not been widely acknowledged until recently. The need to focus on ethical aspects of dentistry in the twenty-first century is indubitably greater than before. An expanding body of literature has reviewed ethical issues in dental practice. Works such as the series of 52 ethical dilemmas collected by Hasegawa and published between 1993 and 2005, Ozar and Sokol’s arguments on ethical aspects of dentistry, cases gathered by Rule and Veatch, the dental ethics case series published monthly by Naidoo since May 2010, and some surveys of ethical issues faced by dentists, have presented a broad, although not exhaustive, list of ethical issues in dental practice.

However, dental ethics seems to be still in its infancy in many countries. Exploratory studies on ethical issues of dental practice could hardly be found in the literature. What is probably required is for dental professionals themselves to raise issues about dental ethics in order to sensitize the profession and help clarify the problems. Analysing the ethical concerns of dentists may provide a basis for more fruitful and timely ethical discussions within the dental profession.

METHOD

The present study assessed the judgment of a group of Iranian dentists in relation to some challenging ethical issues of dental practice in Iran. The primary research tool was a set of six vignettes designed to determine the ethical concerns of Iranian dentists. The opinions of 204 practicing dentists were obtained.

This is the second step of a dental-ethics multi-step project, employing a mix of different research methods (Figure 1). The first step had comprised qualitative enquiries and generated a prioritized list of 18 ethical issues of dentistry, reflecting the views of dental specialists who had been interviewed. In this, the second step, the first six items on the list were used to prepare a series of six static vignettes. Each described a situation related to one of the top six ethical issues which had been identified in the preceding project.

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A first draft of the vignettes was prepared based on the stories narrated by the dental specialists in the first study, on a review of published cases and other dental ethics scenarios, as well as on informal discussions and exploratory interviews with practicing dentists.

The vignettes were framed to have taken place in the private dental office of a hypothetical dentist, unfolding a possible problem that confronts him/her in the clinical relationship with his/her patients. In the original Persian format of the vignettes, the gender of the dentist was not stated. Recognising the low dental insurance coverage in Iran, the patients were all considered uninsured.

The vignettes were presented to a group of five general dentists, in order to generate a list of behaviours that Iranian dentists might actually consider in response to each vignette. The dentists were also asked to state what they thought would be the actual behaviours of typical Iranian practitioners in these situations. The process resulted in four or five options for each vignette, representative of the most likely responses of Iranian dentists in similar circumstances.

Twelve experts, including nine dental specialists and three general dentists, were requested to assess the vignettes for validity and to comment whether they were a good translation of the constructs. Additionally, each of these experts was asked to judge whether each vignette accurately reflected the attributed ethical issue, using a five-point LIKERT scale that ranged between “very low” to “very much”. In an attempt to clarify the respondents’ sense of the difference between law and ethics, the experts were asked to evaluate whether the behaviour of Iranian dentists encountering the described situation may be affected by any particular rule of law rather than ethics, again using the LIKERT scale.

All the vignettes fulfilled the criteria, confirming that each meaningfully reflected the related ethical issues.

A test questionnaire containing six vignettes was then developed. Each was followed by four or five possible response options. The order of the vignettes within the questionnaire was assigned randomly (Table 1).

The respondents were asked to rate each option for every vignette, with respect to (1) their estimation of the prevalence of that behaviour among Iranian dentists (Among 100 national dentists, how many dentists behave in such a way, on average?), and (2) their judgment about the degree of ethically soundness of the behaviour (measured on a seven-point LIKERT scale, ranging from ‘fully unethical’ to ‘fully ethical’. The neutral position was identified as ‘ethically neutral’. Figure 2 represents a schematic view of the design of the questionnaire for each vignette.

Also included were demographic data on age, gender and location of the respondents, specialty status, and information about the size, type and location of the dental practice.

**DATA COLLECTION AND ANALYSIS**

Data were collected by means of a posted self-administered questionnaire. Since there was no reliable data list of registered dentists in Iran, a convenience sample, using the snowballing method, was used to distribute the questionnaire in 10 different locations throughout Iran. A colleague was identified in each location who was interested in participating in the study. The questionnaire was posted to the colleagues, who then distributed it in their clinics. They gathered the completed, anonymous questionnaires and posted them back to the researchers.
DATA ANALYSIS

A composite index of dentists’ concern over the ethical impact of the six vignettes, namely “Relative Importance” (RI), was created by multiplying the perceived negative or positive effect by an estimate of how prevalent each practice was thought to be. RI was chosen to represent the degree to which unethical behaviour concerning an issue was considered frequent. Very negative but rare behaviours were judged to be similar in concern to somewhat negative but common behaviours.

The data were analyzed using SPSS for Windows, version 16.0. Descriptive statistics were used to summarise the demographic characteristics of the sample, while a t-test and one-way variance analysis was used for the comparison of variables. The normality of the distribution of the vignettes’ RI was tested and confirmed with a one-sample Kolmogorov-Smirnov test.

The research was conducted in accordance with the World Medical Association Declaration of Helsinki. The study was independently reviewed and approved by the Ethics Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran.

RESULTS

Responses were obtained from 204 dentists in various locations of Iran. While 145 respondents filled out the questionnaire completely, 59 completed only the columns related to their ethical judgment. The latter group were excluded for the calculation of relative importance (RI). The mean (SD) age of respondents was 37.73 (8.55) years, and ages ranged between 24 and 65. There were 77 (37.7%) female dentists in the sample and more than half of the participants (107) were general dentists, while the percentages of dental specialists and dental graduate residents were 35.8 and 10.3 respectively. The mean duration of respondents years of practicing as a dentist was 11.3 (SD= 7.5) and the majority of respondents (61.8%) stated that they had practiced in one of the big cities of Iran, where the population is more than one million. Table 2 shows the demographics of the responders, their academic qualification level and location of their dental practices.

To compare the degree of significance of these six ethical issues, the RI for each vignette was calculated. A negative RI for a vignette meant that the respondents expressed serious concern about the prevalence of unethical behaviours in that situation. The lowest value for relative importance was -0.2687 , for vignette number three, the issue of “not taking responsibility for one’s errors”. This ethical issue was rated as having the highest importance of the six ethical issues explored in this study.

The prioritized list of the issues, based on the RI of the vignettes is shown in Table 3.

Male general dentists were the only subgroup whose perceived relative importance for all vignettes had a positive value. This indicates that Iranian male general dentists may have less concern about the frequency of unethical behaviour in the profession.

Female dentists in Iran rated the moral conduct of dental professionals lower than did their male dental colleagues. The difference is statistically significant (p<0.05) for the first three vignettes (Figure 3).

Table 2: The distributions of responding Iranian dentists (n=204) by gender, age and professional factors.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Respondents - Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>77 (37.7)</td>
</tr>
<tr>
<td>Male</td>
<td>124 (60.8)</td>
</tr>
<tr>
<td>Unknown</td>
<td>3 (1.5)</td>
</tr>
<tr>
<td>Age group (year)</td>
<td></td>
</tr>
<tr>
<td>≤29</td>
<td>36 (17.6)</td>
</tr>
<tr>
<td>30-39</td>
<td>67 (32.4)</td>
</tr>
<tr>
<td>40-49</td>
<td>68 (33.3)</td>
</tr>
<tr>
<td>50-59</td>
<td>9 (4.4)</td>
</tr>
<tr>
<td>≥59</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Unknown</td>
<td>20 (9.8)</td>
</tr>
<tr>
<td>Qualification</td>
<td></td>
</tr>
<tr>
<td>Graduate student</td>
<td>21 (10.3)</td>
</tr>
<tr>
<td>General dentist</td>
<td>107 (52.5)</td>
</tr>
<tr>
<td>Dental specialist</td>
<td>73 (35.8)</td>
</tr>
<tr>
<td>Unknown</td>
<td>3 (1.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rank</th>
<th>Number of the vignette</th>
<th>Ethical issue</th>
<th>Mean Relative Importance</th>
<th>Standard deviation</th>
<th>Standard error of mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vignette #3</td>
<td>Not taking responsibility for one’s errors</td>
<td>-0.269</td>
<td>1.188</td>
<td>0.099</td>
</tr>
<tr>
<td>2</td>
<td>Vignette #2</td>
<td>Performing procedures without adequate competency</td>
<td>-0.038</td>
<td>1.242</td>
<td>0.103</td>
</tr>
<tr>
<td>3</td>
<td>Vignette #1</td>
<td>Over-treatment (or unnecessary treatment)</td>
<td>-0.006</td>
<td>1.325</td>
<td>0.110</td>
</tr>
<tr>
<td>4</td>
<td>Vignette #5</td>
<td>Unprincipled behaviours towards disadvantaged patients</td>
<td>0.439</td>
<td>0.915</td>
<td>0.757</td>
</tr>
<tr>
<td>5</td>
<td>Vignette #4</td>
<td>Unprofessional discussion of a colleague’s work</td>
<td>0.522</td>
<td>1.173</td>
<td>0.977</td>
</tr>
<tr>
<td>6</td>
<td>Vignette #6</td>
<td>Inappropriate manners towards patients</td>
<td>0.883</td>
<td>0.932</td>
<td>0.783</td>
</tr>
</tbody>
</table>
Overall, the RI of the vignettes was lower when rated by graduate dentists compared with general and specialist dentists. However, the difference was not statistically significant, with the exception of vignette number four (Figure 4). This suggests that Iranian dental residents, in comparison with practicing general or specialized dentists, appear to be more concerned about the unprofessional discussion of a colleague’s work among Iranian dentists.

**DISCUSSION**

The results show that in this study, three situations, including not taking responsibility for one’s errors, performing procedures without adequate competency, and over-treatment (or unnecessary treatment), are considered slight ethical hazards. Three other situations, involving relations with colleagues, attitude towards disadvantaged patients and inappropriate personal behaviour toward patients, were assessed to be ethically neutral. A distinction was made between these two groups of issues according to their relation to technical treatment. The perceived hazards of the first three issues are associated with clinical dental treatment and issues such as error, competence, and treatment planning. The other three issues, which were not regarded in this study as being as important as the former ones, are associated with the professional relationship between patients and colleagues, and with decision making in regard to financial matters.

These results could reflect what Ethics commonly means for Iranian dentists. The findings suggest that Iranian dentists prioritize the interpretation of ethics/morality through the lens of technical dental work and a concern for behaviours that dentists may have to justify to each other. They seem to be less apt to prioritize ethical issues involving professionalism, issues of oral health or financial matters.

This study was a pilot research effort in the field of empirical ethics. It aimed to explore actual moral beliefs, intuitions and expected behaviours in a group of dentists. It sought to characterize an underlying ethical reality that may be of concern to both the profession and society. While empirical ethics research is recognized in other fields to be important, there are very few studies of this kind in the field of dentistry. To address this deficiency, this study set out to (1) describe and analyze the actual moral opinions and some reasoning patterns about morals of a group of dentists, (2) describe and analyze the potential conduct of dental professionals with respect to a morally relevant issue as described within a standardized vignette, and (3) make the examination of ethics more context-sensitive in the sense of developing fruitful ethical discussions in dental schools and dental organizations about those six specific behaviours. These options simply reflect a series of ethical questions that may be of interest to ethical researchers and dental professionals.

The high dispersion of ethical judgments on some options of the questionnaire could indicate an opportunity for fruitful ethical discussions in dental schools and dental organizations about those six specific behaviours. These options simply reflect a series of ethical questions that may be of interest to ethical researchers and dental professionals. An attempt was made to obtain a range of possible responses. This variation was generated by applying a seven-point LIKERT scale. This range from unethical to fully ethical framed a forced ethical judgment framework for respondents to apply to each vignette and its response options. A zero-to-one-hundred scoring system was used to estimate the perceived frequency of that behaviour among Iranian dentists.

As shown in previous studies, the answers by dentists to questions in a questionnaire survey do not always reflect their real practices. For these reasons, the questions about an individual respondent’s own behaviour were not included in the present questionnaire. This was done to minimize the influence of unreal self-reporting answers. Instead of designing questions that would aim to uncover from each respondent his/her own sense of their own or potential behavioural practices, with the survey sought to reveal each dentist’s estimation of what percentage of their colleagues they perceived would behave in a specific way, when confronted with the situation described in each of the six vignettes.

The high dispersion of ethical judgments on some options of the questionnaire could indicate an opportunity for fruitful ethical discussions in dental schools and dental organizations about those six specific behaviours. These options simply reflect a series of ethical questions that may be of interest to ethical researchers and dental professionals. An attempt was made to obtain a range of possible responses. This variation was generated by applying a seven-point LIKERT scale. This range from unethical to fully ethical framed a forced ethical judgment framework for respondents to apply to each vignette and its response options. A zero-to-one-hundred scoring system was used to estimate the perceived frequency of that behaviour among Iranian dentists.
LIMITATIONS OF THE STUDY

Since no reliable database of registered dentists in Iran was accessible, a mail survey which could use baseline data for random sampling was not possible. Another limitation was the time and effort required to complete the questionnaire (it took nearly 40 minutes on average). This, in addition to the high level of concentration required from the respondents, may have contributed to the low response rate. Together, these were perhaps the main reasons why a fully representative sample was difficult to achieve. Snowballing was instrumental in securing at least a meaningful sample; however the familiarity of respondents based in the same clinic may introduce some bias. They were all dentists, with the hypothetical possibility of providing the researchers with well-considered answers they thought were required. This could have influenced the probability of biases relevant to incorrect answers, misconceptions and errors.

CONCLUSION

The ethical issues about which dentists show greater concern are those more connected to the clinical aspects of dental practice. They include not taking responsibility for one’s errors, performing procedures without adequate competency, and over-treatment (or unnecessary treatment). Important, but of less concern, were three other, and more general, ethical issues: unprincipled behaviours towards disadvantaged patients, unprofessional discussion of a colleague’s work, and inappropriate manners towards patients. Overall, Iranian female dentists seem to be more concerned about the moral behaviour of dental professionals than their male peers.

Acknowledgments: This paper considerably benefitted from discussions with Dr Mohammad H. Khoshnevisan and Dr Arezoo Ebn Ahmady.

Conflict of interest: None declared

References

ABSTRACT
There is little published evidence on the current state of oral health service delivery in Limpopo Province.

Aim and objectives: To assess oral health service delivery in the public sector in Limpopo Province.

Materials and methods: This is a cross-sectional, explorative and descriptive study using a combination of qualitative and quantitative data to assess oral health service delivery. Data collection included self-administered questionnaires, a face-to-face interview and statistical records on oral health services. Convenience sampling was used to select oral health care workers (n=84) and purposive sampling to select Oral Health District Managers (n=5). An in-depth face-to-face interview was conducted with the Provincial Oral Health Manager.

Results: The most common clinical procedure was dental extractions (ranging from 59% to 85% of the total headcount for patient visits in the identified month). Less than a quarter of respondents (n=19, 23%) indicated that dental resources were adequate and fewer that resources were easily available (n=17, 21%). Themes arising from data analysis included lack of policy support; no dedicated funding; and poor oral health representation within different levels of the health system.

Conclusion: There is an urgent need for re-orientation of oral health services towards prevention and promotion.

Key words: Oral health services, oral health care workers, dental resources, oral health decision-making.

INTRODUCTION
Most commonly occurring oral diseases are largely preventable, yet oral health care faces huge challenges in South Africa. The prevalence and distribution of oral diseases are uneven across the various provinces and are poorly documented.1 This unclear picture of oral health status is very similar to that describing the public oral health delivery platforms in parts of Africa and in other developing countries.2-5 The support for oral health service delivery is dependent on adequate funding; infrastructure; and resources, including the availability of an appropriate mix of oral health skills.5,6 The discrepancy in the number and distribution of oral health care workers (OHCWs) across the provinces in South Africa is cause for concern.7 According to Statistics South Africa, the highest number of OHCWs is located in Gauteng (ratio of OHCW per population 1: 6217) with the lowest number being recorded in the Northern Cape (ratio of OHCWs per population 1: 20 070).7 Given that the majority of the population is dependent on public oral health services, the availability and quality of oral health services, together with the appropriate skills-mix for oral health service delivery are important considerations for oral health planning.

LIMPOPO PROVINCE
Limpopo Province is one of the disadvantaged regions of South Africa with limited published data on oral health policy formulation and practice. The National Children's Oral Health Survey 2001-2002 indicated that the Province had the lowest levels of dental caries in children, with only 31.3% caries prevalence rates in 4-5 year-olds, and 37.2% caries prevalence rates in 6-year-old children.8 There is insufficient literature on the current state of oral health care in Limpopo Province with regards to service delivery, human resources allocation and policy support for oral health service delivery. This paper then arose out of a need to investigate public oral health service delivery in Limpopo Province. The current Department of Health records suggest that there were 188 dentists, 47 oral hygienists, 57 dental therapists, six dental technicians and 187 dental assistants employed within the public sector in Limpopo province in 2015. Dentists are located in hospitals, oral hygienists are distributed in hospitals and Community Health Centres, while dental therapists are employed in the Community Health Centres in districts of Limpopo Province.

The aim and objectives of this study were to assess oral health service delivery in the public sector in Limpopo Province and to explore the perspectives of oral health care workers on oral health care delivery in the Province.
The study also aimed to explore oral health decision-making in the Province to gain a better understanding of the context of policy planning and implementation.

MATERIALS AND METHODS

This was a cross-sectional, explorative and descriptive study that used a combination of qualitative and quantitative data to assess oral health service delivery in Limpopo Province. The study site included all five districts of Limpopo Province (Capricorn, Mopani, Sekhukhune, Vhembe and Waterberg). Ethical clearance was obtained from the Biomedical Research Ethics Committee at the University of KwaZulu-Natal (BREC REF: 327/14), and approval to conduct the study was obtained from the Department of Health in Limpopo Province. Permission to recruit participants was obtained from the Chief Executive Officers at the individual hospitals. All ethical considerations such as respect for persons, confidentiality, privacy and anonymity were upheld. Written informed consent was obtained from all participants.

The study used convenience sampling to select oral health care workers (dental assistants, dental therapists, dentists and oral hygienists) (n=84) from amongst those employed in the public sector, and purposive sampling to select Oral Health District Managers in each of the five districts in Limpopo Province (n=5). Dental assistants were included in this study because it was deemed important to ascertain their perspectives on oral health service delivery. All other staff not involved in oral health service delivery were excluded from the study.

Data collection processes included self-administered questionnaires, a face-to-face interview and statistical records on oral health services in the Province. A self-administered questionnaire was used to collect data from OHCWs. This used both open-ended and close-ended questions to gather information on oral health service delivery; perceptions on institutional support for service delivery; evaluation of patient satisfaction in services rendered; impact of health services; challenges in oral health service delivery and recommendations for improved service delivery. A Likert scale format with responses such as 1-strongly disagree 2-disagree 3-not sure 4-agree 5-strongly agree, was used to elicit the perception of respondents to questions such as ‘is the morale of oral health professionals high; are there enough resources, dental equipment and appropriate professionals’; and ‘are dental resources easily obtained when a requisition is made?’.

Another self-administered questionnaire was developed and distributed among the five purposively selected District Oral Health Managers to gain a deeper understanding of the organisational structure and delivery of district oral health services; the existence of district policy documents on oral health care; and the strengths and challenges facing oral health services. A similar Likert scale format was used to elicit their perceptions on statements such as ‘oral health programs are given priority by the health authorities; and we have sufficient dental equipment and appropriate oral health professionals’. An in-depth face-to-face interview was conducted with the Provincial Oral Health Manager in Limpopo Province. The purpose of the interview was to ascertain Provincial oral health policy planning and implementation; the current state of oral health services; the strengths and limitations of the services provided and the mechanisms provided to improve service delivery.

Available monthly statistical records on oral health services delivery were obtained for the period: November 2015 to March 2016. These retrospective data were recorded on a data capturing sheet and coded and analysed. In most cases, the researchers had access to only one monthly report per institution for this period. To minimise bias, only the first retrieved report was included in the study. Three reports were excluded due to inconsistency in the data that was captured by the health institutions (the total number of services offered did not correspond with total headcount of patients).

Quantitative data were entered on an Excel sheet and imported to the SPSS statistical software (IBM SPSS Statistics Version 23) which was used for data analysis. Univariate descriptive statistics such as frequency and mean distribution were conducted for all variables. A p-value of <0.05 was set as being significant. The responses to the open-ended questions were grouped and emergent themes were examined and compared for possible associations.

The narrative from the interview transcript was coded and analysed based on the conventional thematic analysis approach. The emergent themes from the interview were compared with the results obtained from the questionnaires and statistical records.

RESULTS

The study sample (n=84) comprised of 37 dentists, 13 oral hygienists, four dental therapists, 29 dental assistants and one dental technician. The majority of the dentists and dental assistants were located in the Capricorn, Mopani, Sekhukhune districts (an average of nine staff per district). The dental therapists were evenly distributed across the districts. Four of the 13 oral hygienists were located in Capricorn district. Almost 73% of the respondents were female (n=61).

ORAL HEALTH SERVICE Provision (PATIENT VISITS PER FACILITY)

The available statistical records indicate that at least one facility in each of the districts recorded a monthly patient headcount of more than 500 patient visits (Table 1). Only Waterberg district recorded a headcount of less than 250 headcount of more than 500 patient visits (Table 1). Only Waterberg district recorded a headcount of less than 250 patient visits for the identified month. The most common dental clinical procedure was dental extractions (ranging from 59% to 85% of the total headcount for patient visits in the identified month). The majority of extractions were of permanent teeth (ranging from 43% to 80% of all extractions performed). Restorations accounted for less than 16% of the total patient headcount, with the exception of Sekhukhune district (Facility A), which recorded 30% of restorations (n=101) done in the identified month. Only Vhembe district (Facility D) recorded a notable number of fissure sealants done (n=140, 39%). Similarly the highest number of scaling and polishing cases (n=58, 12%) was recorded in Vhembe district (Facility D). Clinical procedures such as removal of impacted teeth, removal of roots, management of dry socket (alveolitis), fractures and screening for oral cancers had low records for the identified month.
School oral health promotion was recorded in three districts, namely, Mopani, Waterberg and Vhembe. Only Facility B in Mopani recorded a tooth brushing programme in the district (with 135 participating children). School-based dental screenings were conducted in Vhembe (n=559) and Mopani (n=413). The number of school recall visits ranged from one to nine visits. The number of new school visits ranged from four to nine across the three identified districts. It should be noted that most institutions indicated that the school holidays was the reason for the lack of community-based oral health activities during the time of the survey.

**Staff perception on oral health service provision**

Half of the study sample (n=42, 50%) indicated an opinion of there being insufficient institutional support for oral health care but 18 respondents (21%) were unsure. Only 34 respondents (42%) agreed that there were adequate numbers of dental rooms available for oral health service delivery (Table 2). More than half of the study sample (n=55, 66%) agreed that there were adequate numbers of clinical staff for oral health care. However, all five District Managers did not agree that the number of oral health professionals was sufficient and appropriate (n=5, 100%). District managers emphasised the shortages in particular categories of oral health professionals, specifically the availability of dental specialists.

Only 34 respondents (42%) believed that there were sufficient administrative and support staff for effective delivery of oral health services. Less than a quarter of the respondents (n=19, 23%) indicated that dental resources were adequate and easily available (n=17, 21%). Similar low responses were obtained (n=8, 10%) on whether dental equipment was repaired timely. It was noted that a mere 32 respondents (38%) believed that staff morale was high while a notable number of respondents (n=17, 20%) were unsure.

In addition, 37 respondents (44%) indicated that preventive programmes are integrated into other health activities yet the statistical records on oral health activities fail to reflect this initiative. Respondents also identified possible barriers to the utilisation of oral health services. This is reflected in the following quotations: “People still use home remedies for dental pain; People stay with the disease until it is unbearable and then come for help; Oral health workers do not provide outreach services”.

**Oral health decision making**

The interview with the Provincial Manager revealed that oral health care challenges included inadequate infrastructure and dental resources, indifferent attitude towards oral health care, coupled with lack of clear oral health representation within different levels of the health system. This deprived oral health staff of leadership, communication and participation in health decision-making. The absence of oral health care policy statements within strategic health plans also contributed to the isolation of oral health services and exclusion from budgetary allocations.

Several themes arose from qualitative analysis. These included lack of policy commitment; no dedicated funding; and poor support for oral health services. The responses of District Managers on the open-ended questions on service delivery in Limpopo Province included: - “Challenges of non-functional dental equipment”; “Health centres were ill equipped; patients were travelling far distances to access services; and mobile trucks for oral health services were either broken or in a state of disrepair”.

The responses recording the perceptions of the OHCWs on institutional support for oral health care included:- “lack of recognition of the oral health providers by health facilities management; no provincial oral health policy existed, and there was no dedicated oral health budget; these circumstances were challenging for procurement for basic consumables, repair and service of equipment.”

Some of the recommendations for improved oral health service delivery included: “Educate managers of hospital about the importance of oral health. Increase the budget for oral health services. Buy the needed equipment and service them regularly”.

### Table 1: Oral Health Service Provision: Clinical services

<table>
<thead>
<tr>
<th>District</th>
<th>Month / Head Count</th>
<th>Extractions Perm teeth (%)</th>
<th>Primary Teeth (%)</th>
<th>Total (%)</th>
<th>Restorations Amalgam (%)</th>
<th>Comp (%)</th>
<th>Fissure sealants (%)</th>
<th>SP (%)</th>
<th>Removal of Impacted teeth (%)</th>
<th>Root removal (%)</th>
<th>Suturing laceration (%)</th>
<th>Dry Socket (%)</th>
<th>Fractures (%)</th>
<th>Oral cancer head count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vhembe</td>
<td>Facility A</td>
<td>589</td>
<td>401 (68)</td>
<td>74 (13)</td>
<td>475 (81)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>3 (0.5)</td>
<td>5 (0.8)</td>
<td>6 (1)</td>
<td>8 (1.4)</td>
<td>6 (1)</td>
<td>2 (0.3)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Vhembe</td>
<td>Facility B</td>
<td>360</td>
<td>178 (49)</td>
<td>35 (8)</td>
<td>213 (59)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>140 (39)</td>
<td>16 (4)</td>
<td>0 (0)</td>
<td>4 (1)</td>
<td>1 (0.3)</td>
<td>4 (1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Vhembe</td>
<td>Facility C</td>
<td>484</td>
<td>272 (56)</td>
<td>128 (26)</td>
<td>400 (83)</td>
<td>10 (2)</td>
<td>57 (12)</td>
<td>26 (5)</td>
<td>58 (12)</td>
<td>3 (0.6)</td>
<td>25 (5)</td>
<td>8 (2)</td>
<td>6 (1)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Sekhukune</td>
<td>Facility A</td>
<td>340</td>
<td>205 (60)</td>
<td>64 (19)</td>
<td>269 (79)</td>
<td>0 (0)</td>
<td>101 (30)</td>
<td>8 (2)</td>
<td>28 (8)</td>
<td>0 (0)</td>
<td>8 (2)</td>
<td>14 (4)</td>
<td>1 (0.2)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Sekhukune</td>
<td>Facility B</td>
<td>550</td>
<td>283 (51)</td>
<td>78 (14)</td>
<td>361 (66)</td>
<td>0 (0)</td>
<td>1 (0.2)</td>
<td>7 (1)</td>
<td>16 (3)</td>
<td>11 (2)</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Mopani</td>
<td>Facility A</td>
<td>533</td>
<td>254 (48)</td>
<td>88 (77)</td>
<td>342 (64)</td>
<td>13 (2)</td>
<td>27 (5)</td>
<td>0 (0)</td>
<td>36 (7)</td>
<td>0 (0)</td>
<td>28 (5)</td>
<td>38 (7)</td>
<td>6 (1)</td>
<td>11 (2)</td>
</tr>
<tr>
<td>Mopani</td>
<td>Facility B</td>
<td>378</td>
<td>241 (64)</td>
<td>80 (21)</td>
<td>321 (85)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>38 (10)</td>
<td>13 (3)</td>
<td>3 (0.8)</td>
<td>1 (0.3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Capricorn</td>
<td></td>
<td>696</td>
<td>302 (43)</td>
<td>186 (27)</td>
<td>488 (70)</td>
<td>0 (0)</td>
<td>18 (3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (0.6)</td>
<td>22 (3)</td>
<td>10 (1)</td>
</tr>
<tr>
<td>Waterberg</td>
<td></td>
<td>222</td>
<td>136 (61)</td>
<td>9 (4)</td>
<td>145 (65)</td>
<td>0 (0)</td>
<td>34 (15)</td>
<td>2 (0.9)</td>
<td>16 (7)</td>
<td>12 (5)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
DISCUSSION

The results indicate that oral health service delivery in Limpopo Province is very much facility-based and curative driven. The statistical records reveal that dental utilization patterns centre around the relief of pain and sepsis and imply that oral diseases such as dental caries and periodontal disease may be the most prevalent oral conditions treated in the identified health facilities. The limited provision of other oral health services such as restorative care, fissure sealants, scaling and polishing and topical fluoride applications, is a major concern. These findings are consistent with reports from other studies. Ogbebor and Azodo also reported that patients sought dental treatment primarily for the relief of pain and discomfort.² Benoit et al add that oral health services are limited in many underdeveloped countries and that the availability and accessibility of these services are adversely affected by limitations in resources.⁴

Given that the majority of patients are dependent on public oral health services, it is worrisome that the results of this study highlight notable challenges in funding, resource allocation, and support for oral health infrastructure and dental equipment. Bhayat and Cleaton-Jones also indicated that oral health services in South Africa are largely inaccessible to the majority of the population, specifically the unemployed and socioeconomically disadvantaged populations, because of transport costs and user fees for treatment services.¹⁰ The study findings are further supported by the Limpopo Oral Health 2014-2019 Transformation Plan,¹¹ which reports that a Provincial audit conducted in 2008 found almost 70% of dental equipment required replacement and that oral health service delivery was dominated by extractions (90%). Only about 5% of service delivery included preventive care programmes.¹³ This study, in addition, found fragmented and inconsistent statistical data on prevention and promotion care. Community-based oral health activities appear to be centred around school visits and mobile outreach programmes, and the available evidence suggests that these activities are sporadic. Dental screenings formed the core of school-based oral health programmes. These findings are in line with the observation of Singh et al that oral health promotion programmes were uncoordinated, poorly distributed and inadequate for the population of South Africa.¹⁷

The findings also reveal that oral health care workers were not equitably distributed across the districts in Limpopo. This is supported by Singh et al. who also identified imbalances in the urban-rural distribution of oral health care workers in South Africa.¹⁷ Petersen advocates that high levels of oral diseases result in greater demand for oral health care workers, equipment, oral health facilities and financial resources.² He notes that the regions with lower levels of oral diseases demand fewer highly trained oral health care workers and more technical equipment but rather require more auxiliary oral health professionals and prevention programs.²,¹⁹ There is therefore a need to re-examine the oral health skills-mix for the Province and to identify an appropriate staff establishment that can best meet appropriate the goals of oral health service delivery.

The lack of dedicated budgetary allocations appears to be the main reason for this bleak picture of oral health service delivery in Limpopo Province. The literature suggests that developing countries with low resources invest very little in oral health care and allocate the available resources to provide emergency oral health services for relief of pain.²,¹⁷ Thorpe concurs that oral health programmes are not prioritized in Africa, due to the competing presence of several general health challenges.⁵

Focus on prevention

There is without doubt, an urgent need for a paradigm shift in the policies of oral health service delivery in Limpopo towards an emphasis on prevention and promotion that extends beyond the current focus on school-based programmes. Given that the majority of extractions were performed on permanent teeth, it can be assumed that dental caries and/or periodontal disease are prevalent across the life cycle. Thus there is a need for oral health promotion strategies to include activities that target individuals and communities in all age groups. Oral health care workers need to identify strategies to address lifestyle-induced risks to oral health, such as increased sugar consumption and smoking. Similarly, programmes should be developed to increase access to additional fluoride uptake, specifically in areas where naturally occurring fluoride in the water is low and there are high levels of dental caries rates.¹³ Oral health decision makers need to build stronger relations with key stakeholders within the various levels of the health system (national, provincial, district and institutional levels) to form collaborative links and partnerships that could best support the oral health agenda.¹³ There is an urgent need to identify specific strategies that can translate policy statements on oral health care into implementable programmes that can contribute to positive health outcomes.¹⁷ Oral health care workers need to be involved in the planning, implementation and evaluation of oral health services to ensure true ownership and accountability to oral service delivery.
LIMITATIONS OF THE STUDY
Severa constraints were noted in the study. There was limited access to the statistical records. The available records were a reflection of oral health service provision in an identified health institution on a monthly basis at a particular point in time. There were no comparative records to determine trends in service delivery over time and within the identified health institution. Nevertheless these records provide a substantive picture of oral health service delivery in Limpopo.

CONCLUSION
The results suggest that there is an urgent need for re-orientation of oral health service delivery in Limpopo Province with a greater emphasis on prevention and promotion. There is also an urgent need for oral health advocacy within health decision-making across the public health system in Limpopo to ensure that the goals of oral health care are made possible through dedicated policy support and finding.

Conflict of interests: None declared

Acknowledgements
We wish to thank the following people for their valuable contribution in the preparation of this paper:
1. Dr Jeffrey Ramalelhana, Department of Health, Limpopo Province, for guidance on data collection and presentation.
2. Mr Abidile Lebotsamang, Botswana, for analysing the data collected from the questionnaires.
3. The Provincial Oral Health Department in Limpopo Province for granting access to the statistical records on oral health services and professionals in Limpopo Province.

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32. District Development, Policy, Planning and Information: North West Province HST (page 91)
Participants’ preferred choice of practitioner for orofacial symptoms

SADJ August 2017, Vol 72 no 7 p315 - p322
S Indermun¹, Q Isaacs², R Mulder³

ABSTRACT

Background: Patients seeking treatment from general medical practitioners (GP) may be unaware or ill-informed that dentists are the more appropriate professionals to manage their orofacial symptoms, being able to diagnose and treat, or, if deemed necessary, appropriately refer.

Aims: To: (1) determine from a group of patients (n = 37) their initial preference of health care provider, when seeking treatment for orofacial symptoms (2) establish their awareness of the appropriate proficiency of the dentist, and, (3) determine the referral pathway before patients attended the Tygerberg Oral Medicine Clinic.

Methods: A cross sectional study design; quantitative data was collected by a modified previously published Bell-questionnaire with closed-ended questions.

Results: 53.8% of patients preferred a dentist to attend to a mouth or jaw problem and 46.1%, a GP. When clinical scenarios were posed, all directly related to the scope of practice of the dental practitioner, it was of concern that 47.3% chose the GP and 52.67% chose the dentist.

Conclusion: Patients initially chose the GP for many orofacial diseases, although they indicated at the Oral Medicine clinic that the dentist had the most relevant knowledge. Participants did not associate some of the orofacial symptoms with the training of dentists.

Keywords: Orofacial symptoms, dentist, general medical practitioner (GP), proficiency, participant referral.

INTRODUCTION

A common goal of the health care sector is to serve the public with the best possible care.¹ Problems arise when patients are unsure about who should be their appropriate “first choice” practitioner to provide care. Dentistry and Medicine are different professions, the former exercising treatment mainly of the mouth and teeth, whereas the latter accepts responsibility for the rest of the human body.² However, there is an obvious physical overlap as the oro-dental complex is an integral part of the body.³ Consequently, patients are often conflicted when deciding who to consult first for orofacial problems.

Most patients who seek medical attention from their general medical practitioners (GP) for orofacial diseases are either unaware or ill-informed of the fact that the dentist is the more appropriate professional for treating the oral presentation of symptoms, with a subsequent referral if deemed necessary.⁴ For many, the GP is the first person consulted for advice regarding the treatment and management of dental or oral related pain.⁵ Reported reasons for this include: poor patient education, lack of after-hours dental care, non-classic presentation of dento-facial pain, financial considerations, and for the most part, the participant’s perception of their GP as the primary coordinator of integrated and total health care.⁶

Many oral conditions are tooth-related and many systemic conditions may have a dental dimension, as an influence or manifestation. Although qualified dentists successfully manage orofacial conditions, many patients first consult their GP’s, who then refer them to a hospital or an ear-nose-and-throat specialist (ENT) instead of a dentist.⁷

The public often holds the view that dentists only fill cavities in teeth and provide dentures and that all other oral problems are the domain of a medical doctor.⁷ Yet the scope of dentistry enables qualified dentists to perform a wide range of procedures relating to oral and peri-oral regions.⁸ Modern dentists are well-trained, qualified and equipped to successfully treat many orofacial diseases. Dentists will regularly make sound judgments and promptly refer patients when management and/or treatment are beyond their skills and require specialist care.⁹

A dental consultation should include screening and treatment.¹⁰ For example, dentists recognise oral pre-malignant lesions and/or HIV indicators often before signs

ACRONYMS

GP: General Medical Practitioner

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and symptoms manifest. This allows early and urgent referrals, which results in appropriate treatment with an improved prognosis.

A study investigated current practices detecting lesions and referral of patients by general medical practitioners. Over half of these GPs (57%) stated they would consider urgent referral if an intra-oral lesion had been present for four to five weeks, with 37% expressing the need for referral after two to three weeks. The clear majority of GPs indicated that they would refer to general hospitals (74%) while a further 22% indicated that they would use a dental hospital facility. Of those GPs who indicated that they would refer to general hospitals, 83% said they would choose an Oral and Maxillofacial Surgery unit, with a further 15% opting for an Ear Nose and Throat specialist (ENT). Only 1% referred participants to a General Surgery unit. Most dental respondents (64%) referred suspicious lesions after two to three weeks, with a further 30% doing so after four to five weeks’ observation. While the majority of dental respondents indicated they normally referred to a dental hospital (56%), a substantial number contacted general hospitals (43%). Of the latter group, the department most commonly selected was the Oral and Maxillofacial Surgery unit.

Another study revealed that the clear-out majority of both GPs and dentists selected Oral Medicine and Oral and Maxillofacial Surgery as their preferred points of referral for participants with suspected oral cancer. It was also evident that dentists selected Oral Medicine Specialists (Periodontist) more often than Maxillofacial and Oral Surgery specialists as their preferred point of referral. Oral Medicine has been described as a specialty that bridges the traditional areas of health between Dentistry and Medicine. This interface is concerned with the diagnosis and management of (non-dental) pathology affecting the oral and maxillofacial region. Since dentists commonly refer to an Oral Medicine Specialist, they can be seen as an important link between medical doctors and dentists. A referral to a Maxillofacial and Oral Surgeon or Periodontist is accurate, however for soft tissue pathology and ulcerations, an Oral Medicine Specialist can help avoid unnecessary transfers and costs to the participant.

A study aimed to determine participants’ preference of medical or dental practitioners for a variety of dental and non-dental orofacial symptoms was conducted. It investigated the perceptions of participants of the training, experience, and skills of medical and dental practitioners in treating orofacial symptoms. Participants had to make a choice of which practitioner, medical or dental, they would consult with for a variety of orofacial symptoms. The results revealed that most of the participants preferred to consult a GP rather than a dentist for specific dental complaints. The participant cited being unaware of the dental relevance of some of the dental complaints. The participants also perceived medical practitioners as having had more training and therefore being more capable in dealing with non-dental orofacial complaints.

After reviewing the above literature, it was evident that patients were often not aware of the broad education of dentists and the wide scope of dental practice. Patients were unaware of the reality that upon graduation the dentist was proficient in diagnosing and managing oral mucosal diseases.

**RESEARCH AIM**

1. To determine the initial preferential choice of participants for health care providers to manage orofacial symptoms.
2. To establish the awareness of participants of the proficiency of the dentist for orofacial symptoms.
3. To determine the referral pathway followed by participants before attending the Tygerberg Oral Medicine Clinic at the Dental Faculty of the University of the Western Cape.

**DEFINITION OF KEY TERMS**

**Proficiency**

For purposes of this study, the meaning of clinical proficiency will denote the following: "a dentist who is competent in decision-making, clinical reasoning and judgement to develop a differential, provisional or definitive diagnosis by interpreting and correlating findings from the history, clinical and radiographic examination and other diagnostic tests, taking into account the social and cultural background of the individual. The dentist will also be competent to participate in the diagnosis and proper referral of the participant with life-threatening oral mucosal diseases."

**Patient**

Term used in the literature denoting individuals receiving medical and/or dental treatment.

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![Figure 1: Questionnaire as adopted from Bell et al. (2008).](image-url)
MATERIAL AND METHODS

Research design
This was a cross-sectional study design; quantitative data was collected through the use of a modified previously established and published Bell-questionnaire12 with closed-ended questions (Figure 1). The participants (n=37) were requested to answer various questions on their perception of the preference and ability regarding from which practitioner they would prefer receiving treatment (GP or dentist). Various orofacial disease scenarios were tabulated and the participant was requested to indicate whether they would visit the dentist or the GP. The last component was the participant perception of the knowledge that the dentist has regarding various orofacial and other non-dental scenarios. A ‘don’t know’ option was provided, since dentistry has a wide scope of practice and the participant might not have had profound knowledge of all the non-dental training dentists receive.

Study population
The UWC Oral Medicine clinic treats 360 new participants on average each year and the final sample size for this study represented ±10% of the new participant pool. 55 randomly selected participants attending the Tygerberg Oral Medicine clinic were included in this study. There were eight participants referred by specialists (ENT and Dermatologists) and for this study, these questionnaires were excluded. Three participants were below 18 years of age and the responses from their parents were not accepted as representing the participants’ perception and were therefore excluded. Seven questionnaires were rejected due to participants having two choices marked in lieu of one choice. The questionnaires were handed out to all 55 participants who were waiting in the reception area prior to their appointment. A total of 37 correctly completed questionnaires were accepted after the aforementioned exclusions. Data management and statistical analysis were executed with the use of Microsoft Excel.

RESULTS AND FINDINGS

Participant choice of primary practitioner for orofacial symptoms.
Cross tabulations of the results were made. The responses to the questions posed in the questionnaire were evaluated in a 2x3 contingency table with the Pearson Chi-square test and two degrees of freedom in order to obtain the p-value. A p<0.05 was considered significant. The questions evaluated in the 2x3 were: “Who do you think is the most able to treat problems of the mouth or jaws?” and “Who would you rather visit if you had a problem of the mouth/jaw? (excluding treatment to the teeth or gums)”. For the question “Who do you think has had the most training in diseases of the mouth/face/jaws? (excluding treatment to the teeth or gums)”, a 3X3 contingency table was used (Table 1).

For the tabulation of results in Tables 1 and 2, the hypothesis was tested on the probabilities of choosing the GP rather than the dentist, in the three referring categories (referred by dentist, GP or own appointment made). The p-value yielded by the Chi-square test was greater than 0.05 (0.063).

Regarding the estimated probability of choosing the dentist as “the most able” practitioner, the participants referred by dentists and those who made their own appointments, are more likely to select the dentist. The probability of choosing the dentist was 12/13=0.92 (Dentist referral); 7/13=0.54 (GP referral) and 9/11=0.82 (Own appointment made). Participants referred from their GP are less likely to choose the dentist as “the most able practitioner”.

Table 1 outlines a cross tabulation of the participant’s responses and their referring practitioner. 53.8 % of patients indicated that they would rather visit a dentist if they had a mouth or jaw problem and 46.1% said they would rather visit a GP. The p-value of 0.258 indicated that there is no significant difference between choosing the medical practitioner over the dentist (for participants who were referred from the GP).

<table>
<thead>
<tr>
<th>Referred by Dentist / General medical practitioner (GP)/ Made own Appointment</th>
<th>Dentist</th>
<th>GP</th>
<th>Made own Appointment</th>
<th>Total</th>
<th>Chi square</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who do you think to be the most able to treat problems of the mouth or jaws? (excluding treatment to the teeth or gums)</td>
<td>Dentist</td>
<td>12</td>
<td>92.3</td>
<td>7</td>
<td>53.8</td>
<td>9</td>
<td>81.8</td>
</tr>
<tr>
<td>Who would you rather visit if you had a problem of the mouth/jaw? (excluding treatment to the teeth or gums)</td>
<td>Dentist</td>
<td>10</td>
<td>76.9</td>
<td>7</td>
<td>53.8</td>
<td>5</td>
<td>45.4</td>
</tr>
<tr>
<td>Who do think has had the most training in diseases of the mouth/face/jaws? (excluding treatment to the teeth or gums)</td>
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<td>69.2</td>
<td>8</td>
<td>66.6</td>
<td>2</td>
<td>15.3</td>
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<td>Symptom</td>
<td>Referred by Dentist / General medical practitioner</td>
<td>Made own appointment</td>
<td>Total</td>
<td></td>
<td></td>
<td>Chi square</td>
<td>df</td>
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<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
<td>n</td>
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<td></td>
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<td></td>
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</tr>
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<td>13</td>
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<td>10</td>
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<td>2</td>
<td>15.3</td>
<td>4</td>
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<td>11</td>
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<td>63.6</td>
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<td>5</td>
<td>38.4</td>
<td>5</td>
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<td>14</td>
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<td>61.5</td>
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<td>Bad breath</td>
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<td>69.2</td>
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<td>90.9</td>
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<tr>
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<td>7</td>
<td>63.6</td>
<td>27</td>
</tr>
<tr>
<td>Dentist</td>
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<td>30.7</td>
<td>1</td>
<td>7.6</td>
<td>7</td>
<td>63.6</td>
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<td>Mouth ulcers/ sores</td>
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</tr>
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<td>Pain under a denture</td>
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</tr>
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<td>4</td>
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<td>5</td>
<td>38.4</td>
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<tr>
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<td>12</td>
<td>92.3</td>
<td>10</td>
<td>90.9</td>
<td>32</td>
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<tr>
<td>Tooth socket that is slow to heal</td>
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<td>23</td>
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<td>5</td>
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<td>10</td>
<td>76.9</td>
<td>10</td>
<td>90.9</td>
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<td>Swelling under tongue</td>
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</tr>
<tr>
<td>GP</td>
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<td>53.8</td>
<td>10</td>
<td>76.9</td>
<td>9</td>
<td>81.1</td>
<td>26</td>
</tr>
<tr>
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<td>3</td>
<td>23</td>
<td>2</td>
<td>18.1</td>
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<td>Swelling of neck just below lower jaw</td>
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<td></td>
</tr>
<tr>
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<td>0</td>
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<td>18.1</td>
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<td>Jaw ache with headache</td>
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<td>Facial swelling with toothache</td>
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<tr>
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<td>61.5</td>
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<td>72.7</td>
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</tr>
<tr>
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<td>0</td>
<td>1</td>
<td>9</td>
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</tr>
<tr>
<td>White or red patch on cheek or tongue</td>
<td>5</td>
<td>38.4</td>
<td>11</td>
<td>84.6</td>
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<td>63.6</td>
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<tr>
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<td>2</td>
<td>15.3</td>
<td>4</td>
<td>36.3</td>
<td>14</td>
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<td>Sore cheeks or tongue</td>
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<tr>
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<td>76.9</td>
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</tr>
<tr>
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<td>3</td>
<td>23</td>
<td>3</td>
<td>27.2</td>
<td>10</td>
</tr>
</tbody>
</table>

**Table 2: Cross Tabulation of Participants’ Choice of Practitioner for Various Symptoms against Source of Referral**
Participants were presented with a variety of orofacial symptoms and were asked who they would consult for these symptoms (Table 2). In most cases, for the obvious dental problems (such as toothache, lump or gum, bad taste in the mouth, bad breath, bleeding gums, pain under dentures, complications of tooth removal and toothache associated with facial swelling) participants chose to consult their dentist. For other orofacial symptoms, and symptoms that included extra-oral involvement (such as clicking jaw joints, limited mouth opening, mouth ulcers, tongue swellings, neck swellings, jaw ache with headaches, lump on lip), participants chose to consult their GP. This can be linked to the likelihood that participants consider all these problems to fall out of the scope of dentistry.

However, Table 2 indicated a lack of consistency between the choice of primary care practitioner for the orofacial symptoms listed. The results for the observations as per Table 2 were done in 3×2 contingency tables. The Pearson Chi-square was determined for every question asked (e.g. lump on gum, bad breath, etc.). These results were verified by the Fisher exact test as the frequencies were small and obtaining a p-value from Chi-square might have been inaccurate. The Fisher exact test resulted in the same conclusion as the Chi-square values.

Table 2 represented results that indicated a lack of significant difference between the choice of practitioner and referral source. The p-value obtained from Chi-square above 0.05 confirmed the result. If a dentist referred a participant, the participant is more likely to select the dentist as the treating practitioner. The same trend exists for participants referred from GPs.

**Participant awareness of the proficiency of the dentist**

With regard to participants that chose their medical doctor as the primary practitioner it was important to note that 53.8% of participants thought that the dentist is most able to treat problems of the mouth or jaws (Table 1). 66.6% of participants regarded dentists as having the most training as the primary practitioner it was important to note that extra-oral involvement (such as clicking jaw joints, limited mouth opening, mouth ulcers, tongue swellings, neck swellings, jaw ache with headaches, lump on lip), participants chose to consult their GP. This can be linked to the likelihood that participants consider all these problems to fall out of the scope of dentistry.

The participants’ awareness of the proficiency of the dentist was determined by investigating their knowledge regarding the training dentists underwent to understand various diseases and procedures (Table 3 and 4). When referring to Table 3, participants had consensus that the dentist had education in diseases of the gums, jaw bones and joints; training in extracting teeth; training in anaesthetics; diseases of teeth, training in prevention of dental disease; training in dentures; training in filling teeth and training in gum treatment. The results were consistent for all the participants irrespective of whether they made their own appointments or referred from the dentist or medical practitioner. A large percentage (90.53%) of participants referred from the medical practitioner confirmed that they thought the dentist had the most training in those conditions, yet from Table 1, 46.1% of participants would still rather visit their medical practitioner if they had a problem related to the mouth/jaw/face.

Table 4 lists areas of training where the participants were uncertain of the expertise of the dentist. There was no consensus of the results indicating a misperception and/or uncertainty of the proficiency of the dental practitioner. Notably, of the total participants, only 51.35% and 43.24% were aware of the training dentists have in HIV/AIDS and cancer, respectively. The percentage of participants indicating that they “do not know” and “false”, indicates that the scope of practice of dental practitioners requires more attention regarding education and information provided to participants.

**The referral pathway of participants attending the Tygerberg Oral Medicine Clinic**

The results showed that 35.1% of participants attending the Tygerberg Oral Medicine Clinic were referred from their medical practitioner and that 35.1% were referred from their dentist. 29.7% of participants had made their own appointment. From the initial study population of 55 participants, eight participants were referred by specialists (ENT and Dermatologists). Although these...
questionnaires were excluded from the final sample size, the significance of the referral source remains. Clearly defined referral pathways for all health professionals have shown a reduction in delay of diagnosis and definitive treatment.

**DISCUSSION**

In this study, an equal percentage of participants were referred from their medical doctor (35.1%) and their dentist (35.1%) to the UWC Oral Medicine Clinic at Tygerberg. Irrespective of the referral source, the participants still thought the dentist was the most able to treat problems of the mouth and jaws (53.8%). In terms of questions posed in Table 1, the trend was that participants referred by the dentist were more likely to choose the dentist as the preferred practitioner (92.3%; 76.9% and 69.2%). The same trend exists for those participants who were referred from their doctor and those that made their own appointment, but to a lesser degree than the dentist referrals. This can indicate a possible relationship between the referral source and accessibility, as participants referred from their GP may have found it easier to make an appointment with their doctor, as there may also be a doctor patient trust relationship already present. Nevertheless, patient preference of their primary practitioner for orofacial symptoms and who they thought were most able to treat orofacial problems is largely dependent on their perception of the dentist.12

There is a perception that dentists only “perform routine extractions and fillings.” Many people also avoid consulting their dentist because of their dental anxiety.15 Excessive dental anxiety can lead to avoidance strategies of patients to elude dental treatment, which can have dire consequences because of delayed diagnosis.16

Table 2 presented clinical scenarios and the participants’ perception of which practitioner they would prefer to visit. The following scenarios and the participants’ choice of GP or dentist being very similar is concerning (GP/Dentist: Bad breath 45.9/54; clicking of the jaw 59.4/40.5; mouth ulcers/sores 56.7/40.5 and lump on the roof of the mouth 40.5/59.4). These data indicate that participants were aware of the capabilities of the dentist to treat problems related to the teeth and gums. However, their choice of primary practitioner for orofacial problems of non-dental origin is not clearly established as being either the GP or the dentist. These results obtained from the individual scenarios (Table 2) regarding the choices made is relevant considering that overall 75.6% of these participants indicated in that the dentist was most able to treat problems of the mouth and jaw (excluding the teeth and gums) versus the GP (Table 1). This could mean that the patient is not aware of the full scope of practice of a dental practitioner or that patients do have more faith in the ability of GPs over dental practitioners.12

The more obvious scenarios like toothache (2.7/97.2); bleeding gums (18.9/81); pain under a denture (18.9/81); pain after tooth removal (8/86.4); tooth socket not healing (13.5/86.4) and facial swelling with toothache (24.3/75.6) were predominantly chosen with the dentist as the treating practitioner. The possibility that the public still views dentists as only filling cavities and extracting teeth,7 instead of treating and managing orofacial diseases, should be considered.

When all the percentages of the various clinical scenarios from Table 2 are calculated, it becomes apparent that 47.3% chose the medical practitioner and 52.67% chose the dentist as the treating practitioner. This is concerning considering that the clinical scenarios depicted in Table 2 are all directly related to the scope of practice for the dental practitioner.

One of the most likely encounters with oral lesions is that of oral ulcers. A randomized study determined where members of the Israeli public may seek advice on mouth ulcers.4 The results indicated that the clear majority of the public (69%) would first approach a general medical practitioner for advice where only 13-17% of the study participants would first approach a dentist. An even lesser number (4-10%) would first go to a pharmacy for advice. Similarly, most of the participants in this current study (56.7%) also chose to consult a medical practitioner for ulcers (Table 2). These results clearly indicate the lack of participant awareness regarding dentists having
significantly more training and knowledge regarding the diagnosis and management of mouth ulcers than most medical or pharmaceutical practitioners.4

The participants’ awareness of the proficiency of the dentist was determined by investigating their knowledge regarding the training dentists underwent to understand various diseases and procedures (Table 3 and 4).

Most participants were aware of the teaching offered in managing the common tasks of the dentist such as training in filling teeth (100%), training in dentures (97.3%), training in gum treatment (97.3%) and training in extracting teeth (100%). However, only a minor proportion of participants were aware of the training dentists have in HIV/AIDS (51.35%) and cancer (43.24%).

Participants were unaware of the extent of dental training. These extended areas included: diseases of the sinuses, salivary glands, throat, tonsils, antibiotics, cancer, x-rays, general medicine, HIV/AIDS and bacterial disease. Similarly, in a study carried out by Scully et al., patients failed to regard dentists as being trained in general medicine, cancer and HIV/AIDS. This is problematic as failure to consult the appropriate medical professional can result in delays in diagnosis and consequential delays in treatment.10

59.4% of participants chose to consult a GP for a clicking jaw joint; however, 81.08% of participants agreed that dentists received adequate training in diseases of the jaw bones and joints. Participants lacked the ability to understand and associate some of the orofacial symptoms with their concepts of the training of the dentist. The possibility that the public still views dentists as only filling cavities and extracting teeth,7 instead of treating both oral and systemic health. Participants with medical and dental professions will greatly improve the delivery of effective care to participants.18

CONCLUSION
Participants at the Tygerberg Oral Medicine Clinic, who despite being referred from their GP, agreed that the dentist is more capable in treating orofacial symptoms. They perceived dentists to be well trained in obvious dental problems such as toothache, bleeding gums, extractions, and fillings. However, for non-dental problems or problems that manifested extra- and peri-orally such as jaw pain, neck swellings and lumps on the lips, participants indicated GPs to be better trained.

The participant choice of primary practitioner for orofacial symptoms is influenced by their awareness and perception of the proficiency of the dentist and in turn this affects their referral pathway.

It can be concluded that participants are unaware of the fact that the dentist is proficient in diagnosing and managing orofacial diseases as well as identifying oral manifestations of systemic disease. The idea that the expertise of the dentist is limited to extracting and filling teeth needs to be transformed to include diagnosing and treating orofacial disease.

LIMITATIONS OF THE STUDY
Limitations of the study included the fact that the specialist Oral Medicine clinic at Tygerberg OHC treats a relatively small number of new patients compared with the undiagnosed disease burden. Language barriers may have limited the study due to incorrect completed questionnaires in English only and some limited assistance in Afrikaans. The socio-economic status could limit the comprehension in understanding some terms, despite participants being English speaking and there was a possibility that the information was misinterpreted. The sample bias of patients also may have limited the study, as the patients were influenced by the fact that they had appointments at the Oral Medicine clinic. Age (>25 yrs vs < 25 yrs) and gender subgroups (Females vs Males) analyses were not recorded, since the sample size was too small to draw from the comparisons between referral sources.

CONCLUDING REMARKS AND RECOMMENDATIONS
The limitations do not diminish the rationale that public awareness about the scope, skills, training and therapies available from trained dentists should be promoted. Improved patient education regarding the proficiencies of the dentist is required. This should be cultivated and taught by dentists and other health care workers in practice. This research provides a pragmatic baseline for future research. This topic should be researched further with a larger sample size and in a more neutral setting.

ETHICAL CONSIDERATIONS
The study population included participants attending the Tygerberg Oral Medicine clinic at the UWC Dental Faculty. No incentives were offered for participation. Ethical consideration for the research study was obtained from the Dental Research Committee of the University of the Western Cape.
The anonymity of all participants was ensured by allocated record numbers and written informed consent was obtained prior to their participation in the survey. An information sheet and consent form was distributed to the participants providing a brief background and reason for the study. The results obtained from the study will be used for educational and research purposes only.

Conflict of Interest: None declared.

References
Prevention of infective endocarditis before dental procedures

Infective endocarditis (IE) is a rare but severe disease and occurs when circulating microorganisms colonise cardiac valves (both natural and prosthetic), the endocardium, or intra-cardiac devices. Certain pre-existing conditions render an individual more susceptible. Because of the serious associated morbidity and mortality, prevention of IE is an important clinical issue.

In a three-year prospective epidemiological study of IE in the Western Cape, rheumatic heart disease (RHD) was the major predisposing condition in 77% of the patients. Seventeen percent had prosthetic heart valves. IE may also occur as a result of invasive procedures or in the placement of prosthetic valves and implantable cardiac devices. This is the predominant cause of IE in Europe/North America, where guidelines and indications for antibiotic prophylaxis have been reduced.

In the Western Cape study, six-month mortality was 36% (much higher than reported international rates of 6% to 27%), and nearly half of the patients required subsequent valve replacement. Cardiac failure developed or worsened in just over 75%, which may in part be related to late referral and other inefficiencies in local health care services. A more recent publication in Gauteng reported an increasing incidence of right-sided endocarditis associated with the use of intravenous nyoape, in HIV infected individuals.

As RHD markedly elevates the risk of IE, its prevention should be a priority, but unfortunately this has not yet happened, neither here nor in other developing countries. Instead, antibiotic prophylaxis has been advocated to reduce bacterial adherence and minimise or prevent the bacteraemia that precedes endocarditis. Unfortunately, its efficacy is controversial.

In Europe, it has been estimated that prophylaxis may avoid only one case of IE per 150,000 dental procedures (in intermediate risk patients) and that only one case per 46,000 would occur for dental procedures unprotected by antibiotics.

However, South Africa is not Europe, and the high incidence of RHD may require different protocols. Transient bacteraemia occurs not only following dental (and other) procedures, but also after routine oral activities such as tooth brushing, flossing and chewing. It is likely that there may be a cumulative effect of low-grade daily episodes, especially in those with poor oral hygiene, and that this may represent a greater risk factor than sporadic bacteraemia occurring with a single invasive/dental procedure. Patients with underlying heart conditions that predispose to bacterial colonisation are therefore exposed to a low but continual lifelong risk of developing IE.

A recent SA study concluded that inadequate attention is paid to the maintenance of oral hygiene in patients with severe RHD requiring cardiac surgery and there is no doubt that maintenance of optimal oral hygiene is the most effective intervention for the prevention of IE of oral origin. However, the recommended regimens of regular professional dental care, the appropriate use of manual, powered, and ultrasonic toothbrushes, the use of dental floss and other plaque-removal devices, are beyond the reach of most South Africans.

Therefore the recommendations for antibiotic prophylaxis take all the above into account, and are as follows:

1. Patients with valvular heart disease should be referred to a dentist/oral hygienist for regular and ongoing monitoring, treatment and advice wherever possible. Clearly this responsibility rests with both the cardiologist and the dentist. It is recommended that patients receive a warning card to record their cardiac condition and any drug therapy, and the suggested prophylactic measures to be taken before dental treatment.

2. The following patients are considered to be at risk:
   - Patients with a history of rheumatic heart disease.
   - Patients with a prosthetic valve or prosthetic material used for cardiac repair.
   - Patients with previous IE.
   - Patients with congenital heart disease:
     - Cyanotic congenital heart disease without surgical repair or with residual defects, palliative shunts or conduits.
     - Congenital heart disease with complete repair with prosthetic material whether placed by surgery or percutaneous technique, up to 6-months after the procedure.
     - When a residual defect persists at the site of implantation of prosthetic material or device by cardiac surgery or percutaneous technique.

3. For the patients identified above, the following procedures are those requiring antibiotic prophylaxis:
   - Procedures requiring manipulation of the gingival or peri-apical region of the teeth or perforation of the oral mucosa, where bleeding is anticipated. In some situations, this may include intra-ligamental local anaesthetic infiltration and placement of orthodontic bands.
   - Periodontal and endodontic infections are mainly due to gram-negative bacteria. Merely covering these with Amoxicillin will not be effective, and broader therapy is required.

Note: Antibiotic prophylaxis is not recommended for local anaesthetic injections in non-infected tissue, treatment of superficial caries, removal of sutures, dental X-rays, placement of removable prosthetic orthodontic appliances or braces or following shedding of deciduous teeth or trauma to the lips or oral mucosa. There appears to be no evidence to contraindicate implants in any patient at risk. The indication...
4. The following are the recommended antibiotic prophylaxis regimens: Cephalosporins should not be used in those with anaphylaxis, angio-oedema or urticaria after Penicillin or Ampicillin.

<table>
<thead>
<tr>
<th>Situation</th>
<th>Antibiotic</th>
<th>Single dose 30-60 mins before procedure, LO or IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not penicillin allergic</td>
<td>Amoxicillin / Ampicillin</td>
<td>Adults: 2g; Children: 50mg/kg</td>
</tr>
<tr>
<td>Allergy to penicillin</td>
<td>Clindamycin</td>
<td>Adults: 600mg; Children: 20mg/kg</td>
</tr>
</tbody>
</table>

Alternatives: Cephalaxin 2g i.v. for adults or 50mg/kg i.v. for children; Cefazolin or Ceftriaxone 1g i.v. for adults or 50mg/kg i.v. for children.

Clindamycin is not always available in a suspension form in certain State clinics. It is therefore suggested that suitable alternatives are azithromycin or clarithromycin, 500mg for adults and 15mg/kg in children.

References

COMMENT
As with all such policy statements, SADA would welcome feedback, and this statement will be formally reviewed every three years.

Acknowledgements
The formulation of a policy for a controversial clinical dilemma demands the attention and commitment of experienced experts in the field. The vexed question of just when and how antibiotics may play a role in the prophylaxis of Infective Endocarditis is just such a challenge. The teams assembled to wrestle with the determination of a policy for South Africa combined their expertise to produce documents which offer guidelines which will be invaluable to all practitioners faced with patients who may., or may not., require prophylactic antibiotic cover. The accolades and appreciation of the South African Dental Association are accorded to the members of these committees.

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THE JOINT COMMITTEE established to consider in depth the role of prophylactic antibiotic therapy in Oral and Dental practice.

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Dr J Lawrenson, Cardiologist
A 71-year-old male was referred from his general practitioner to the Oral Medicine Clinic at the University of the Western Cape, Oral Health Centre, Tygerberg campus, on account of a six-week history of recurrent oral ulceration.

The patient reported that his mouth and throat were painful and he had difficulty in swallowing food. Initially, the ulcers had persisted over the two weeks following the prescription of Dynexan®, Augmentin 1g BDS for 5 days, Andolex C® and Mucain mouthwash®, by his general practitioner. Subsequent referral to an ENT surgeon had resulted in confirmation of an extra-oesophageal reflux component. A PPI (proton-pump inhibitor), Gastriwin®, was prescribed.

The patient disclosed that he had Type II diabetes, hypertension and had suffered a cerebrovascular accident (stroke) two years previously. Questioning by the ENT surgeon revealed that the patient had consulted a dermatologist who had prescribed methotrexate (MTX) to treat psoriasis. The patient did not use supplementary folic acid. The outcome of blood investigations, requested by the ENT surgeon, revealed bone marrow suppression as a result of the methotrexate usage. The patient was referred to his dermatologist with the recommendation that the medication be supplemented with folic acid.

Extra oral examination revealed the presence of a 10 mm scaly patch, surrounded by an erythematous margin, on the patient’s right hand. Similar lesions were observed on the extensor surfaces of both legs.

The patient was edentulous with a loss of vertical dimension and did not wear any dentures. Diffuse, ill-defined erosions and ulcerations were present bilaterally on the buccal mucosa, upper and lower labial mucosa. The posterior soft palate had areas of irregular ulcerations and erosions, which contributed to the difficulty in swallowing.

A differential diagnosis of methotrexate-induced oral ulceration was proposed. The condition was exacerbated by the lack of folic acid supplementation, which contributed to the subsequent bone marrow suppression. The lymphocyte count, red cell count and platelet levels were 0.5x10E9/L, 2.8 x10E12/L and 63x10E9/L respectively (Table 1).

**DISCUSSION**

Oral ulceration is a common side effect of various drugs. Direct contact may cause local hypersensitivity or chemical burn, or, less frequently, the complication is part of a complex reaction with cutaneous or systemic manifestations.
Drug induced oral ulcers are resistant to conventional therapies; but will heal rapidly following withdrawal or reduction of the dose of the suspect medication. Recognition of the cause and subsequent diagnosis of these ulcerations is usually difficult, especially in patients on multiple drug regimens. Medications likely to induce solitary oral ulcers are commonly prescribed in the management of rheumatoid, cardiac and psychiatric conditions (Table 2).

MTX is an antimetabolite, antifolate agent developed in 1948, used to treat certain forms of cancer. It is also commonly used to treat rheumatoid arthritis in both adults and juveniles and severe psoriasis. MTX interrupts the synthesis of both DNA and RNA and slows or stops the growth of rapidly dividing cells, including mucosal, cancer and bone marrow cells. MTX induces a deficiency of folate-dependent co-enzymes and suppresses the immune system. MTX is a bicarboxylic acid, a folic acid analogue that inhibits dihydrofolate reductase enzyme. The latter is required to reduce folate to an active form, which acts as a co-factor in the production of nucleic acids essential for DNA synthesis. Inhibition of this enzyme by MTX causes a reduction in DNA formation and cell turnover and is responsible for both its therapeutic and the more common side effects, such as myelosuppression and mucositis.

Psoriasis is a chronic, inflammatory, non-contagious skin condition usually affecting the skin of the elbows, knees, and scalp. The cells in the superficial skin layer multiply more quickly than normal, causing thickened areas of skin, and producing thick scaling plaque. It has a variable course with periodic periods of remission and exacerbation. Both biologic and non-biologic agents are used in its treatment. Non-biologics, such as MTX, suppress the immune system and are considered first-line treatments. Biologics target certain aspects of the immune system contributing to the pathogenesis of psoriasis. These agents are generally well tolerated and limited outcome data have determined biologics to be safe for long-term use in moderate to severe plaque psoriasis. However, biologics have been linked to risks of immunosuppression, serious infections and malignancy, both cutaneous and lymphoproliferative.

Regular blood and liver function tests are required for patients undergoing systemic treatment to monitor the toxicities of these medications, all of which must be avoided in pregnancy.

### Table 2: Drugs commonly implicated in oral ulceration

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>DRUGS/COMPLICATIONS</th>
</tr>
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<tbody>
<tr>
<td>Rheumatology</td>
<td>NSAI and long-term rheumatoid arthritis therapy</td>
</tr>
<tr>
<td>Cardiology</td>
<td>Angiotensin-converting enzyme inhibitors. Angiotensin 2-receptor antagonist</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>Antidepressants</td>
</tr>
<tr>
<td>HIV</td>
<td>AIDS therapy</td>
</tr>
</tbody>
</table>
Oral ulceration is reported in 14% of patients on long-term, low-dose MTX treatment. The lesions may be caused by a lack of folic acid supplementation or an over-dosage of the MTX drug. Whilst the lesions are aggravated by chronic drug administration, they will disappear three weeks after suspension of the MTX administration. This adverse effect of MTX is mostly dose-dependent and usually occurs due to an accidental over dosage. Oral side effects are of importance to the patient not only because of the associated pain, but also because it affects the ability to eat. This aggravates the folate deficiency, causes weight loss and leads to a general weakening of health. Folic acid supplementation can reduce MTX-induced mucosal and gastrointestinal side effects by 79%. Most of the cases of ulceration induced by methotrexate have been described in patients treated with low-dose (7.5-25mg/week) instead of a higher dose of methotrexate (100-250mg/m2/week), probably because hyperproliferative psoriatic plaques are more susceptible to the influence of folic acid antagonism.

One of the primary toxic effects of methotrexate is myelosuppression. MTX suppressed hematopoiesis has been confirmed to cause anemia, aplastic anemia, leukopenia, pancytopenia, neutropenia, thrombocytopenia, lymphadenopathy, and lymphoproliferative disorders. MTX is thus contraindicated in patients with low hematologic cell counts or pre-existing myelosuppression. Regular monitoring of a complete blood count (CBC) is compulsory and some cases may require temporary discontinuation of the therapy. In addition, folate therapy or leucovorin rescue may prevent or palliate side effects.

Low dose methotrexate is increasingly being administered in the control of psoriasis. It is generally an effective and safe medication, with oral ulceration being its most common side effect. Oral ulceration may be due to dosage error or folate deficiency and these problems should be clarified in patients who present with oral ulceration while using methotrexate.

Conflict of interest: None declared

References

ABSTRACT
This study evaluated the success of the whitening of darker teeth by comparing the results of a tooth whitening programme in two groups, subjects with darker (A2 and darker) teeth and patients with whiter teeth. Opalescence PF 10% was applied for 14 days (nightly for 6-8 hours) and the colour changes followed over a six month period. The overall effect (∆E*ab) showed a much higher improvement (p<1%) in the whitening of darker teeth (~40%) relative to teeth which at the outset had been whiter than A2. Overall (∆E*ab) a deterioration of about 19% for darker teeth and ~9% for whiter teeth was seen after six months, but a significant improvement in colour was still evident. Conclusion: The effect of Opalescence PF 10% treatment was significantly better in all components (L *, a*, b* and ∆E*ab) for A2 and darker teeth relative to whiter teeth. Despite a significant colour relapse after a six-month period, there was still an improvement compared with before treatment. Thus, it can be expected that bleaching treatment of darker teeth would result in more aesthetic observable colour changes. The significant loss of the whitening effect found after six months may suggest the recommendation to re-bleach.

INTRODUCTION
Tooth whitening in cosmetic dentistry has continuously evolved in the last decade. Film stars took the leading role in whitening their teeth on a regular basis, an example which had a copy-cat impact on the general public, leading to increasing demand.

The different ways in which teeth can be whitened include dentist-supervised home bleaching (nightguard vital bleaching), in-office or power bleaching, a combination of in-office and take-home bleaching, as well as over-the-counter whitening products, for use at home.1-3

Nowadays, tooth bleaching is mainly done with different peroxides. Hydrogen peroxide forms free radicals like hydroxyl and perhydroxyl, together with, superoxide anions(unstable reactive oxygen molecules which are transformed into oxygen and hydrogen peroxide anions).4 Today it is known that tooth discolouration varies in appearance, aetiology, localization, severity and degree of adsorption to tooth structure, which last can be intrinsic, extrinsic or a combination. Intrinsic discoloration is mainly caused by the incorporation of chromogenetic material in enamel and dentine, exposure to high fluoride levels from different sources, tetracycline intake and other factors.1-3 Extrinsic stain (as the word implies) comes mainly from the consumption of all kinds of foodstuff with different colouring pigments like carrots, wine (mainly red wine), coffee, tea, etc.

Given the different degrees of darkening, it may be enquired whether darker teeth would whiten more than whiter teeth? The present investigation sought to clarify the question by means of a clinical study.

METHODS AND MATERIALS
Students with two sound maxillary teeth (tooth 11 and 21) at the Dental Faculty were included in the study (Registered Project #: UW, 10/3/29). These students were medically healthy, and were not on any treatment. None had undergone any whitening treatment previously. The treatment process followed was as outlined by the Opalescence PF 10% company. Bleaching was done
every night (for about 6-8 hours) over a 14 day period. A spectrophotometer (Model: CM-2600d, Konica Minolta Sensing, Inc., Japan) was used to measure the colour of teeth before treatment (base-line), after 14 days and after six months.

RESULTS AND DISCUSSION

The spectrophotometer enables the quantification of colours by measuring them numerically in a three dimensional colour space (L*a*b*). Total colour includes three components which are defined as a*, b* and L* (Figure 1).

Previous contributions (Insights 1 and Insights 2) have reported on the overall positive effect of Opalescence PF 10% on the whitening of teeth and on the less demonstrable whitening achieved by an LED treatment. This section investigated what can be expected when darker teeth (group One) were treated in comparison with the effects on whiter teeth (group Two).

For both groups, all three components (L*, a* and b*) showed differences (improvements) between baseline values and the values obtained after treatment (14 days later), and between base-line and after six months (p<0.01; Wilcoxon Signed Rank Sum Test). For darker teeth after six months: the decrease in L* (less lighter/brighter) from base-line was a low ~8%, the value for a* did not change significantly while the b* value became more yellow, a relapse of about 20%. The deterioration in the overall colour was ~19% after six months. However, it is clear that there still remained a significant improvement in colour compared with before treatment.

The question now is whether these bleaching effects would be visible to the human eye and therefore warranted. If we accept that an overall colour change of one or more units in ∆Eab would be visible to the human eye it becomes clear that for both whiter and darker teeth, the bleaching effect would be clearly visible after the 14 day treatment as well as after a six month period, with ∆Eab values of 5.2 and 4.2 for darker teeth, and 3.2 and 3.0 for whiter teeth.

CONCLUSION

The effect of Opalescence PF 10% treatment was significantly higher in all components (L*, a*, b* and ∆Eab) for A2 and darker teeth relative to changes seen in whiter teeth. The response was more visible for darker teeth. A significant colour relapse after a six-month period was found for both groups.

Thus, it can be expected that bleaching of darker teeth would result in more observable aesthetic colour changes both initially and at the six month recall.

Acknowledgements

Financial support was obtained from the University of the Western Cape and the DDF fund of the South African Dental Association.

References

5. Minolta, Precise colour communication, Minolta, Co., Ltd., Osaka, Japan, 1994; 9242-4830-92 IHCAJ.
Maxillo-facial radiology case 153

An elderly female patient presented with the main complaint that she had not slept on occasions over the past three weeks due to a severe throbbing pain on the right side of her face. She reported experiencing the same pain when bending down or drinking hot coffee. Figure 1 is an intra-oral radiograph of the third molar of the patient. What important radiological findings are discernible and what are your differential diagnoses?

**Fig. 1**

**Fig. 2**

**Fig. 3**

**INTERPRETATION**

The intra-oral radiograph (Fig.1) shows a lesion at the apex of the 18. The lesion has extended to destroy a portion of the antral floor. There is also loss of the lamina dura and the presence of a “halo” (green arrow) of periosteal new bone suggestive of an osteitis. Some authors refer to this lesion as a localized mucositis or sinusitis of the left maxillary sinus. A Water’s view of another patient (Fig.2) shows an opaque right maxillary sinus and a classic air-fluid level (red arrow) in the left sinus, features which are consistent with acute sinusitis. Another example of acute sinusitis is discernible on the axial CT (Fig.3) scan of another patient showing a clearly opacified left maxillary sinus with mucosal thickening and an air-fluid level (red arrow). Acute sinusitis presents clinically with facial pain, headaches, local tenderness and purulent discharge and is a common infection of the maxillary sinuses. Figure 4 is a Water’s view of the maxillary sinuses showing a very sclerotic right sinus and small sclerotic maxillary antra in the left sinus (purple arrows), which is suggestive of chronic sinusitis. An axial CT scan (Fig.5) of the same patient shows marked thickening of the walls of the right maxillary sinus with a thickened mucosa. The medial wall defects indicate that prior nasal antrostomies had been performed (blue arrow).

Chronic sinusitis is an infection of the sinuses that persists beyond the acute phase or fails to respond to treatment. Impaired sinus drainage is a predisposing factor. As in the acute form, chronic sinusitis is characterized by mucosal oedema and inflammation. With time, reactive sclerosis of the sinus walls and irreversible fibrosis of the sinus lining may develop. In another case in which the patient complained of nasal discharge and sinus pain an opportunistic infection, aspergillus sinusitis presented as a chronic sinusitis which did not improve with antibiotics or irrigation. In 90% of cases Aspergillus fumigates was the offending organism, as it was in this case. An axial CT (Fig. 6) scan of the affected patient shows thickened mucosa of the right maxillary sinus (yellow arrow) and the thickened walls of the left sinus, reflecting chronic sinusitis.

**Reference**

Continuous education in procedural sedation: life-threatening airway obstruction and contributing perioperative patient factors

ABSTRACT
More complex surgical procedures are increasingly offered to older patients with pre-existing disease. Perioperative patient care is at the cornerstone of the current trend in anaesthesia research. Sedation practitioners also have a role to play as intra-operative events can have an impact on long-term morbidity and mortality. A common respiratory emergency encountered during sedation is airway obstruction. Identifying the patient at risk of obstruction will greatly improve the levels of safety and care.

Keywords: perioperative care, airway obstruction, respiratory depression, laryngospasm, anaphylaxis

INTRODUCTION
Detailed statistics of the global and national outcomes following surgery remain limited. Estimates from “high-income”, first world countries estimate that postoperative complications occur in up to 20% of patients undergoing surgical procedures. Little is known about the specifics of this subgroup of patients who do present with postoperative complications. Deaths are more common in the surgical population who present as mostly older patients with comorbidities. More complex surgical options exist and are increasingly offered to more patients than in the past. This group of patients often include the older individuals with chronic disease.

The purpose of this article is to highlight the global movement towards better peri-operative care and to focus on the challenges and management of potentially life-threatening airway obstruction that could occur during procedural sedation.

ACRONYMS
OSA: obstructive sleep apnoea
OR: odds-ratio

DISCUSSION
In standard international practice, surgery should not be undertaken for a patient with an American Society of Anaesthesiologists’ (ASA) classification of 3 or 4 in a remote setting depending on out-of-theatre procedural sedation. Should any complication occur, the patient with comorbidities might fail to cope and need escalation of care in the immediate postoperative period. Identifying the “high-risk” patient is not an easy task and is currently seen as a major aspect of future research in peri-operative care. Many different triage tools exist that have been validated to predict whether a patient would do well in the post-operative period. However, it remains the considered judgement of the clinician to decide on the day of surgery whether it is in the best interests to continue with the case or not.

Currently, large data collection is being undertaken for the evaluation of perioperative anesthesia outcomes in a very large cohort of hospitals in South Africa in which pediatric surgery is undertaken. As we seek to ensure safe surgical treatment for our patients, we need to understand the severity of harm that can develop following complications during the surgery.

The Enhances Recovery After Surgery (ERAS) approach is a “bundle” or group of interventions aimed at enhancing early recovery following surgery. With more complex and longer cases being conducted under sedation, practitioners should be acquainted with these principles. This approach is aimed at reducing the need for postoperative hospital admissions.

The second concept to be discussed in this article is the importance of identifying the patient who may be at risk of airway obstruction during procedural sedation.

Structured sedation protocols exist to provide for the incorporation of safety principles to reduce morbidity.
Regardless of the intended level of sedation, procedural sedation is a continuum and patients may develop respiratory complications at any time. Life-threatening respiratory complications include airway obstruction, respiratory depression, laryngospasm, bronchospasm and unintended loss of the patient’s protective airway reflexes.6

The framework of the upper airway consists of bone and cartilage attached to soft tissue structures; starting at the nose and lips, and extending to the larynx.6 Where the upper airway is unsupported by bone or cartilage it has the tendency to collapse when the muscular framework relaxes during sleep.6 The pharyngeal section is a collapsible area between two rigid structures: the nasal and tracheal sections.6 During sedation or anesthesia, the decrease in muscle tone is further compounded by drug-induced upper airway neural and muscular activity.6 This increases the risk of airway obstruction and intervention might be necessary to overcome the problem.

Airway collapse typically occurs at points of narrowing and/or flaccidity. In the case of children with tonsillar hypertrophy a higher chance of obstruction exists. The area of the upper airway most commonly prone to collapse is the velopharynx, as may be shown radiologically with enflurane anaesthesia and under propofol total intravenous anaesthesia.7 Interestingly, in the study described here, the principal site of collapse was not affected by the depth of anaesthesia.7 This is important for the sedation practitioner who might be challenged to attempt a “quick, uncomplicated case” on a patient with potentially undiagnosed obstructive sleep apnoea – remember that even a short case could have complications if the patient selection was not done carefully and if the setting were not safe for the “more complex, high-risk patient”. These patients should preferably be looked after at a facility with a theatre and having help available. Table 1 is an adapted summary of patients predisposed to developing obstructive sleep apnoea.6

Other features predisposing to airway obstruction, especially in paediatric patients involve: a relatively large occiput, a large tongue and operator-induced obstruction, ie: the surgeon or dentist depressing the mandible while operating.

The STOP-BANG questionnaire consists of eight-items and has been validated for the screening of patients for obstructive sleep apnoea (OSA).8 Chung et al concluded that a STOP-BANG score of 5-8 increases the incidence of OSA in the surgical population.9 OSA is a condition characterised by functional airway collapse during sleep causing reduced or complete cessation of airflow despite ongoing breathing efforts. In a 2012 meta-analysis, the authors found an odds-ratio (OR) of 2.4 of OSA associated with acute respiratory failure and OR of 2.3 for post-operative oxygen desaturation.10 Patients with OSA should be classified in the ASA 3 group. However, the sedation practitioner should always be aware of the undiagnosed patient at risk.

An important distinction should be made between patients with airway obstruction and those with respiratory depression, which is a reduction in the patient’s central drive to breathe/ventilate.11 A cause of central respiratory depression is opioid administration. Sedation guidelines point to the use of short-acting opioids when necessary. Patients at risk are the elderly, patients with renal impairment and the paediatric population. In the UK, the incidence of post-operative opioids-induced respiratory depression is approximated at 1%.11 Identifying The patient who obstructs is identified as one who “cannot breathe” in contrast with the respiratory depression of “won’t breathe”.6 Foreign material in the upper airway can also be a reason for obstruction: secretions, “throat/pharyngeal packs” or a poorly positioned tongue are all possible culprits.

Prompt identification of upper airway obstruction forms the mainstay of treatment. The next step in the management of an obstructed patient involves correct positioning: “sniffing the morning air” position is achieved by elevating the shoulders slightly, causing flexion of the neck and extension of the head. This keeps the plane of the mid face parallel to the bed. Simple airway manoeuvres like lifting the chin or a slight jaw thrust usually solve the problem. When these don’t work, and the practitioner is sure that the patient is not suffering from central respiratory depression, other causes of upper airway obstruction should come to mind, namely laryngospasm or laryngeal oedema which is highly suggestive of anaphylaxis. Detail on the management of the latter two conditions has been discussed in a previous communication on Continuous Education. (SADJ volume 71, February and September 2016).

Should the above manoeuvres fail to provide a patent airway, more advanced management, including positive pressure ventilation with a bag-mask device and endotracheal intubation or supraglottic airway support may be indicated. Prompt referral to a hospital facility is imperative.

What can sedation providers do to best prepare for managing airway obstruction?

---

**Table 1: Predisposing conditions for obstructive sleep apnoea**

Adapted from Hillman et al.5

<table>
<thead>
<tr>
<th>Diagnosis / Condition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>Acquired, or Prader-Willi syndrome</td>
</tr>
<tr>
<td>Genetic predisposition</td>
<td></td>
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<tr>
<td>Age</td>
<td></td>
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<tr>
<td>Male gender</td>
<td></td>
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<tr>
<td>Alcohol, sedatives</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
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<tr>
<td>Nasal obstruction</td>
<td>Septal deviation, chronic nasal congestion</td>
</tr>
<tr>
<td>Pharyngeal obstruction</td>
<td>Tonsillar and adenoidal hypertrophy</td>
</tr>
<tr>
<td>Craniofacial abnormality</td>
<td>Down's, Pierre-Robin, Treacher-Collin's Syndromes, achoondroplasia, acromegaly, fragile-X syndrome</td>
</tr>
<tr>
<td>Laryngeal obstruction</td>
<td>Laryngomalacia</td>
</tr>
<tr>
<td>Endocrine/ metabolic disorders</td>
<td>Hypothyroidism, androgen therapy, Cushing's syndrome</td>
</tr>
<tr>
<td>Neuromuscular disorders</td>
<td>Stroke, cerebral palsy, head injury, muscular dystrophies, myotonic dystrophy</td>
</tr>
<tr>
<td>Connective tissue disorders</td>
<td>Marfan’s syndrome</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td></td>
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<tr>
<td>Storage diseases</td>
<td>Mucopolysaccharidoses</td>
</tr>
</tbody>
</table>
Patient selection, careful review of current and underlying medical conditions, and a detailed pre-operative assessment are fundamental. See Table 2 for more factors which govern our actions in protecting our patients from adverse events. Staff training and practitioner skills have been shown in the literature to improve rescue attempts when a patient develops a complication or inadvertently slips down the continuum to a deeper level of sedation than that intended.

### Table 2: Summary of factors that could reduce the risk of complications during sedation

<table>
<thead>
<tr>
<th>Factors that should be employed to minimize risk:</th>
<th></th>
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<tbody>
<tr>
<td><strong>Practitioner</strong></td>
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<tr>
<td>• Skills</td>
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<td>• Training</td>
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<tr>
<td>• Guidelines</td>
<td></td>
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<tr>
<td>• Pharmaceutical knowledge</td>
<td></td>
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<tr>
<td>• Vigilance; patient monitoring</td>
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<tr>
<td><strong>Patient</strong></td>
<td></td>
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<tr>
<td>• Patient selection</td>
<td></td>
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<tr>
<td>• Procedure suitable for out-of-office sedation</td>
<td></td>
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<tr>
<td><strong>Environment and staff:</strong></td>
<td></td>
</tr>
<tr>
<td>• Accreditation</td>
<td></td>
</tr>
<tr>
<td>• Training</td>
<td></td>
</tr>
<tr>
<td>• Checklists</td>
<td></td>
</tr>
<tr>
<td>• Equipment: checked, tested, available</td>
<td></td>
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<tr>
<td>• Awareness: posters</td>
<td></td>
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<tr>
<td>• Emergency plan</td>
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</tbody>
</table>

### CONCLUSION

Complications arise mostly while providing any level of sedation or general anaesthesia for patients who have significant medical compromise. Sentinel events can be prevented as far as possible by ensuring optimal pre-sedation assessment, optimal patient selection as well as attentive intra-operative monitoring and rescue support when indicated.

Perioperative procedural sedation outcomes should be further explored in the South African milieu.

### References


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There is an idiom which says "A picture is worth a thousand words". At no time could this be truer than in the very visual digital world of today. The Internet, having the ability to mix text with other media such as pictures and videos, has revolutionized the way information is published and consumed. While it has been estimated that more than 80% of online activities are text-based, reading large amounts of information is time consuming and can be overwhelming. Thus if these activities can be enhanced by multimedia, or substituted with images, consumer behaviour could be transformed and their behaviour shifted, as well as enhancing learning and interactions with others.1

INTRODUCTION

Dentistry has not escaped this digital explosion, with social media usage and interactions being a part of everyday life for most practitioners and patients. In the clinical setting, photographs, radiographs and scans are taken for many reasons and serve different purposes. They can form part of the dental records to document the "before treatment" situation, to aid communication with colleagues when seeking advice, to show to students in educational settings, to illustrate treatment options to patients, to be available for publishing in dental journals as part of research or case studies, and on internet sites when sharing treatment outcomes with others.2 There is an abundance of literature regarding the importance of gaining informed consent before embarking on any dental treatment. The process by which this is obtained is guided and instructed by ethical principles, legal requirements and professional policies.3 Surely then, patient images should require the same levels of informed consent and assurance of confidentiality.2 The mere act of signing a consent form is secondary to ensuring that good process has been followed in the process leading up to this written affirmation. Valid consent can only ensue if there has been full disclosure by the dentist, clear understanding by the patient as to the conditions and scope of the agreement, and a shared decision-making process.4

This paper will discuss the requirements of a valid consent process, and will present a draft patient consent form that may be adapted and used when consent is sought for the use of personal images in dentistry.

REQUIREMENTS FOR INFORMED CONSENT

This can be divided into dentist and patient factors. The National Health Act No 61 (2003) stipulates that the following information must be given to all patients: the range of diagnostic and treatment options available; the benefits, risks, costs and consequences of each; and the implications, risks and consequences if treatment is refused.5 In addition, it should be presented in a manner that does not place any undue influence on the patient, allowing time for consideration all the options before the agreement is signed. The process of ensuring understanding, comprehension and agreement or refusal is of prime importance.6 During the discussion the clinician can get to know the patient better, listen to all his/her fears and concerns and tailor the treatment according to the needs and desires. This builds patient trust and confidence and also allows them to feel more in control, which may lead to improved compliance.6

There are three key elements involved in the consent process, concerning both the dentist and the patient:

1. Threshold elements entail that the patient is sufficiently competent to understand and decide, and can make the decision voluntarily
2. Information elements relate to the duty of the dentist to disclose all relevant information, to recommend an appropriate plan of action that will serve the patient’s best interests and to ensure that the patient has clearly understood all the options before the agreement is signed. The process of ensuring understanding, comprehension and agreement or refusal is of prime importance.6 During the discussion the clinician can get to know the patient better, listen to all his/her fears and concerns and tailor the treatment according to the needs and desires. This builds patient trust and confidence and also allows them to feel more in control, which may lead to improved compliance.6
3. Consent elements refer to the patient’s ability to decide for or against the treatment, and to then authorize the plan of action.7 Note: a patient may later withdraw consent provided the condition is not life threatening, and the patient is not ignorant or uninformed. By the
same token, the dentist does not have to provide any treatment considered to be potentially harmful to the patient.5

DIFFERENCES BETWEEN CONSENT TO TREATMENT AND CONSENT TO USE OF PERSONAL INFORMATION / IMAGES

1. Consent to treatment
This requires the dentist to explain the proposed therapy, risks involved, time and cost implications, alternative options and the consequences of no treatment. This should take the form of a verbal discussion followed by written information, which the patient needs time to read and consider. In many instances consent is often “implied” and assumed by inference from the patient’s actions even though there was no actual explicit consent process. This may suffice for many routine dental procedures, such as examination and charting but will not provide protection for a dentist against legal actions if more extensive work has been done.3

“Expressed” consent is specific, and should be gained from a patient for each particular procedure that is not routine or which carries some form of risk. It may be given in either an oral or written form. The former is valid and may be adequate for minor work, but must still be witnessed and documented in the patient’s records. Written consent is required for more extensive treatment. Although this may be used to defend a legal action, it does not automatically mean that the goals of informed consent have been met.3 Not only must the dentist

APPENDIX A:
Patient consent form for the use of dental images

This form provides consent for the use of my dental images, including photographs, radiographs and scans, for either record purposes, as diagnostic aids, for treatment planning, communication with colleagues, teaching and lecturing, in printed or electronic publications, and /or for research subject to the conditions signed for below.

Name of person shown in photograph: __________________________

Contact details of clinician: ____________________

I_________________________________________ [insert full name] give my consent for this information about MYSELF/MY CHILD OR WARD/MY RELATIVE [circle correct description] relating to the subject matter above to be used for the purposes indicated in Column A, and adhering to the conditions stipulated in Columns B, C and D.

I understand that:

1. The Information will be used or published without my name attached and every attempt will be made to ensure my anonymity. I understand, however, that complete anonymity cannot be guaranteed and there is a remote chance that somebody may be able to identify me.

2. The illustrations may be published in sites that have a local or worldwide distribution. Although this material is aimed at dentists and related medical specialists, it may be seen by other lay persons, including journalists.

3. The illustrations may appear on dental or educational websites which are visited by many different users.

4. My information and illustrations may also be used in full or in part in publications and may be translated in print, in electronic formats, and in any other formats that may be used now and in the future. It may appear locally and internationally.

5. None of my information or illustrations will be used for advertising purposes or used out of context for unrelated purposes.

6. I can withdraw my consent at any time before publication, but once it has been published or posted on the internet I understand that it will not be possible to revoke the consent. Illustrations may be withdrawn but the clinician and publishers have no control over images that have been uploaded and used by others prior to this withdrawal.

Signed: __________________________________

Date: ______________________

Conditions of Acceptance

<table>
<thead>
<tr>
<th>Image Code – (date &amp; time)</th>
<th>Subject matter description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Anticipated use:</td>
<td>B. Can be used</td>
</tr>
<tr>
<td>Dental records</td>
<td></td>
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<tr>
<td>Diagnostic aids and treatment planning</td>
<td></td>
</tr>
<tr>
<td>Communication with colleagues</td>
<td></td>
</tr>
<tr>
<td>Teaching &amp; Lecturing</td>
<td></td>
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<tr>
<td>Publications (print media)</td>
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<tr>
<td>Publications (print or electronic media)</td>
<td></td>
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<tr>
<td>Research</td>
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</tbody>
</table>
ensure adequate disclosure, provide sufficient necessary information, and refrain from placing any undue influence on the patient, but the patient needs to have the capacity to understand, appreciate the consequences, communicate, weight up various options, and make autonomous choices. The clinician also needs to be aware that this process involves both the assimilation of information and decision making prior to the actual consent, and that the decision may be to agree or to decline consent.  

2. Consent to use of information and/or images

This differs somewhat from consent to treatment and involves clarification of scope and conditions of use. Here the clinician is required to provide full disclosure, as opposed to the adequate information which is required when seeking to secure consent to treatment. This entails giving sufficient specific information as to how and why the images will be used, who is the potential viewing audience, how much of the patient’s details will be shared, and the possible domains where they may appear. All patient images, regardless of whether or not they will be seen by others or contain identifying features, require the same consent process, guarantees of confidentiality and safeguards as any other medical record. As with consent for treatment, the person who is being photographed should be the one to provide this consent, or the parent/legal guardian in the case of minors. However, the latter should still be asked for assent if possible. Consent must be provided for ALL intended uses of each image, even if merely for record purposes. In the case of possible publication, the patient should be made aware that electronic publications have the potential to reach wide audiences and to be re-posted on many internet sites. In addition, once published or posted in a public domain it cannot later be removed. Patients or guardians should also be given a copy of the consent form with contact details of the clinician should they desire to withdraw consent at a later stage. If so, the images can be removed from display in whatever form that may be, however there must be awareness that printed media cannot be retracted, and neither can images that have been downloaded from internet sites and re-used by others. Patients must also be reassured that they have every right to refuse the use of their images or to ask for withdrawal at a later stage and that this will in no way negatively affect their doctor-patient relationship or treatment.

DRAFT CONSENT FORM

A draft consent form for use in Dentistry has been developed. This can be adapted and used by clinicians according to their needs (see attachment). The aim was to keep it as clear and straightforward as possible, while at the same time giving patients the opportunity to specify in detail their desires. It makes provision for patients to choose and sign a once-off consent to the taking and use of all images for all or limited purposes (e.g. for records only, for lectures and teaching, in publications), to sign at each appointment for specific use of the images taken that day, or to request the opportunity to view each image before giving approval for its use. In the case of the first options, a once-off consent signature will suffice. For the other choices, patients will have to sign each block on the second page at each visit. This page can easily be duplicated as many times as needed. In all instances anonymity and protection of identity must be guaranteed.

At the same time the clinician should ensure that public use of images does not disclose enough personal information that would allow a third party to put the pieces together and to identify the patient. The option of choice should be clearly marked on the front of the record files to alert the clinician that consent may be needed each time a photograph is taken. Each image must also be clearly identified in the consent form. A good way to do this while still ensuring anonymity would be to code it using the date and time of capture, as these numbers will never be duplicated and are easy to collate with the files if accurate appointment books are kept.

CONCLUSIONS

Adoption of a specific image consent form will enhance the patient’s trust of the patients in their dentists, and will help safeguard clinicians when they make use of these images, privately or publically for professional purposes. It also reinforces the principle of “Veracity” or truthfulness which relates to the concept that “professionals have a duty to be honest and trustworthy in their dealings with patients, including respecting the position of trust inherent in the dentist-patient relationship, communicating truthfully and without deception, and maintaining intellectual integrity at all times”.

References

What’s new for the clinician?
Summaries of and excerpts from recently published papers

1. Effectiveness of a miswak extract-containing toothpaste on gingival inflammation: a randomized clinical trial


The removal of dental plaque and food debris is necessary to maintain oral health and plays an important role in the prevention of caries and periodontal diseases. Oral hygiene has been practiced by different cultures for thousands of years. The chewing stick or miswak (meswak or siwak) which originates from trees of the family Salvadoraceae (Salvadora persica) is the first known tooth-cleaning tool in history, and its use dates back as early as 3500 BC.1 Presently, chewing sticks are mainly used in Islamic countries where its use is sanctioned as a religious practice.1 Recently, toothpastes with miswak extracts have become commercially available. The extract consist of essential ingredients for caries prevention such as fluorides, silicate, potassium sulphate, calcium sulphate, tannins, saponins, vitamin C and chlorides.1 Several studies have reported an antibacterial effect of miswak extract which have been shown to be effective against various types of oral bacteria implicated in caries or periodontal disease.1 Azaripour and colleagues1 reported on a clinical trial that sought to compare the efficacy of a miswak extract-containing toothpaste to treat gingival inflammation with that of two other toothpastes. Since herbal components are essential ingredients of miswak, a herbal toothpaste (Parodontax) was selected for comparison along with Colgate Total which is a well-documented and effective conventional toothpaste and is recommended for oral hygiene.

MATERIALS AND METHODS
A randomized three-week prospective clinical trial with three parallel groups was designed with the following inclusion criteria: patients had to be greater than 18 years old; be willing to participate and willing to sign the informed consent; have a sulcus bleeding index (SBI) ≥25%; have no pocket depths >3 mm; have at least 20 teeth (with five teeth in each quadrant); and be systemically healthy. Patients were excluded if they had known hypersensitivity to ingredients of toothpastes used in this study; had carious cavities next to the marginal gingiva that could cause gingival bleeding; had taken antibiotic therapy <3 months before treatment and were smokers or were pregnant.

RESULTS
A total of 118 patients were assessed for eligibility and 66 (31 male, 35 female) met the inclusion and exclusion criteria and could be analysed. The participants were
randomized and equally allocated to one of the three groups (each group thus comprised of 22 participants).

The groups did not differ with respect to age (mean age 57.8 ± 10.2 years) and the gender distribution of participants (female: 53%, male: 47%). The periodontal pocket depth was comparable between the groups (Miswwak-group: 2.8 ± 0.2, Parodontax-group: 2.8 ± 0.3, Colgate-group: 2.8 ± 0.2).

The analysis of the data showed a significant reduction in SBI and API in all groups after 21 days of brushing with the assigned toothpastes.

The Parodontax -group and the Miswak-group had a significantly stronger reduction in SBI than the Colgate-group. There was no significant difference between the Miswak-group and the Parodontax-group (P = 0.466). Furthermore, all groups showed a significant reduction in API that was not significantly different between the groups.

All patients (n = 66) were asked to return the forms containing details on the date and time of brushing. Furthermore, patients returned the questionnaire containing the subjective rating of the taste of toothpaste, subjective oral sensations and personal assessments. The majority of patients was satisfied with the taste of the toothpastes, and no adverse side effects were reported. All patients in the Miswak-group were satisfied with the taste of the toothpaste (100%), and most of the patients reported improved oral hygiene (72.7%). Most patients (91%) liked to continue using it. The Parodontax-groups’ toothpaste was often described as salty (41%) and a third of the patients considered it to be not pleasant to use (27%). Interestingly, 80% of the patients reported an improvement in oral hygiene and 91% of the patients liked to continue using it. No displeasing taste was reported in the Colgate-group, even though 41% experienced the toothpaste as being salty. Most of the patients (82%) reported a good overall sensation.

CONCLUSIONS

The use of each of the three tested toothpastes caused a significant reduction in gingival inflammation and amount of plaque.

IMPLICATIONS FOR PRACTICE

The finding in this trial imply that miswak extract-containing toothpaste can be recommended safely as alternative toothpaste. The miswak extract-containing toothpaste showed a similar effect as the herbal toothpaste and can be used for domestic oral hygiene in patients with gingivitis.

References


2. The effectiveness of conically shaped compared with cylindrically shaped interdental brushes – a randomized controlled clinical trial.

Larsen HC, Slot DE, Van Zoelen C, Barendregt DS, Van der Weijden GA. Int J Dent Hygiene 2017; 15; 211–218

Recent high quality systematic reviews have shown that initial plaque scores are reduced by between 42% to 46% when using a manual or a powered toothbrush. These reviews also concluded that there was room for improvement in self-performed plaque control, as toothbrushing failed to provide complete (100%) plaque removal. Additionally, it has also been shown in a number of published studies that plaque removal by toothbrushing alone was insufficient to reach the interproximal areas of teeth. In response to this, several interdental oral hygiene devices, such as dental floss, wood sticks and interdental brushes (IDBs) have been introduced as adjuncts to mechanical tooth brushing as a means of plaque control and/or removal.

In a systematic review of the effect of IDBs on plaque scores, it was concluded that in combination with toothbrushing, IDB removed more plaque than toothbrushing alone. In addition, IDBs were more effective in removing interdental plaque than dental floss or wood sticks. Consequently, for larger interdental spaces, especially those with gingival recession and root exposure, dental floss is not recommended. Instead, the use of an IDB is more appropriate.

Currently, the two most common forms of IDBs are cylindrical and conical in shape. Considering that the conically shaped IDB has a smaller volume at the outer end, it is possible that when used only from the buccal side, the lingual side of the approximal areas will receive less mechanical friction to remove the plaque. Few studies have compared these two basic IDB shapes on plaque removal efficacy. However, the outcome would be of substantial interest in everyday practice, where these interdental oral hygiene devices are recommended by the dental care professional.

While IDBs are frequently used by periodontal patients, no long-term studies that specifically evaluated the use of IDBs in individuals attending a supportive periodontal maintenance programme are available. Thus, Larsen and colleagues’ reported on a trial that sought to test two basic IDB geometrical shapes (cylindrical or conical) for their plaque removal efficacy and control of periodontal
inflammation on buccal and lingual approximal surfaces in periodontal maintenance patients. The hypothesis was that the cylindrical-shaped IDB removes more plaque and better controls the periodontal condition on the buccal and lingual approximal surfaces than a conical-shaped IDB.

**MATERIALS AND METHODS**

Patients receiving supportive periodontal therapy at the clinic were invited to participate in this examiner blind parallel group randomized clinical trial, out of which 60 subjects volunteered. All had been initially treated for periodontitis and had been under a periodontal maintenance care programme (PMC) for at least 1 year. All subjects were ≥18 years old and systemically healthy.

The first appointment consisted of a regular PMC performed by a trained and experienced dental hygienist examiner. During this first appointment, a periodontal examination was performed, which included plaque scores (PS), probing pocket depth (PPD) and bleeding upon probing (BOP). All assessments were performed at six locations around each tooth: disto-vestibular, vestibular, mesio-vestibular, disto-lingual, lingual and mesio-lingual. In the upper and lower jaws separately, the vestibular surfaces were first probed and scored, followed by the lingual surface. Plaque was scored as either present or absent. For registration of the plaque score, disclosing solution was used on the teeth. The PPD was measured manually with a conventional Hu-Friedy® pqw probe with Williams markings. Additional individualized oral hygiene instructions were given if needed. All teeth received PMC sub- and supra-gingivally with hand instruments and an ultrasonic scaler (Satelec®).

After four weeks, the second appointment was scheduled, and the type of IDB (conical or cylindrical) was randomly assigned. All participants were instructed on the use of their assigned IDBs by the same experienced dental hygienist and were given a brochure explaining IDB use in detail. Based on the randomization, the appropriate size IDB was used from the buccal side. Proper use of the IDB was described as six backward and forward motions in each interdental space. Location and suitable size of IDBs were noted for individual instruction to each participant. The subjects were instructed to use the IDB for a maximum of five days and to replace them earlier if deemed necessary. All subjects received a sufficient number of IDBs to last for the study period.

As regards other mechanical oral hygiene measures, the subjects were instructed to continue these according to their regular toothbrushing habits. The additional use of antimicrobial mouth rinses was not allowed during the trial period. After the IDB instruction, the participants received a professional prophylaxis. Participants were instructed not to give any information on their assigned IDB (brushes ranged from 2.5 mm to 12 mm). After three months, the subjects returned for their scheduled recall. At this appointment, the same clinical assessments as those conducted during the first visit were repeated by the same blinded examiner, who was unaware of previous records.

**RESULTS**

Five of the 60 eligible participants failed to show up for their first appointment; subsequently 55 subjects were enrolled. In total, 54 participants completed the study. One subject had to prematurely end the trial after the second appointment due to the complications following a car accident. Three subjects were excluded from the analysis because of protocol violations. Of these, one subject was excluded for using an essential oil mouth rinse and two for using chlorhexidine during the trial period. In terms of the demographics of the subjects [Cylindrical IDB: n=26; mean age: 55.1 years; males 15; females 11; preferred hand: left=3; right=23; toothbrush: power=25; manual=1] [Conical IDB: n= 25; mean age: 55.7 years; males 15; females 10; preferred hand: left=5; right=20; toothbrush: power=25; manual=0], all variables were not significantly different between the groups.

The overall effect of the combined use of toothbrushes and interdental cleaning devices showed no significant difference between groups. This indicates that, on average, a comparable level of overall plaque control was performed by the participants in both groups. Focusing on the approximal surfaces that were suitable for the IDB, no difference between the two groups was found. However, for approximal lingual sites within the conically shaped IDB group, a significant increase was found from baseline to end. In contrast, in the cylindrically shaped IDB group, a significant reduction was found for the approximal lingual surfaces between the baseline and end assessments. Consequently, at the three-month assessment, there was a significant difference between the groups for the incremental change between baseline and the end of the trial at the approximal lingual sites (P = 0.004).

In terms of BOP, a significant change between baseline and end was found in approximal surfaces that were suitable for the IDB, and a significant increase of bleeding tendency was observed on approximal lingual sites. No such effect was found for the Cylindrical IDB group. This resulted in a significant difference between baseline and end assessments between the groups at the approximal lingual sites.

For PDD measurements, neither group exhibited a significant change in time nor were there any significant differences at the baseline and end assessments between the Conical IDB and Cylindrical IDB groups.

**CONCLUSIONS**

Within the limitations of this three-month study, the conical IDBs were less effective than cylindrical IDBs with respect to approximal lingual plaque removal. This resulted in an increase of periodontal inflammation as assessed by BOP and PPD. Thus, in patients receiving supportive periodontal therapy, the cylindrical form should be considered as the first choice of IDB to obtain and maintain gingival health around natural teeth.

**IMPLICATIONS FOR PRACTICE**

Advising and instructing patients on the use of cylindrical IDBs for daily self-care appears to be the best strategy for cleaning natural teeth in patients undergoing periodontal maintenance care.

**References**

1. Larsen HC, Slot DE, Van Zoelen C, Barendregt DS, Van der Weijden GA. The effectiveness of conically shaped compared with cylindrically shaped interdental brushes – a randomized controlled clinical trial. Int J Dent Hygiene 2017; 15; 211–218

This edition is accredited for a total of 3 CEUs: 1 ethical plus 2 general CEUs

GENERAL

Dental caries- is it contagious? (p 302)
1. The implementation of the proposed Sugar Tax is not expected to have any impact on the incidence of dental caries.
   a. True
   b. False

2. Identify the incorrect statement:
   Saliva contributes to the maintenance of a healthy mouth provided:
   a. It is saturated with ions which are essential for tooth remineralisation
   b. It adheres tightly and closely to tooth surfaces
   c. It can buffer the pH of the oral environment
   d. The flow of saliva is adequate to ensure no occurrence of a dry mouth.
   a. True
   b. False

3. It is suggested that Lactobacillus does not play a role in the initiation of the disease dental caries but in the progression of the condition.
   a. True
   b. False

4. Identify the incorrect statement: Streptococcus mutans:
   a. May readily be completely eradicated from the mouth.
   b. Is the main bacterium associated with caries
   c. Has been shown to have strong correlations as regards its presence in the saliva of mother and child.
   d. Is not present in the mouths of new born infants

5. The frequency of sucrose intake has been shown to be more important than the total amount consumed, because increased frequency results in a decrease of the pH of the oral cavity.
   a. True
   b. False

Dentists in the mirror of Dentists (p 305)
6. Although there was a high dispersion of ethical judgments, Iranian dentists identified the three major ethical problems facing the dental profession as: not taking responsibility for one’s errors, performing procedures without adequate competency, and over-treatment (or unnecessary treatment).
   a. True
   b. False

7. Iranian dentists accorded greater emphasis to professional relationships and financial considerations of ethics with less emphasis on clinical aspects.
   a. True
   b. False

8. There seemed to be a gender disparity with male Iranian dentists more concerned about the moral behaviour of dental professionals than their female peers.
   a. True
   b. False

Oral health service delivery in Limpopo Province (p 310)
9. The Limpopo Oral Health 2014-2019 Transformation Plan reported that only about 5% of service delivery included preventive care programmes.
   a. True
   b. False

10. The investigation points to a bleak picture of oral health service delivery in Limpopo Province and identifies the lack of dedicated budgetary allocations as the main reason for this state of affairs.
    a. True
    b. False

Methotrexate induced mucosal erosions and ulcerations (p 325)
11. Methotrexate-induced oral ulceration may be exacerbated by a lack of folic acid supplementation.
    a. True
    b. False

12. Identify the incorrect statement: Methotrexate:
    a. Interrupts the synthesis of both DNA and RNA
    b. Slows or stops the growth of rapidly dividing cells, including mucosal, cancer and bone marrow cells
    c. Stimulates the immune system
    d. Common side effects are myelosuppression and mucositis

Whitening of darker teeth in contrast to the effects on relatively whiter teeth (p 327)
13. The response to tooth whitening programme was more evident when darker teeth were treated.
    a. True
    b. False

14. The adsorption of chromatogenic material to tooth structure can be intrinsic or extrinsic but not both.
    a. True
    b. False
15. The critical factors in managing upper airway obstruction are prompt identification of the problem and correct positioning of the patient (“sniffing the morning air” position).
   a. True
   b. False

16. The critical factors in preventing airway obstruction are optimal pre-sedation assessment, optimal patient selection as well as attentive intraoperative monitoring and rescue support when indicated.
   a. True
   b. False

17. Periosteal new bone is always a sign of a chronic infection?
   a. True
   b. False

18. Acute sinusitis is normally not a common infection of the maxillary sinus?
   a. True
   b. False

19. In the Azaripour et al trial, patients in the Parodontax-group and the Miswak-group had a significantly stronger reduction in SBI than the Colgate-group.
   a. True
   b. False

20. In the Larsen et al trial, the conical IDBs were less effective than cylindrical IDBs with respect to approximal lingual plaque removal.
   a. True
   b. False

21. Valid informed signed consent can only ensue if there has been adequate disclosure by the dentist, clear understanding by the patient as to the conditions and scope of the agreement, and a shared decision-making process.
   a. True
   b. False

22. Consent that is “implied” and assumed by inference from the patient’s actions, for example in routine procedures such as examination and charting, may in practice still suffice.
   a. True
   b. False

23. Identify the incorrect statement.
   Full disclosure must be made to secure consent to the use of images and should include:
   a. how and why the images will be used
   b. reassurance that the images can be fully removed from electronic media
   c. who is the potential viewing audience
   d. how much of the patient’s details will be shared
   e. the possible domains where the images may appear

24. The practitioner, busy in clinical practice, is entitled to encourage the patient to make an on-the-spot decision about treatment options.
   a. True
   b. False

25. Identify the incorrect statement.
   Professionals have a duty to:
   a. be honest and trustworthy in their dealings with patients.
   b. respect the position of trust inherent in the dentist-patient relationship.
   c. persuade the patient to accept the most complex and expensive treatment plan.
   d. communicate truthfully and without deception.
   e. maintain intellectual integrity at all times.
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