The Puffer, or Blowfish, or Swell fish is a member of the Tetradontidae, and has teeth which are fused to form a beak-like structure split in the centre of each jaw, hence the scientific name. The skin is prickly and of course the fish can inflate its body into a threatening spiny ball. The internal organs contain a highly toxic substance, tetrodon toxin, (again the four jaw reference). Best not to sink your teeth into a puffer!
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- Helps prevent new stains forming
- Protects against plaque bacteria
- Fluoride helps strengthen teeth

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Juno was the wife of Jupiter. Caesar gave the sixth month her name. However, there is another version which ascribes the name of the month to Junius... meaning Youth and indeed June is celebrated as Youth Month in South Africa. This is a time of rededication and of commitment to the future. The energy and enthusiasm and excitement of Youth are recognised and encouraged.

In many ways June may be a time of rebirth, of a determination to seek new paths and directions. So it has been for at least three of our Association colleagues who in the month of June have relinquished aspects of their current lives and are embarking on new and stimulating opportunities. This issue of the Journal recognises the enormous contributions made by those three colleagues..... disparate though their fields of endeavour may have been.

Johan Smit may just have set a world record for he has been Chief Dental Officer of South Africa for more than 25 years! He has retired to the Lowveld where he has every intention of taking advantage of country life, walking, reading, wildlife studies. The profession awards Dr Smit a resounding accolade for his dedication and for his commitment in representing Dentistry at the highest levels of government over all those years. A burdensome, challenging and at times frustrating responsibility, carried out with sincerity and with achievement. He held our trust and deep respect. Well done, Johan and thank you.

For many readers the Journal has over several years offered a truly impressive and valuable service -the accumulation of Ethics CPD points has been wonderfully facilitated by the regular columns contributed by Professor Su Naidoo. A more consistent contributor you will not find. Month after month an article appeared, a pertinent ethical topic was explored, some careful observations made and excellent advice and guidance delivered. This has been a column on which all could totally rely... and it will be a source of sadness and distress that Su has now delivered her last Ethics commentary...number 61 appears in the June issue, an unbroken line over all those Journals. Professor Naidoo is seeking a new direction in her life and has indicated that no longer will her bye-line be appearing in our Journal. Sad for us all but we wish her such success and happiness. Our sincere appreciation and congratulations on a significant contribution to the enormous benefit of readers.

Although Maretha Smit will be with us until the middle of August it was in June that the news of her impending departure was first announced. The vacant chair in the office of the CEO will emphasise just how much she will be missed. Over the years of her tenure the Association has matured and developed. Maretha can depart knowing she leaves an Association in shipshape condition. Her dedicated and intense and innovative efforts on behalf of Dentistry South Africa have earned her the respect and admiration and congratulations of members.

The Journal has profited from the input of all three of these colleagues, whether as author, referee or involved executive. Now changes are due... and we may philosophise about change, ranging from Heraclitus (540-475?BC) who wrote: There is nothing permanent except change to Alfred North Whitehead (1861 -1947) who observed: The art of progress is to preserve order amid change and to preserve change amid order. In both quotations we should find truth. On that understanding the Journal and the Association will be encouraged to seek the youthful energy promised by June, and to continue to move forward in pursuing the ideals and the examples set by our departing colleagues... to each of whom the warmest good wishes are extended.
A Peripeteia… a sudden change

In 2009 Phillip Baldwin, Chief Executive of The Hong Kong Institute of Chartered Secretaries, offered a definition of what is meant by a “professional body”. The definition is actually derived from The Analytic Quality Glossary, Quality Research International and reads:

A professional body is a group of people in a learned occupation who are entrusted with maintaining control or oversight of the legitimate practice of the occupation.

In 1995, Professor Lee Harvey and Selena Mason recognised a paradoxical situation in that a professional body is set up to safeguard the public interest,… but also represents its own self interest. Hence it is a controlling body,… but that control may paradoxically be based on self interest.

Perhaps it was a recognition of the implied challenge in that paradox that motivated Maretha Smit, at least in part, to seek appointment as the CEO of our professional body, The South African Dental Association. In January 2011 Maretha assumed the office and brought a perspective that has cast a whole new light on the role of the Association, our responsibilities, our position in society, our need to recognise that the introduction of the principles of corporate governance have in fact become central to the effective management of our professional body.

Whatever the motivation that prompted this elegant lady to take on the multiplicity of roles which must be played by our CEO, then January 2011 was a propitious time for SADA. Elegant is an appropriate description but it belies the brave determination and commitment which has enabled Maretha with her previous business experience to safely guide the Association into becoming a professional body effectively satisfying the required principles of the Companies Act. Corporate governance is recognised today as central to the proper management of … companies, yes, …but equally applicable to a no profit association trying to balance that combination of social and self interests.

After some five and a half years of decisive and incisive leadership, Maretha is to depart from the Association, and indeed from South Africa, to take up a position in New Zealand. That news burst upon the Association with tsunamic force. It has been Maretha who has championed the awakening of the Association to the need to move ahead and to accept the triple objectives of governance under the King principles, the economic, the environmental and the social aspects of the activities of any institution. An inclusive approach should replace an exclusive approach. The King Committee comments, (with slight modifications) : Boards must apply the test of fairness, accountability, responsibility and transparency to all acts or omissions and be accountable to, but also responsive and responsible towards, the stakeholders.

Maretha Smit has brought that focus and that challenge to the Association. The Association has matured and advanced under her leadership. The monumental tasks could not have been managed without an impressive work ethic, without a total dedication and without enormous patience. But there has always been the warm person behind the driving initiatives, the genuine smile of welcome no matter the pressures, the preparedness to listen and to cogitate and to debate the issues, all with gracious forbearance. Maretha respects and acknowledges those with whom she works… an indispensable characteristic of the successful CEO.

This Communique bears then the sad news of the departure of Maretha Smit from our Head Office and from RSA….. BUT it also carries the appreciation and the accolades of the Association to a CEO who has met the challenges and set a new path and done this with dedication and resolve.

Thank you, Maretha for kindness, empathy, patience…. And for determination and commitment. You have graced the office of CEO. The news has indeed been a peripeteia … but you have made a courageous decision and you carry with you every best wish from the Association for your new
Johan Smit is taking down his shingle

This is indeed a most special shingle for it would hold the inscription “Chief Dental Officer for South Africa”… and would record that Dr Johan Smit has held that post for more than 25 years (25 years, 3 months to be exact). Taking the shingle down is truly a momentous event after a career in the public service of Dentistry of 39 years and four months. Over all those years the presence of Johan at innumerable dental functions was a given. It will be a strange experience to not find his smiling welcome awaiting us.

Yes, Dr Johan Smit has indeed retired and he and his wife Anne-Marie are happily ensconced in their new home in Mokopane. He describes this as a beautiful mountain town still embellished by donkey carts! He declares he is fond of gardening, cycling and outdoor adventures… a better place for those new occupations would be hard to find.

Born in the Karroo dorp of Aberdeen, Johan was schooled there and in Barkly East, having, at both, his father as Headmaster and mathematics teacher. Later he matriculated at High School CR Swart in Pretoria, completed the then compulsory military training at the South African Medical Services before registering as a dental student at the University of Pretoria. Whilst at SAMS he worked with one of the original computers, a massive beast which occupied an entire underground room. Perhaps that sparked his inspiration to enter the management side of the profession?

But there were other life aspects intervening, for Johan married Anne-Marie Hattingh (sister of the late Professor Johan Hattingh, Head of Physiology, Wits Dental) and took her off to England for a short period during which he practised under the NHS and they managed some European touring. It was on their return to South Africa that the life career opportunity in the administrative side of Dentistry started to become a reality, for within a brief time, Dr Smit was promoted to head the Dental Services in the then Northern Transvaal (now Limpopo Province). Commitment to that path prompted Johan to further study, this time in Public Health Administration, gaining two additional degrees from his alma mater, the University of Pretoria. His star now rapidly rising, Johan was promoted to the National Office of the then Department of Health and Welfare as Deputy Director, and soon, Director, of Preventive and Promotive Dentistry. During his tenure Dr Smit also served in other portfolios for he represented the Department on the Medicine Control Council for five years, chaired the Dental Committee of that Council and for seven years represented the Department on the State Tender Board.

It was on 1st May, 1991 that Dr Johan Smit was appointed Chief Director, Dentistry, a post known internationally as Chief Dental Officer, our CDO. He was to hold that post through several administrations to his retirement. Eight Ministers of Health, eight Directors General, one CDO. That is surely some sort of record, and it speaks volumes for the outstanding commitment and dedication of the man who was at the helm of Public Service Dentistry, who was trusted

The Graduating Class, UP Faculty of Dentistry, 1975
by all those successive officials to continue to serve and to achieve and to manage the ever widening spread of duties which by now included national responsibility for all six Oral and Dental Training Hospitals apart from Public Oral Health Services (Policy Council for Academic Oral Health Centres). In the midst of all those burdens, Johan was also tasked with Chairmanship of the Tender Committee, a fourteen year stint, and membership of the Financial Management Committee of the Department, and Membership (Treasurer, Vice President etc) of the Dental Technicians Council, for 25 years!! Of course there were many other committees and boards and institutes which all benefitted from the contributions of the dedicated dentist, Dr Smit

Dr Smit held international status over those many years, representing South African Dentistry at the World Health Organisation, the Federation Dentaire Internationale, the Centres for Disease Control and liaising with dental schools and professional Associations worldwide. These were busy years indeed and Johan needed to be cognisant of his health for in 1987 he had been diagnosed as having type one diabetes mellitus. On one memorable, and frightening occasion he suffered a hypoglycaemic coma at the airport, and collapsed under a Boeing. A paramedic administered glucagon to bring “the drunk” around safely. Dr Smit has since managed his condition most diligently, even awakening at midnight to monitor his blood sugar levels. No complications thirty years down the line with diabetes his constant companion, well done!

There were other occasions when Johan Smit felt the brush of death, a speeding Mercedes and a laden truck, a Skymaster aircraft that lost hydraulics and was forced into an uncontrolled landing. Some nocturnal episodes of hypoglycaemia resolved by the injection of glucagon by his radiographer wife Anne-Marie, to whom he pays the warmest tributes.

A life of achievement and sustained contribution cannot be realised without the influence of colleagues and friends… Johan acknowledges his debt to many, amongst whom he would name Prof Leon Taljaard, Prof Daan Barnard, Dr Piet Marneweck and Dr Lenox Matthews. Throughout he has retained a firm and lasting faith.

A recent signal honour has been the bestowal on Dr Smit of Honorary Membership of the International Association of Dental Research, awarded in recognition of unparalleled commitment to the work of improving Oral Health of all South Africans. The International President of the Association made the presentation, to the enthusiastic acclaim of members.

Dr Johan Smit may have taken down his shingle, but his is an outstanding example of dedication, commitment, extremely hard work and thorough achievement, an icon amongst his peers in South African Dentistry.

Congratulations Johan, colleague, friend and mentor. The Association wishes you and Anne-Marie such happiness and contentment.
The psychological impact of malocclusion on patients seeking orthodontic treatment at a South African oral health training centre

ABSTRACT

Objective: The study set out to assess the psychosocial impact of dental aesthetics among a sample of patients seeking orthodontic treatment at Medunsa Oral Health Centre (MOHC), Sefako Makgatho Health Sciences University (SMU).

Methods: One hundred and fifty patients (100 females and 50 males, aged 13–29 years) presenting for orthodontic treatment were prospectively enrolled. Following comprehensive orthodontic clinical examination, patients were requested to complete the Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ), which was supplemented by a few additional items. The data were analysed using Chi-square, Student’s t-tests and ANOVA.

Results: The questionnaire demonstrated good reliability, with a Cronbach score of 0.85. Total psychological impact and particularly social impact were significantly greater among those older than 18 years (p = 0.017) than amongst the younger patients (p = 0.035), and dental self-confidence was significantly higher among females than males (p = 0.045). Self-perceived malocclusion had a significant positive association with aesthetic concern (p = 0.036).

Conclusion: Malocclusion, particularly when self-perceived, has a significant negative impact on the psychological wellbeing of patients, especially for those older and male. Orthodontic treatment may result in improved oral health-related quality of life and thus enhance the general psychological wellbeing of patients.

INTRODUCTION

Health-related quality of life indicates the individual’s perception or assessment of the impact of disease or conditions on their (i) functional, (ii) psychological, and (iii) social well-being.¹ Poor oral health-related quality of life (ORHQoL) is indicative of the expressed negative impact of oral conditions on the multidimensional attributes of the individual’s life. Aesthetic appearance, morphology of the facial structure, of the oral cavity and smile social interaction. Hence judgements about the attractiveness of the facial profile especially teeth and jaws, can have a huge impact on the social and psychological wellbeing of a person.² The literature suggests that psychological and social effects rather than functional attributes are compelling reasons why patients seek orthodontic treatment.³ Orthodontics has been perceived as generally addressing normative clinician-based concerns with less regard for
THE DENTAL SPECIALISTS’ SOLUTION
FOR ORAL HEALTH

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Chlorhexidine gluconate** and Benzydamine hydrochloride

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- Relief of painful inflammatory conditions of the mouth and throat

**Andoxel-C oral gel contains cetylpyridinium chloride

References:
the equally important preferences and aspirations of the patient. Hence the recommendation that ORHQoL measures be integrated in the clinical management of patients for improved outcomes and satisfaction.

Orthodontic treatment is commonly undertaken during adolescence and young adult life. Coincidentally, patients in these age groups are acutely aware of their appearance, recognise any physical deviation from normal, and are more concerned about their social position and independence. Hence the expectation that adolescents and youth with untreated malocclusion will experience psychological and social impact and poor oral health-related quality of life.

Numerous instruments have been used to measure the impact of oral conditions on the quality of life. The Oral Health Impact Profile (OHIP) is the most widely used tool and is based on Locker's conceptual model. The Psychological Impact of Dental Aesthetics Questionnaire (PIDAQ) is gaining popularity among researchers as a tool to assess self-rated psychological impact of dental aesthetics among young patients. This questionnaire was developed in English-speaking countries but has since been adapted to other languages and has been found to be reliable, although only limited information is available on the reliability of this instrument in Africa. The effect of malocclusion status on subjective psychological well-being of young South Africans, particularly as it relates to normative measures used in orthodontics, has also not been widely researched.

The aim of this study is therefore to evaluate the psychological impact of malocclusion on a cohort of black South African patients seeking orthodontic treatment at a South African oral health training centre.

**METHODOLOGY**

All patients aged 13-29 years, screened during March to December 2015 at the Department of Orthodontics at one of the four oral health training centres in South Africa were invited to participate in this study. Using OpenEpi, Ver3, with power (1 - β) set at 0.80 and α = 05 for two-tailed tests, the recommended sample size was estimated to be n= 138, 140 and 154 respectively. It was consequently determined that a sample of 150 participants would be sufficient to detect the 10% levels of group differences in measures of psychological impact. Eligible and consenting participants underwent comprehensive orthodontic clinical assessment and completed self-administered questionnaires. In the case of minors, accompanying guardians gave permission for the children to participate in the study. Through these assessments, the following variables were measured (i) clinician assessed malocclusion or normative malocclusion (NM), (ii) self-assessed malocclusion or self-perceived malocclusion (SPM), (iii) and psychological impact of malocclusion using PIDAQ.

**Assessment of normative malocclusion and self-perceived malocclusion**

The clinical assessments of patients were undertaken by calibrated 3rd and 4th year orthodontic registrars/residents who were in a four-year specialist training programme. The normative assessment was done using clinical evaluation, cast models and cephalometric radiographs. Following this assessment, patients were classified as having mild, moderate or severe malocclusion, and as needing simple to complex intervention. To evaluate self-perceived malocclusion, patients were asked to rate their occlusion as mild, moderate or severe on a 5-point Likert scale.

**Table 1**: Descriptive characteristics of participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levels</th>
<th>Mean (SD)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>≤18</td>
<td>14.52 (2.10)</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>&gt;18</td>
<td>25.28 (4.52)</td>
<td>67</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>50</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>100</td>
<td>66.7</td>
</tr>
<tr>
<td>Self-reported Malocclusion</td>
<td>Mild</td>
<td>36</td>
<td>24.0</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>88</td>
<td>58.7</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>26</td>
<td>17.3</td>
</tr>
<tr>
<td>Normative Malocclusion</td>
<td>Mild</td>
<td>37</td>
<td>24.7</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>56</td>
<td>37.3</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>57</td>
<td>38.0</td>
</tr>
</tbody>
</table>

**Table 2**: Association between socio-demographics, self-perceived or normative malocclusion and psychological impact subscales and total PIDAQ scale.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Categories</th>
<th>Mean scores (SD)</th>
<th>PIDAQ total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DSC</td>
<td>SI</td>
<td>PI</td>
</tr>
<tr>
<td>Age group</td>
<td>≤18</td>
<td>8.85 (5.70)</td>
<td>11.96 (6.92)</td>
</tr>
<tr>
<td></td>
<td>&gt;18</td>
<td>8.57 (6.82)</td>
<td>15.17 (8.78)</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.78</td>
<td>0.017*</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>10.16 (6.23)</td>
<td>12.14 (7.28)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>8.00 (6.10)</td>
<td>14.01 (8.20)</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.045*</td>
<td>0.18</td>
</tr>
<tr>
<td>SPM</td>
<td>Mild</td>
<td>9.89 (5.87)</td>
<td>11.86 (7.01)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>8.69 (6.53)</td>
<td>13.36 (8.02)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>7.27 (5.36)</td>
<td>15.50 (8.60)</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.27</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>8.18 (6.66)</td>
<td>13.79 (9.07)</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>8.33 (5.80)</td>
<td>12.86 (6.82)</td>
</tr>
<tr>
<td>p-value</td>
<td></td>
<td>0.29</td>
<td>0.81</td>
</tr>
</tbody>
</table>

*Statistically significant group differences
perceived malocclusion, previously tested questions from different questionnaires were incorporated into the PIDAQ which was then completed by the study participants, who graded their responses to these additional questions based on a 7 point Likert scale. Questions such as: “how do you feel about appearance of your teeth” and “do you cover your mouth because of appearance of your teeth” were applied to elicit the perception of participants of their malocclusion.

Psychological impact of malocclusion (using PIDAQ)
The PIDAQ is a questionnaire specifically designed for assessing the psychosocial impact of dental aesthetics in young adults. This instrument was developed and tested on similar population groups and is composed of 23 items and four subscales. The Dental Self-confidence index is a positive subscale (DSC; 6 items), but Aesthetic Concern (AC; 3 items), Psychological Impact (PI; 6 items) and Social Impact (SI; 8 items) are negatively worded subscales i.e. for the latter three subscales, the higher the score the more severe the psychological impact. The response options were based on a five-point Likert scale ranging from 0 to 4 (i.e. 0 - no impact of dental aesthetics on QoL, to maximal impact - 4). For purposes of this study the English version of PIDAQ was used without translation. However the tool was tested for internal consistency and homogeneity between items using Cronbach’s alpha.

Statistical data analysis
Data were analysed using SPSS version 23.0 (IBM Corp 2010). The subjects were categorised into three groups according to the estimated severity of malocclusions (mild, moderate and severe).

Additive scales and subscales for PIDAQ -23 were calculated by summing the responses to the various items. The variables in the dental self-confidence sub- scale (items 1 to 6) were reverse coded to bring the direction of the scores into line with the other three subscales. Descriptive statistics, such as mean, median and proportions were used to enumerate population characteristics. Mean differences in psychological impact of malocclusion across categories were compared using Student’s t-test in the case of two group mean differences, and analysis of variance for means differences across three or more groups. Statistical differences in the proportion across groups or categories were tested using Chi-square statistics. All statistical tests were two tailed and the level of statistical significant was set at p<0.05.

RESULTS
A total of 150 participants agreed to undergo clinical examination and completed a structured questionnaire. By gender, two-thirds (100) were female, in terms of age, 55.3% (83) were younger than 19 years, with a mean age of 14.52 years (standard deviation 5.10), (Table 1). Based on normative evaluation of malocclusion, 75.3% (113) of participants were classified as having moderate to severe malocclusion. A similar proportion (76%; n=114) of the study participants self-perceived their malocclusion to be moderate to severe. It was however observed that participants tended to under-report the ‘severe’ category of malocclusion (17.3%; n= 26) when compared with clinical findings by the orthodontic registrars (38%; n=57), who relied on normative measures (Table 1).

Cronbach’s alpha of 0.85 shows an excellent degree of internal consistency or scale reliability and homogeneity between the scale items. Similarly, the subscales of PIDAQ were highly correlated, with Cronbach alpha coefficients ranging from 0.81 to 0.92.

The mean and 95% confidence interval for total PIDAQ score was 45.26 (95% CI=42.64 to 47.87). The mean DSC was 8.82 (7.81 – 9.83), SI score 12.54 (12.25 – 14.82), PI 15.05 (14.17 – 16.13), and AC 7.76 (7.06 – 8.45).

Our study shows no significant association between psychological impact and age except for the total PIDAQ and social impact subscale for which those older than 18 years had significantly higher scores (p =0.017 and 0.05 respectively). No significant differences were also noted by gender in the total and subscales, except for DSC for which males reported significantly worse scores than females (p =0.045). A one-way ANOVA was conducted to compare the mean scores on the PIDAQ and its subscales across the three self-perceived and normatively determined malocclusion categories. The results showed a significant association between categories of self-assessed malocclusion and reported aesthetic concern (p=0.036). Post hoc comparisons using the Fisher’s least significant difference (LSD) test indicated that the aesthetic concerns were significantly lower among participants who reported they perceived their malocclusion as ‘mild’ as compared with that amongst those who perceived their malocclusion as ‘moderate’ (p=0.021) or severe (p=0.026). However, aesthetic concerns did not differ significantly between moderate and severe SPM (p=0.595) (Table 2). Furthermore, there were no significant differences in mean PIDAQ or its subscales across the categories of normative malocclusion (Table 2).

Self-perceived malocclusion was significantly associated with age but not with gender. Compared with those older than 18 years, the younger participants reported their malocclusion significantly more frequently as either mild or severe. Those older were significantly more often likely to report their malocclusion as moderate (Table 3).

DISCUSSION
This study examined the impact of malocclusion on the overall psychological wellbeing and its PIDAQ subscales among 13-29 year olds seeking dental treatment at MOHC. It was found that twice as many females than males sought orthodontic treatment at the centre. This finding is in agreement with previous studies that females have a significantly higher uptake of orthodontic treatment than males.16,17 It is postulated that this is because girls

<table>
<thead>
<tr>
<th>Variables</th>
<th>Self-perceived malocclusion % (n)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤18</td>
<td>28.9% (24)</td>
<td></td>
</tr>
<tr>
<td>&gt;18</td>
<td>17.9% (12)</td>
<td>0.036*</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>28% (14)</td>
<td>0.144</td>
</tr>
<tr>
<td>Female</td>
<td>22% (22)</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Association of self-perceived malocclusion with age and gender
are frequently and intensely dissatisfied with their dental appearance,\textsuperscript{15,18} tend to put a higher priority on their physical appearance, and appreciate the social significance and expectation of aesthetics more than do male counterparts.\textsuperscript{7} It can also be considered that parents might be socialised to seek orthodontic treatment for their daughters rather than their sons.\textsuperscript{16}

Differences in self-perception of malocclusion between genders were statistically insignificant (p=0.144). This result supports findings by Peres\textsuperscript{24} and Batool\textsuperscript{23} but contradicts others.\textsuperscript{21,22} The absence of consensus in the literature about the gender differences and perceived malocclusion, may be attributed to methodological variation, resulting in a failure to detect the presence of statistical inconsistencies.

Our study, similar to many, has evaluated the psychological impact of malocclusion on young adults\textsuperscript{19,23} compared with adolescents and teenagers.\textsuperscript{12,24} We found heightened perceptions of severe malocclusion by younger participants, similarly reported by Aikins \textit{et al.}\textsuperscript{21} Peres \textit{et al.}\textsuperscript{24} Klages \textit{et al.}\textsuperscript{25} and refuted by Jawad \textit{et al.}\textsuperscript{26}

It has been found that increasingly, adolescents and the young report for orthodontic care primarily to address the aesthetic and social effects of malocclusion, and secondarily to manage functional problems.\textsuperscript{26} The impact of malocclusion in this age group can be attributed to cohort effects. Age cohorts are exposed to similar social events, common experiences, influences and demographic trends and tend to adopt and display comparable but unique behaviour patterns over time. Nowadays, appearance, beautiful smiles and acceptance have become paramount in advancing social equity, given the proliferation of technology and information. It may thus be expected that the younger age group will seek intervention, like orthodontic treatment, to advance their social positions. In addition, this group is exposed to acceptance of a social image through social media and related technology.

The mean total PIDAQ of 45.26 in our study is comparable with the findings observed from similar population groups elsewhere of 47.9327 and 47.128. These scores are indicative of the overwhelming impact of dental aesthetics on the psychological wellbeing of patients.

The literature corroborates our results that total PIDAQ and its subscales do not differ significantly by gender, except for DSC.\textsuperscript{24,25} We observed high DSC scores in males, suggesting that males displayed lower self-confidence and self-assurance about their teeth, and consequently suffering a greater negative psychological impact of malocclusion. Our results are contradictory to the established and socialised norm, that women are more likely than men to worry about how their teeth look, and hence display a heightened impact of malocclusion.\textsuperscript{17,26}

It is possible to hypothesise an emerging phenomenon specific to African subjects as represented by the participants in our study. Notably, more adults and more males are seeking orthodontic care to address primarily the aesthetic and psychological consequences of malocclusion. This occurrence could be attributed to improved socioeconomic positions, increased oral health awareness, changing perceptions about self-image especially in males, and improved access to orthodontic treatment. As a result, teaching institutions like MOHC are observing an increased demand for orthodontic treatment by previously underserved population groups, who now are finding these services to be more affordable and attainable.

**CONCLUSION**

There is no previously published study on the psychological impact of malocclusion in South Africa. While this study cannot be seen as representative of the whole population, it does provide a reasonable impression of the reaction to malocclusion amongst orthodontic patients in this area and facility.

This cross sectional study has validated the reliability of PIDAQ in the South African population group seeking orthodontic treatment, and provided evidence on the impact of dental aesthetics on oral health related quality of life and specifically the psychological impact. Additionally, the findings reveal that the perceptions of an individual of their malocclusion had a greater impact on their psychological and social wellbeing than did clinician assessed status of malocclusion. Malocclusion has a significant negative impact on the psychological wellbeing of patients, especially for those older and male.

**Recommendations**

These results imply that teaching institutions and private healthcare should incorporate adult orthodontics in the curriculum and that the available treatment modalities should be discussed, given the increasing demand for care from this population group.

More comprehensive studies should be conducted in the future. Significant moderating and intervening factors between perceived malocclusion and its impact should be explored to provide a greater understanding of this relationship. Novel approaches should incorporate a pre-post design to evaluate the definitive impact of orthodontic treatment.

**References**


Dentistry has not been allocated ‘Critical Skills’ status in South Africa after the repeal of the previous ‘Exceptional Skills’ permit, thus making it impossible for a foreign-born dentist to obtain a temporary or permanent work permit on the basis of his/her qualification alone.

**Aim:**
To determine and discuss, on a need basis, whether Dentistry should be classified as a critical skill.

**Objectives:**
1) Compare the current SA ratio of one dentist per 10,000 population with WHO recommendations.
2) Obtain the ideal health care worker: population ratio for other health care fields listed as Critical/Scarce skills
3) Determine whether Dentistry meets the parameters of a ‘Critical Skill’

**Design:**
a descriptive study, with aggregated data.

**Methods:**
Data was collected from: 1) Health Professions Council of South Africa (HPCSA); 2) The WHO country data on health workers, 3) Health Systems Trust (HST), 4) Analysis of various ‘Scarce Skill Lists.’

**Results:**
There is a comparative shortage of dentists, and the percentage increase required to achieve WHO recommendations is greater than for other professions already classified as ‘Critical Skills.’

**Conclusions:**
There needs to be a more scientific, evidence-based approach to classifying professions as Scarce Skills. In light of the evidence Dentistry should be considered as a Critical Skill.

**Keywords:**
dentists in South Africa, scarce skills, residency dentists South Africa

**INTRODUCTION**
In June 2014, the ‘Exceptional Skills’ work quota permit for dentists was repealed. This permit had made it possible for foreign-born dentists to obtain permanent residence without a five-year-waiting period. Prior to 2014, both the definition and classification of professions that might have been considered as ‘Exceptional Skills’, were open to interpretation. It prescribed that a person was to obtain:

‘A letter from a foreign or South African organ of State or from an established South African academic, cultural or business body, confirming the applicant’s exceptional skills or qualifications.’

A dentist born outside South Africa could obtain a letter from the Department of Health confirming a shortage of dentists in South Africa, and thereafter, could apply for an ‘Exceptional Skills’ work quota permit. With the ‘Exceptional Skills’ permit; foreign-born dentists were granted temporary residency. Applications for temporary residency could have been made from outside of South Africa. This temporary residency could then have been easily converted into permanent residency, within an approximate waiting period of eight to twelve months.

The Immigration Regulation of 2014 marked the commencement of the Immigration Amendment, Acts of 2007 and 2011. The regulation repealed the ‘Exceptional Skills’ Visa, replacing it with the current ‘Critical/Scarce Skill’s Visa.’ Dentistry has been omitted as a Critical/Scarce Skill. Under the umbrella term of Health Professionals, Public Health Managers, Public Health Physicians, Medical Practitioners, Nursing Professionals, Veterinarians, Child and Family Health Nurses and Pharmacists have been described as meeting the criteria of being Critical Skills. Many foreign born dentists, including those with South African qualifications, have thus had to explore other means of securing work permits in South Africa.

**LITERATURE REVIEW**
In a 2007 briefing paper, the National Skills Authority expounded on the definitions of the then proposed Scarce and Critical Skills Regulations. The briefing papers were commissioned by the South African Department of Labour, and funding was obtained from the German Technical Cooperation (GTC).
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- Anti-bacterial and anti-microbial activity
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The definitions were stated as follows:

‘Scarcity Skill’ refers to an inability to find suitably qualified and experienced people to fill occupational vacancies either at an absolute level of scarcity (no suitable people available) or at a relative level of scarcity (no suitable equity candidates available); while ‘Critical Skill’ refers to an inability of people to perform at the level of occupational competence required due to gaps in their skills’ profiles.

A literature search was undertaken, seeking relevant articles published in the past ten years. PubMed searches were conducted using the limits ‘English language’ and 2005 to 2015. On PubMed a search of keywords ‘dentist AND emigration’ produced 34 results. There were 35 results for ‘dentist AND immigration’ and ‘dentist AND skills visa’ yielded two results, ‘dentist AND immigration’ yielded 45 results, ‘dentist AND immigration’ and ‘dentist AND emigration’ produced 34 results. There were no papers of South African origin.

In the United States, all foreign-born dentists who desire to practice are required to have a valid legal visa status or be a permanent resident or citizen of the United States. It was acknowledged that obtaining a visa is a long and cumbersome process, which requires adequate planning on the part of the potential employer and the foreign-trained dentist. However, a foreign-born dentist may practice privately, even without permanent residence status, provided that an advanced dental degree had been achieved through a two or three year graduate programme. The same paper also reported that refugee and asylum seekers are allowed to work in private practice in the United States.

Another study published in 2010 found that: ‘long term solutions to the misdistribution of dentists that involve foreign trained dentists need to ensure that dentists locate to and remain in areas with the greatest need’. The researchers also reported that policies that encourage the relocation of foreign-trained dentists will potentially result in a ‘brain drain’ in their home countries and have ethical implications. This is said to decrease the skill pool, especially in developing countries. However, it was the researchers’ view that ‘foreign-trained dentists will continue to be an important part of the dental workforce (in the USA).’

**Aims**

The aim of the study is to discuss, and possibly determine, on a need basis, whether Dentistry should be classified in South Africa as a Critical Skill.

**Objectives**

The objectives of this study were:

- To compare the existing ratio of one dentist per 10,000 population in South Africa (SA) to the distribution recommendations of the World Health Organisation (WHO).
- To obtain the ideal ratios for health care worker per population for other health care fields currently listed in SA as a Critical/Scarce Skills (as determined by Government Gazette, 3 June 2014).6
- To determine whether Dentistry in South Africa meets the parameters of a ‘Critical Skill.’

**Materials and Methods**

Data was collected from the following sources:

- Health Professions Council of South Africa, providing data on health workers.
- The World Health Organisation (WHO) providing country by country data on health workers.
- Health Systems Trust, providing data on health workers.
- Analysis of the Scarce Skill Lists of South African, Skills Education and Training Authorities (SETAs)

An analysis was made of:


<table>
<thead>
<tr>
<th>Profession classified as a critical skill</th>
<th>Number of professionals in SA</th>
<th>Number of professionals per 1000 population SA</th>
<th>WHO recommendations for profession per 1000 population</th>
<th>Shortage of professionals</th>
<th>Number of practitioners required to meet shortfall (if any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Health Managers</td>
<td>NO DATA AVAILABLE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Health Physicians</td>
<td>13, 593</td>
<td>0.32</td>
<td>1</td>
<td>Yes</td>
<td>39, 387</td>
</tr>
<tr>
<td>Medical Practitioners (Including Specialists)</td>
<td>41, 132</td>
<td>0.77</td>
<td>1</td>
<td>Yes</td>
<td>11, 848</td>
</tr>
<tr>
<td>Veterinarians</td>
<td>2, 400</td>
<td>0.255</td>
<td>0.65</td>
<td>Yes</td>
<td>3, 710</td>
</tr>
<tr>
<td>Child and Family Health Nurses</td>
<td>129, 015</td>
<td>2.43</td>
<td>2.4</td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>13, 364</td>
<td>0.25</td>
<td>0.5</td>
<td>Yes</td>
<td>13, 126</td>
</tr>
<tr>
<td>Dentists</td>
<td>5, 856</td>
<td>0.11</td>
<td>0.5</td>
<td>Yes</td>
<td>20, 634</td>
</tr>
</tbody>
</table>

**Table 1:** The number of professionals in categories classified as critical skills (and Dentistry) to number of professionals recommended by WHO for effective health services

**Figure 1:** Percentage increase by profession required to meet WHO recommendations
The Critical Skills’ List, published in the ‘Health Professions and Related Clinical Sciences Umbrella’ (as determined by Government Gazette, 3 June 2014).8

For each category of Health Care worker, a ratio was determined between the registered number of practitioners and the total population. In the case of the veterinarians, the total number of domestic animals was used in estimating the ratios.14,15 Those South Africa ratios were compared with the internationally accepted “ideal ratios,” enabling the calculation of how many additional practitioners were required in each instance.

It was unclear whether the field of ‘Child and Family Nursing’ referred to: critical care child nursing, paediatric nursing, and child nursing or encompassed all these disciplines. However, the inclusion of the word ‘family’ in the title seems to denote that the classification may have broader applications.16 Thus all registered general nurses have been included in the population data.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points Allocation</th>
<th>Maximum Score</th>
<th>Score for Dentistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scarce Skills list (2013): 1 point is allocated to an occupation if it is identified in a specific Sector Education and Training Authority Scarce Skills List (21 SETAs).</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Pivotal skills list (2013): points are allocated to an occupation if it is identified in a specific SETA Scarce Skills List (21 SETAs).</td>
<td>20</td>
<td>20 (Identified 5 or more times by SETA’S)</td>
</tr>
<tr>
<td>3</td>
<td>Joint Initiative on Priority Skills Acquisition (JIPSA): 10 points each are allocated to an occupation if it is identified by JIPSA.</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>National Development Plan (NDP): 5 points are allocated to an occupation if it is identified in the NDP.</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>Industrial Policy Action Plan (IPAP): 5 points are allocated to an occupation if it is identified in IPAP.</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Job Opportunities and Unemployment Report (JOUR): Points are allocated to an occupation if it is identified in the index.</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Profession: 20 points are allocated to a profession if it is identified as scarce.</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>Strategic Integrated Projects (SIPs): 10 points are allocated to an occupation if it is identified as scarce in the SIPs List.</td>
<td>10</td>
<td>10 (As part of broader National Health Insurance goals)</td>
</tr>
<tr>
<td>9</td>
<td>Study Duration: 10 points are allocated if an occupation requires a minimum of three years of formal study.</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>87</td>
</tr>
</tbody>
</table>

The Critical Skills’ List, published in the ‘Health Professions and Related Clinical Sciences Umbrella’ (as determined by Government Gazette, 3 June 2014).8

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**STATISTICAL ANALYSIS**

Although a statistical analysis was performed, this paper reports only the essential facts based on population ratios derived from total population levels and using aggregated data.

(The analysis used Epi Info (Version 7.0 for Windows) with alpha set at p= 0.05 for Proportion Test Calculations.)

**RESULTS**

The population of South Africa is assumed to be 52.98 million. The calculations of the current ratio of registered practitioner per 1000 population (humans or animals) yielded, in all categories except Child and Family Health Nurses, figures well below the WHO recommended ratios (Table 1) These data reveal that South Africa is adequately provided with Family Health Nurses but requires nearly three times as many Public Health Physicians and nearly twice as many Pharmacists. Medical Practitioners are in more reasonable supply with only an additional one third of the current total required, but Veterinarians are in shorter supply, requiring one and a half times the current registrations to meet international standards. Dentists however are lagging well behind in numbers, these data showing that an additional twenty thousand plus are needed. This translates to three and a half times the current registered number, not all of whom are in practice.

There were no data available for Public Health Managers, although this category could include any health care worker, with a relevant qualification in public health.

Figure 1 shows the percentage increase of professionals in professions classified as critical skills (and Dentistry) required to meet WHO recommendations for the number of professionals in the respective fields. An increase of public health physicians from 0.32 to 1 per 1,000 population would translate to a required 212.5%. Similarly, the number of pharmacists would need to be increased by 100%, veterinarians by 150.9% and medical practitioners by 29.87%. Since CFHNs currently meet WHO recommendations, an increase would not be applicable. It is evident that Dentistry would require the greatest percentage increase to meet WHO recommendations (354.54%).

Dentistry has been mentioned as a scarce skill more than five times by two SETAs namely the Public Service SETA (PSSETA)8 and the Health and Welfare SETA (HWSETA).12 Perhaps it would be illogical to expect that Dentistry (and any other medical profession) should be mentioned by non-healthcare related SETAs (e.g. Safety and Security SETA, Transport SETA etc.) and possibly ‘Criteria 1 and 5’ of ‘Table 2’ need to be revisited, as the criteria may not be pertinent for highly specialized fields. Dentistry has been recognized as a needed skill by the JOUR,12 JIPSA16 and the NDP.17 The NHI is one of the 18 SIPs, is classified as a ‘social expenditure SIPS’, and Dentistry has been included in the broad plans to increase capital expenditure to meet the requirements of the NHI. The current study period for a dental practitioner is five years (and one year of community service); therefore, ten points have been recorded for criterion nine (Table 2), Dentistry.

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**Table 2: Analysis of Dentistry according to the ‘Ranking Scorecard for the National Scarce Skills List 2014’11**

<table>
<thead>
<tr>
<th>Criteria</th>
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<tr>
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<td></td>
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<td>87</td>
</tr>
</tbody>
</table>
DISCUSSION

A recent study by the Department of Labour identified the number of vacancies for dentists in the current South African private and public sector as 45 in total. The unemployment indicator was, however, difficult to establish. From HST data, the percentage of unemployed dentists in the public and private sectors suggests underemployment, rather than unemployment.

It may be noted that there are currently 1,056 dentists9 servicing the public sector. There are approximately 42,384,007 South Africans utilising the public health sector for medical and dental treatment, and these data translate to 0.02 dentists per 1,000 population (i.e. one dentist per 50,000 people). This is far below the national average of 0.11 dentists per 1,000 population and a staggering 2,400% below current WHO recommendations.9

Perhaps categories such as Industrial Action Plan should have been included as ‘bonus points’ for health care scarce skills status?

Dentists have been listed on the Canadian National Occupation Classification List (NOC) under the category ‘technical and skilled occupations in health’, which would fast track Canadian immigration processes after registration with the Health Council of Canada (applicants could even qualify for Express Entry). Currently, Canada meets the WHO guidelines on the number of registered dental practitioners per 1,000 population (0.53) New Zealand has also placed Dentistry on its ‘immediate skills shortage list’ and its ‘list of skilled occupations.’ Thus, a dentist relocating to New Zealand could apply either as a ‘skilled migrant’ or for an ‘essential skills’ visa.

However, in July 2015, Australia removed Dentistry from its SOL (Skilled Occupations List), Dr Rick Olive AM RFD, President of the Australian Dental Council stated that, “The reality is there is an oversupply of dentists in Australia.” Australia, with a population of 23.13 million has 19,462 dentists, which is 0.84 per 1,000 population, well above WHO recommendations.

Dentistry was measured according to the ‘Ranking Scorecard for the National Scarce Skills List 2014,’ and scored 87 out of 100 points (Table 2). The National Scarce Skills List is going to be reviewed every 2 years.25 The list may be reviewed earlier, should the Minister of Higher Education and Training deem it necessary.25 In the same paper, the Department of Higher Education and Training went on to state that,

“The formulation of the National Scarce Skills List should be viewed as a dynamic process that is subject to further continuous iterations and methodological improvements based on substantive proposals from the public. It will be interesting to note that Dentistry did not make the top 100 proposed occupations for the National Scarce Skills List of 2014.”

Mr Siphele Ngcwangu, a researcher at the Centre for Researching Education and Labour, University of the Witwatersrand stated that,

“The methods, consultations and literature review sources used to create the Scarce Skills publication privilege government-articulated priorities and those of industry and capital... A ranking scorecard is used to determine demand for a particular occupation based on an analyst’s review of these particular sources.”

Reflecting on its own methodology, the Manufacturing, Engineering and Related Services SETA reported that: ‘The development of the ‘scarce skills’ list... did not, in fact, reflect genuinely scarce occupations with any level of accuracy.’ It added that, ‘the priority skills list presented in the scarce skills publication of 2012/13 was not scientifically confirmed or quantified.’

From Figure 1, it is evident that Dentistry is a comparatively understaffed profession in South Africa (as compared with other ‘critical skill’ professions) and below the international average of 0.3 practitioners per 1,000 population. Since the HPCSA requires permanent residency for registration in the category ‘Independent Practice,’ a foreign-born dentist is limited to work in the category ‘Public Service’ for a period of five years (the minimum expiry time period before permanent residence is granted as ‘residency on other grounds’). Whilst there appears to be so-called underemployment of dentists in the public sector, foreign-born dentists are nevertheless unable to obtain ‘Independent Practice’ registrations, due to the compulsory five year waiting period before applying for permanent residence, often resulting in a predicament of their being unable to earn an income.

Perhaps the only way to circumvent this cycle would be to apply for a ‘Financially Independent’ visa, where an applicant can demonstrate that his/her net worth exceeds 12 million rand. This permanent residency visa has a processing fee of R120,000, and it requires that an applicant proves a net worth greater than 12 million rand.1 By comparison, under the previous ‘Exceptional Skills’ work quota permit, a foreign-born dentist would have been eligible to apply, at an application fee of a mere R 1,520,¹ for permanent residency immediately, without a five year waiting period.

CONCLUSION

Based on the comparative scarcity of dentists in South African, Dentistry should be classified as a ‘Scarce Skill’. There needs be a more scientific and evidence-based approach to the listing of scarce skills professions utilising HST, WHO, vacancy, employment and the population needs data. Currently, there are many noted inaccuracies and indeed, room for bias, in the methodology of the assessment of professions for ‘Scarce Skills’ classification. The recruitment and retention of foreign dentists would be an effective method of addressing the evident shortage of professionals. Classifying Dentistry as a scarce skill would also allow for foreign-born dentists, without permanent residency or citizenship, the ability to practice in the private sector. This is perhaps the only means of professional income for foreign-born dentists, because of the relative underemployment in the South African public sector. The scarce/critical skills visa would fast-track application processes and allow for an increased recruitment of foreign born dentists into the country.

It is envisioned that this paper will be submitted during the 2016 ‘call for public comments’ on the Scarce Skill list.
Limitations

The study has assessed WHO recommendations of practitioner to population ratio. The need for practitioners may differ from country to country, due to the demand of particular health services in a specific region. Since there is no study which assesses the exact number of practitioners required by South Africa for the optimal functioning of health care services, the recommendations by WHO on the number of professionals per 1000 population were used as guidelines. The accuracy of the HST data used in this study is also questionable because the number of registered dentists on the database may differ from the actual number of practicing dentists. Furthermore, numbers of registered dentists may have emigrated, passed away or are not currently practicing in the profession.

Ethical considerations

An ethical waiver was obtained on the 20/5/2015 (W CJ 150520) from the Medical Research Ethics Committee, University of the Witwatersrand.

Declaration:

No conflict of interest.

Disclosure: The researchers do not have any financial interest in the products used in this case.

References

The development of a physiotherapy intervention programme for mandibular condyle fracture patients

ABSTRACT

Introduction: The need for physiotherapy in the treatment of mandibular condyle fractures has been highlighted, but there has been no agreement regarding an exercise programme for these patients.

Aims and objectives: The study aimed to develop proposals for an appropriate program for patients who had sustained mandibular condyle fractures.

Design: Quantitative, non-experimental study, by means of a Delphi questionnaire.

Methods: Data obtained from the literature and a previously conducted needs analysis was used in compiling a Delphi questionnaire dealing with the type and dosage of a suitable physiotherapeutic treatment protocol. The questionnaire was distributed amongst 20 experts (national and international) in the fields of physiotherapy, maxillo-facial surgery and dental surgery. A convenience sampling method was used to select appropriately trained participants for the Delphi review panel.

Results: The Delphi technique was used in the development of a suitable physiotherapy intervention program for mandibular condyle fracture patients. Inter-reviewer consensus was reached regarding the commencement and dosage of various jaw exercises, as well as what would constitute in-hospital physiotherapy visits.

Conclusions: The proposed post-surgical intervention program could serve as a baseline for clinical implementation and in further research studies. The advantages of referring these patients to physiotherapy are also highlighted.

Key terms: mandibular condyle fractures; physiotherapy for mandibular condyle fracture rehabilitation for mandibular condyle fractures; temporomandibular joint; trismus

INTRODUCTION

Trauma is regarded as one of the major factors resulting in temporomandibular joint (TMJ) dysfunction, especially as the articulating disc in the joint does not have the ability to repair and remodel. Following trauma to the mandibular condyles there may be a limitation of mandibular movement to a varying extent due to muscle spasm, oedema and haemarthroses. Safe and effective post-surgical exercises according to patient-specific precautionary measures can prevent displacement of fractured bone ends, stimulate remodelling, and have a positive effect on the recovery of normal mandibular function.

A large number of studies have found that an ideal prognosis for mouth function is dependent on a programme of appropriate post-surgical functional exercises. Active and passive joint movements for increasing the range of motion of the TMJ are regarded as key components in the post-surgical management of patients who underwent surgery in the TMJ region. Long-term follow-up is recommended.

No standardised criteria or post-operative rehabilitation programmes for patients who have sustained mandibular condyle fractures could be found in the literature. Previous research studies investigating the effects of any such exercise regimes varied in dosage and exercise types, and were all provided by surgeons with no physiotherapy demonstrations or interventions. Only one non-clinical study conducted by Trott (2011) described an empirically based physiotherapy intervention programme. In contrast, a South African research study specifically highlighted the need for physiotherapy intervention in the treatment of mandibular condyle fractures. Patients are afraid to exercise into a zone of discomfort for fear of re-fracturing or pain, therefore appropriate active jaw exercises should be commenced as soon as possible. It was the opinion of the participants in a previously conducted needs analysis that there is a need for physiotherapy intervention for...
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patients who had sustained mandibular condyle fractures treated by ORIF surgery or closed reduction. The aim of this study was therefore to use the Delphi technique to compile a proposed physiotherapeutic intervention program for the post-operative rehabilitation of patients following mandibular condyle fractures.

**METHODS**

**Study design**

A quantitative, non-experimental Delphi technique study was performed.

**Participants**

As this study explored a formerly pristine area of physiotherapy research, a convenience sampling method was used to select appropriately trained reviewers for the Delphi review panel. Hence, the panel comprised of experts in the maxillo-facial, dentistry and physiotherapy fields in South Africa and abroad, with a ratio of 2:1 South African: International reviewers. More South African experts were recruited as the study aimed at promoting awareness of a new physiotherapy field in South Africa, and therefore focused on the South African environment and patients.

Specialist Maxillo-facial surgeons were included as were qualified physiotherapists who had completed their post-graduate training in Orthopaedic Manipulative Physiotherapy (OMPT), had a special interest in the cranio-mandibular field and / or a minimum of two years work experience in the field. The qualified dentists included in the Delphi review panel had to have a minimum of five years work experience in dental surgery.

The finally constituted Delphi round one review panel consisted of eight physiotherapists, eight maxillo-facial surgeons and four dental surgeons, in a ratio of 2:1:2, to provide for sufficient feedback from all experts routinely treating patients who had sustained mandibular condyle fractures. A larger number of maxillo-facial surgeons and physiotherapists were recruited, as they form the most important part of this rehabilitation team. Twenty review panel members were appointed to generate sufficient input and to provide for reviewer drop-out, while maintaining reliability.

**Ethical considerations**

The study was approved by the Health Research Ethics Committee of the University of the Free State (ECUFS NR: 05/2012). Informed consent was obtained from each participant before completion of the Delphi questionnaire. Confidentiality of all collected information was ensured as the questionnaire did not require names of the participants or any other identifiable data.

**Procedures**

Available international literature as well as the results of a previously conducted South African based needs analysis indicated that there is a need for physiotherapy intervention for patients who had sustained mandibular condyle fractures which had been treated by either open reduction or internal fixation (ORIF) surgery or closed reduction.

The Delphi method is based on reviewers reaching a predetermined level of consensus in the responses to questions. This is achieved by a process of repeated circulation of a questionnaire to an anonymous panel of experts, the questions being modified by feedback for each round. The questions on the Delphi questionnaire were formulated using information gained from personal communication with maxillo-facial surgeons, from available literature and from the results of the needs analysis. Information gained from that analysis included recommended precautionary measures as well as exercises for possible inclusion in a post-operative exercise regime for mandibular condyle fracture patients.

The questionnaire was divided into two sections: demographic information and the proposed physiotherapeutic management of mandibular condyle fracture patients. Closed questions were posed to participants, with areas for comment following each question.

A pilot study was conducted to increase the face validity of the study and to minimise misinterpretation of questions. Piloting of each Delphi questionnaire round was done by two experts in the field, one physiotherapist and one maxillo-facial surgeon. SurveyMonkey™, an online research tool, was used to electronically send each questionnaire round to members of the review panel.

Consensus for this study was determined as an 80% agreement between participants regarding a question’s answer. If consensus was reached, the question was omitted from subsequent rounds. Questions not achieving consensus were identified and information was extracted from questionnaire responses and fed back to the reviewers for consideration and further deliberation during the subsequent round. Any relevant comments or questions logged by reviewers during a round, were also incorporated into the subsequent questionnaire for circulation. The stability of responses for the questions not reaching consensus, was measured when there were no new comments from reviewers indicating that a saturation point had been reached.

A review panel member was excluded from subsequent Delphi questionnaire rounds if he / she failed to respond within the allocated time frame for completion of the questionnaire round.

**Table 1:** Commencement of different treatment modalities after mandibular condyle fractures had been treated with either ORIF surgery or closed reduction.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Commencement</th>
<th>Response %</th>
<th>Round (n = 12)</th>
<th>Consensus/ Stability/ None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical care and post-surgical advice</td>
<td>Day 1 post-surgery</td>
<td>66.7%</td>
<td>3</td>
<td>Stability</td>
</tr>
<tr>
<td>Active jaw exercises</td>
<td>Day 1 post-surgery</td>
<td>72.7%</td>
<td>3</td>
<td>Stability</td>
</tr>
<tr>
<td>Isometric jaw exercises</td>
<td>Day 1 post-surgery</td>
<td>66.7%</td>
<td>3</td>
<td>Stability</td>
</tr>
<tr>
<td>Jaw muscle stretches</td>
<td>Out-patient follow-up or after fixation removal</td>
<td>45.5%</td>
<td>3</td>
<td>Stability</td>
</tr>
<tr>
<td>Massage of facial muscles</td>
<td>Day 1 post-surgery</td>
<td>50%</td>
<td>3</td>
<td>Stability</td>
</tr>
<tr>
<td>Passive TMJ movements by therapist</td>
<td>Out-patient follow-up</td>
<td>58.3%</td>
<td>3</td>
<td>Stability</td>
</tr>
</tbody>
</table>
receive physiotherapy treatment until hospital discharge. Toward agreement, and stability was reached, regarding evaluation and treatment commencing day one after surgery or closed reduction, as well as manage and fracture patients who had been treated by either ORIF that a physiotherapist should evaluate mandibular condyle fracture patients who had been treated by either ORIF surgery, and between 11-49% of patients treated by closed reduction, reported functional loss at follow-up.

Forty-two percent of review panel members reported that 11-49% of mandibular condyle fracture patients, treated by closed reduction tend to demonstrate in-hospital functional loss. More than 70% of review panel members reported that up to 0-49% of mandibular condyle fracture patients treated by ORIF surgery, and between 11-49% of patients treated by closed reduction, reported functional loss at follow-up.

Results regarding pre-cautionary measures to be considered when treating mandibular condyle fracture patients varied between rounds. However, it was found that at six weeks postoperatively there was a relatively consistent high response rate regarding adherence to pre-cautionary measures for mandibular condyle fracture patients, who had been treated by either treatment method. Although stability was reached indicating the safety of posterior-anterior / anterior-posterior mandibular condyle movements, it is the opinion of reviewers that the treating maxillo-facial surgeon should be contacted before commencing mandibular protrusion movements following a mandibular condyle fracture.

As shown in Table 1, stability was reached with reviewers indicating that jaw muscle stretches and passive TMJ movements should only be commenced during outpatient follow-up, whereas all other physiotherapeutic interventions can be commenced in-hospital. There was an increased tendency in reviewer responses towards agreement that all exercises should be executed in front of a mirror, with stability reached in the recommendation that all jaw exercises should be done with light guided hand pressure to prevent incorrect mandibular deviation.

In accord with reviewer comments, questions relating to exercise dosage were simplified and grouped together. The exercise related questions were also, as per reviewer comments, grouped to be either answered by the maxillo-facial surgeons and dentists or physiotherapists, separately. As mentioned by reviewers, physiotherapists should have more experience with exercise prescription, and hence directing these questions to those panellists should ensure more reliable interpretations on the enquiry.

Data analyses indicated that the majority of exercise dosage related questions reached consensus between physiotherapists, with the maxillo-facial surgeons and dentists achieving consensus on only 50% of those questions, possibly due to their lack of practical experience.

### Table 2: Delphi questionnaire, Round three: Exercises and dosages.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>2. Repetitions at one time</th>
<th>3. Repetitions per day</th>
<th>4. Contraction / stretch held for:</th>
<th>5. Exercise obtained from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isometric jaw muscle contractions</td>
<td>5 contractions per muscle (63.3%)</td>
<td>Stability</td>
<td>3 (77%)</td>
<td>Stability</td>
</tr>
<tr>
<td>Jaw opening</td>
<td>5 movements (70%)</td>
<td>Stability</td>
<td>3 (83.3%)</td>
<td>Consensus</td>
</tr>
<tr>
<td>Lateral jaw movement</td>
<td>5 movements (75%)</td>
<td>Stability</td>
<td>3 (70%)</td>
<td>Stability</td>
</tr>
<tr>
<td>Protrusion of jaw</td>
<td>3 movements (63.6%)</td>
<td>Stability</td>
<td>3 (70%)</td>
<td>Stability</td>
</tr>
<tr>
<td>Stretch</td>
<td>5 movements (100%)</td>
<td>Consensus</td>
<td>3 (90%)</td>
<td>Consensus</td>
</tr>
</tbody>
</table>

**Statistical analysis**

SurveyMonkey™, the online research tool used to conduct this study, reported all results as a percentage. The data obtained from the three Delphi questionnaire rounds was analysed by the researcher, in conjunction with the research supervisors who were responsible for verifying data analyses.

### RESULTS

**Demographics and response rate**

Of the 20 review panel members included in round one of the questionnaire, 12 completed the third and final questionnaire round, of whom seven were physiotherapists and three, maxillo-facial surgeons. The main reason cited for surgeon drop-out was a lack of time to complete the subsequent questionnaire rounds.

The gender distribution was equitable during all three rounds of the Delphi questionnaire. The majority of reviewers were practising in the private sector.

The ratio of South African versus international members of the review panel was 2:1 during the final questionnaire round, however that ideal was not met for physiotherapists due to international reviewer drop out.

**Possible physiotherapy intervention for mandibular condyle fracture patients**

Currently the majority of in-hospital patients treated for mandibular condyle fractures are seen only by maxillo-facial surgeons. Two physiotherapists and one dentist indicated that they are involved in the treatment and rehabilitation of mandibular condyle fracture patients in an out-patient setting. One international reviewer indicated that mandibular condyle fracture patients abroad are already receiving routine physiotherapeutic management.

The majority of review panel members were of the opinion that a physiotherapist should evaluate mandibular condyle fracture patients who had been treated by either ORIF surgery or closed reduction, as well as manage and progress the post-surgery exercise program. Stability amongst reviewers was reached regarding physiotherapy evaluation and treatment commencing day one after either ORIF surgery or closed reduction. The panel tended toward agreement, and stability was reached, regarding whether mandibular condyle fracture patients should receive physiotherapy treatment until hospital discharge.
in prescribing exercises. Physiotherapists achieved consensus on nearly 70% of exercise dosage questions, with the remaining 30% of questions recording between 70% and 76% inter-reviewer agreement (Table 2).

**DISCUSSION**
As facial trauma is one of the major causes of TMJ cartilage degeneration and intra-articular pathology, it is necessary to recognise that impact and to provide adequate treatment for this patient population. The study aimed to determine the proposed content of a post-operative physiotherapeutic intervention program for patients who had sustained mandibular condyle fractures, using the Delphi technique. The study results confirmed, according to expert opinion, that post-operative physiotherapeutic intervention for patients who had sustained mandibular condyle fractures is of the utmost importance.

Previous research studies investigating the effects of post-mandibular fracture exercise regimes varied in quality, dosage, exercise types and were all provided by surgeons without physiotherapy demonstrations or interventions. As discussed in the studies conducted by Bevilaqua-Grosso et al (2002), Yun and Kim (2005) and Feng et al (2009) there are currently no unifying criteria regarding the physiotherapeutic management of mandibular condyle fractures. However, the need for adequate and prompt physiotherapy treatment in mandibular condyle fracture patients has been emphasised by a South African study conducted by Rikhotso and Ferretti (2008), and highlighted again in this Delphi study.

The fact that stability was reached regarding only those questions relating to functional loss and the amount of treatment sessions provided, may be due to the fact that each patient presents differently after surgery, require different methods of treatment or may present with other complications resulting from their injury. Clear communication between the surgeon and physiotherapist is therefore important to ascertain fracture stability, the treatment required and those pre-cautionary measures for adherence.

As each patient differs clinically, it is advised that patient-specific pre-cautionary measures and their duration be discussed with the treating maxillo-facial surgeon.

Even though it was those questions pertaining to exercise dosages which achieved stability, the results regarding exercises which should be included in a post-operative physiotherapeutic intervention provided substantial information, enabling the compilation of a comprehensive exercise program, together with proposed exercise dosages. The exercise dosages suggested by the Delphi review panel showed concurrence when compared with the general exercise prescription guidelines proposed in the literature. These advocate a low number of repetitions, performed at low intensity, to be repeated several times per day.

When analysing the results, it should be taken into account that only 50% of review panel members had clinical experience in the physiotherapeutic treatment of patients who had sustained mandibular condyle fractures. As this regime is still a fairly unexplored area in South Africa, this lack of experience is to be expected.

The results of the Delphi study was used to compile and to propose a post-operative intervention protocol for mandibular condyle fracture patients which could be implemented in clinical trials as part of further research to assess the viability and efficacy of the programme.

**CONCLUSION**
The need for adequate and prompt physiotherapy treatment for mandibular condyle fracture patients has been emphasised by the previously conducted needs analysis, as well as previous research. The results of the study provide a platform for expanding the evidence-base for physiotherapy intervention for the treatment of maxillo-facial conditions. Whilst an evidence-based method was utilised during the development of the proposed post-operative physiotherapy intervention program, this in no way guarantees efficacy in the prevention of complications in patients who underwent maxillo-facial surgery following a mandibular condyle fracture. Further research is warranted into the implementation of this proposed physiotherapeutic intervention to determine the efficacy of the programme.

**LIMITATIONS**
As the study investigated an area where in which very few South African physiotherapists are currently actively practicing, reviewers showed a certain amount of hesitation to participate in due to a lack of specific clinical knowledge. This reluctance resulted in difficulties in increasing the original sample size.

There is a strong possibility that recall bias may have been present in the questions relating to patient-reported functional loss in-hospital and at follow-up after ORIF surgery or closed reduction for mandibular condyle fractures. As the majority of respondents were physiotherapists, bias could have been present, in that there would a natural tendency for physiotherapists to believe that physiotherapy is invaluable in the treatment of mandibular condyle fracture patients.

Inter-reviewer consensus could not be reached on all questions posed to reviewers, possibly due to the differing nature of the specialisation fields of the participants. This dilemma was addressed by separating out those questions pertaining to exercise prescription.

**Acknowledgements**
The researcher would like to extend a heartfelt thank-you to all reviewers who participated in the study, for offering their precious time and valuable input.

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6. Thiele RB, Marcotte RM. Functional therapy for fractures of the
Efficacy of Er,Cr:YSGG Laser in treatment of unusual presentation of Pyogenic Granuloma in a 9 year old girl

ABSTRACT
The term pyogenic granuloma is a misnomer because the lesion does not contain pus and is not strictly speaking a granuloma. The growth is typically seen in young adults; however it may occur in any age, especially in individuals with poor oral hygiene. Some cases have also been reported in children. The latest treatment options include lasers of different type. Final diagnosis of the lesion is mainly by biopsy and histopathological examination. Here we report a case of pyogenic granuloma in a paediatric patient who was treated with Er,Cr:YSGG laser.

Keywords: Pyogenic granuloma, paediatric patient, inflammatory hyperplasia, lasers

INTRODUCTION
Pyogenic granuloma (PG) is one of the common inflammatory hyperplasias (IH) seen in the oral cavity. Hullihen's description in 1844 was most likely the first PG reported in English literature, but the term “pyogenic granuloma” or “granuloma pyogenicum” was introduced by Hartzell in 1904.2,3

The term “pyogenic granuloma” is a misnomer because the lesion does not contain pus and is not strictly speaking a granuloma. Approximately one-third of the lesions occur due to trauma and poor oral hygiene may also be one of the precipitating factors.4

Although it is a common disease in the skin, it is extremely rare in the gastrointestinal tract, except for the oral cavity where it is often found on keratinized tissue. There are two kinds of PG namely lobular capillary haemangioma (LCH type) and non-LCH type, which differ in their histological features.5,7

The growth is typically seen in young adults; however it may occur in any age, especially in individuals with poor oral hygiene. Females are far more susceptible than males because of the hormonal changes that occur in women during puberty, pregnancy, and menopause.8,9 Some cases have also been reported in children.10

Final diagnosis of the lesion is mainly by biopsy and histopathological examination. Conventional treatment of pyogenic granuloma consists of surgical excision along with elimination of irritating local factors. The latest treatment options include lasers of different type. Here we report an unusual case of pyogenic granuloma occurring on the gingiva of a paediatric patient, which was treated with Er,Cr:YSGG laser. This case is submitted after the prior approval of the Institutional Review Board.

CASE REPORT
A nine year old female child patient presented to the Department of Oral Medicine & Radiology with the chief complaint of a growth in the lower left posterior region of the mouth, first noticed by the parents of the patient about one month previously. The growth was initially smaller, had been gradual in onset and had progressively increased in size over the month. The patient and her parents were unaware of just when the lesion had first appeared. The gradual increase in size of the growth has caused discomfort while eating and there has also been occasional bleeding during chewing of food.

ACRONYMS
IH: inflammatory hyperplasia
PG: pyogenic granuloma
LCH type: lobular capillary haemangioma and non-LCH
IOPAR: intra-oral periapical radiograph

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Skeletal muscle relaxants interrupt the pain-spasm-pain cycle\(^1\)

Stop the vicious cycle of muscular spasm\(^1\), including Temporomandibular disorder (TMD)\(^2\)

Increase in muscle tone → Jaw muscle pain

References:
The past medical history was not contributory. Extra oral examination revealed no relevant findings. Intra oral examination revealed a solitary sessile growth situated behind tooth 36, involving the marginal gingiva and measuring 1.2 x 1 x 0.5 cms (Figure 1). The surface was smooth and erythematous with a groove in the centre, which was ulcerated, suggestive of indentations by the maxillary counterpart.

An intraoral periapical radiograph was taken of the 36, 37 region, which revealed slight interdental bone erosions on the mesial side of 37 (Figure 2).

Blood investigations of the patient were performed, with results which were within normal range. An excisional biopsy was done under local anesthesia with an Er,Cr:YSGG laser with a wavelength of 2780nm. After the lesion was excised (Figure 3) the sample (Figure 4) was sent for histopathological examination (Figure 5).

**DISCUSSION**

The incidence of the pyogenic granuloma has been described as between 26.8% to 32% of all reactive lesions. According to Shafer et al., oral pyogenic granulomas arise as a result of infection by either staphylococci or streptococci, but also as a result of some minor trauma to the tissues that provides a pathway for invasion of non-specific types of microorganisms. These authors explain the mechanism by suggesting that the tissue response invokes the well-known biologic principle that any irritant applied to living tissue may act either as a stimulus or as a destructive agent or both. If many cells are present in a small volume of tissue and there is a relative reduction of blood flow through the area, as in inflammation, the concentration of the stimulating substance will be high and growth will be stimulated. As differentiation and maturation are attained, the cells become widely separated and the concentration of the substance falls and little growth occurs. In the type of inflammation that results in the formation of oral pyogenic granuloma, destruction of fixed tissue cells is slight but the stimulus to proliferation of vascular endothelium persists and exerts its influence over a long period of time.

![Figure 1: Clinical presentation of the lesion](image1)

![Figure 2: IOPAR of 3rd quadrant showing interdental bone erosions on mesial side of tooth](image2)

![Figure 3: Site after excision of the lesion with Er,Cr:YSGG laser](image3)

![Figure 4: Excised sample sent for histopathological examination](image4)

![Figure 5: Microscopic High Power View (40x) showing large endothelial lined blood vessels and inflammatory infiltrate.](image5)
Abdulai et al. in their retrospective study among 108 cases of oral pyogenic granuloma presenting in patients aged between 9 months to 71 years, concluded the peak ages of occurrence are 11 – 20 years with the commonest site being the gingivae (58.33%), and a higher prevalence in the upper jaw (42.59%). Other sites include the lips (18.52%), buccal mucosa (10.19%) and tongue (8.26%).

Clinically pyogenic granuloma appears as a localized solitary lump having a sessile or pedunculated base. It is a well circumscribed benign soft tissue tumour of inflammatory rather than neoplastic nature arising from the connective tissue of the skin or mucous membrane. The surface can be smooth or lobulated, having a deep red or purplish colour. It is a vascularized lesion with a tendency to bleed profusely owing to micro trauma. In general there are no relevant radiographic findings in pyogenic granuloma. However, Angelopoulos in his review observed that localized alveolar bone resorption can be seen in rare instances of large and long standing gingival tumours.

Histopathologically the major bulk of the lesion is formed by a non lobulated mass of angiomatous tissue. Usually, lobulated lesions are composed of solid endothelial proliferation or a proliferation of capillary sized blood vessels. Collagen in the connective tissue is sparse. The natural history of the lesion follows three distinct phases. In the cellular phase, the lobules are compact and cellular with little lumen formation. In the capillary phase the lobules become highly vascular with abundant intra-luminal red blood cells. In the involutionary phase there is a tendency for intra and peribulbar fibrosis with increased venular differentiation. Increased vascularity may be noticed and some observers have reported that pyogenic granuloma is partly or completely covered by parakeratotic or non keratinized stratified squamous epithelium.

Differential diagnosis of pyogenic granuloma includes parulis, peripheral giant cell granuloma, peripheral ossifying fibroma, leiomyoma, hemangioendothelioma, hemangiopericytoma, baccillary angiomatosis, Kaposi’s sarcoma, metastatic tumour, pregnancy tumour and post extraction granuloma.

For pyogenic granuloma, surgical excision is the treatment of choice. Another conventional surgical modality for treatment is cryosurgery in the form of either liquid nitrogen spray or cryoprope. Nd:YAG and CO2 and flashlamp pulsed dye lasers have also been used for the treatment of oral pyogenic granuloma. Meffert et al. used the flash pulsed dye laser on a mass of granulation tissue that did not respond to the unusual treatment. Lasers have been shown to be a successful option for the excision of pyogenic granuloma with advantages of minimal pain and invasiveness and the lack of any need for suturing or packing. Dermal pyogenic granuloma has been treated with electrodessication and sclerotherapy. White et al have also suggested that laser excision is well accepted by patients with no adverse affects.

In the present case the laser excision was well tolerated and no adverse affects were observed. In the postoperative period minimal bleeding occurred and no sutures were placed.

CONCLUSION

The present case was reported as it is unusual in the sense that it is occurring in a paediatric patient over the mucosa of an erupting tooth, and that treatment was with the use of lasers. This is an unusual combination, rarely reported in the literature.

References

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BACKGROUND
Forensic Odontologists may be called upon to help identify deceased individuals in situations such as: criminal cases, where victim identification is needed before official investigations can take place; marriages, where confirmation of the death of a spouse is required before the partner can remarry; for monetary purposes, such as paying out of pensions and life insurance policies; for completion of death certificates prior to burial; for social reasons such as closure for family members; for unclaimed bodies; for unidentified bodies in mass disasters; and in cases of fires, drowning, violent crimes, and motor vehicle accidents where the bodies may be so badly disfigured, decomposed or physically altered, that identification by family members would be psychologically traumatic.1-3

Although many regions of the body have been used for identification purposes, the teeth remain one of the most ideal sources as they have a number of distinctive features and are able to withstand many chemical and physical insults that would destroy other body tissues.1 Radiographs taken at the time of autopsy should replicate the type and angles of any existing records as closely as possible.2 It is routine that a thorough, systematic, clinical and radiological examination is carried out on each tooth as well as the surrounding oral tissues. The list of features examined is extensive, especially in cases with little or no restorative work, as these are much more difficult to positively identify.4

Following the examination, the ante-mortem records are compared with the post-mortem findings taking note of all similarities and discrepancies. Enough clear similarities, and no inconsistencies, will help determine a positive diagnosis. Radiographic features are the most reliable measures, but those used must be unique to the individual as well as stable over time. Skeletal radiographic identification requires a recommended minimum of eight concordant features.3 In contrast, there is no specified number of concordant features needed for a positive identification when using dental images. Even one single tooth with unique concordant features and no discrepancies may be considered adequate for a conclusive decision.1 A single discrepancy would, however, cast doubt on the verdict and needs to be explained, failing which an exclusion decision would have to be made. Examples of explicable discrepancies would be replaced or enlarged restorations, or extracted teeth. An inexplicable discrepancy would be a tooth present at the post-mortem examination that was not evident in the ante-mortem records.2 Following the comparison, a conclusion needs to be drawn. The American Board of Forensic Odontology has suggested narrowing the options down to one of the following four possibilities: Positive identification, (sufficient matching features and no discrepancies); Possible identification, (consistent features but the quality of records or remains prevents a definitive conclusion being drawn); Insufficient evidence, (not enough evidence to substantiate a definitive conclusion), and Exclusion, (lack of similarity or unexplainable discrepancies between ante-mortem and post-mortem data).5

This paper presents a case of a young accident victim whose body was too badly mutilated for identification by the family, and the case was thus referred to the forensic odontologists to try to confirm his identity. A seemingly obvious positive identification was hampered by the presence of a single confounding feature, and the crucial lack of accurate dental records to substantiate or refute any conclusion.

CASE REPORT
A 23-year old jogger was fatally injured after being knocked down and subsequently run over by a truck. The only possessions he carried were his gym clothing. The body was too badly disfigured to allow family members to view, but a positive identification was needed before it could be released for burial. Tissue samples were taken and sent for DNA analysis; however, this is a costly and tedious process.
process and could take up to six weeks for results. The family were anxious to have their son positively identified to allow them bury his remains as soon as possible. They sought the help of the forensic odontologists to try to speed up the process.

The father provided a recent photograph of the victim. From this a mild class III malocclusion was evident, but given the state of the body, it was impossible to make any correlations with the photograph. The family dentist was able to provide a panoramic radiograph dating back to when the boy was 17 years old (Figure 1). Forensic dental identification involves comparing features on old records with those taken at the time of the autopsy – including photographs, manual visualization and charting of all teeth and surrounding structures, and full mouth periapical radiographs. The forensic team were hampered by the victim having a perfectly healthy dentition, with no dental restorations to aid their processes. The panoramic radiograph did however reveal some characteristic features. All four of his third molars were still in the bud stage of tooth development, as would be expected at his age of 17, and showed a tendency towards becoming horizontally impacted. The 37 and 47 were slightly supra-erupted compared with the 36 and 46, a feature that was confirmed clinically. All four of these teeth also had characteristically pointed pulp horns, which was also evident on the post mortem radiographs. A further interesting and distinctive feature was the width of the 32 and 42 compared with the mandibular centrals. The former were seen to be much larger clinically, and on both the ante-mortem panoramic radiograph and post-mortem peri-apical radiographs.

These characteristic features alone may have led to a positive identification; however, the case was complicated by one discordant observation. All four third molars had been removed. The peri-apical radiographs revealed a remaining fractured root of the 38 lying horizontally about 5mm deep in the mandibular bone (Figure 2). However, the dentist had not provided any records stating these teeth had been removed, and without further evidence, a positive identification could not be made at this stage.

The dentist was contacted and he confirmed that he had referred the patient for surgical removal of the teeth when he was 18 years old. He also gave the name of the maxillofacial surgeon, who, unfortunately, was not reachable at that time. Sadly, this meant that a positive identification of the individual could not be made because of this otherwise unexplainable discrepancy. This led to a lot of anguish for the boy’s family, as the body could not be released for burial. Identification was finally confirmed through DNA analysis, a process requiring a further six weeks.

**DISCUSSION**

With no further dental records to go by there were a number of unanswered questions and many issues to consider, which would each impact differently on the identification process. Based on the radiographs provided by the family dentist, and the evidence at hand, there were five possible scenarios to consider. The discussion below explores these and highlights two relevant questions that arose as a result of this investigation.

1. **No extraction of the third molars and a positive identification**

Had the boy’s wisdom teeth not been extracted, they would still be evident on the postmortem forensics radiographs and may even have been visible in the mouth (which would have been explainable given that he was then at that time 23 years old). There would have been no conflicting evidence and a positive identification could have been made based on three distinctive concordant features, namely: the pointed shape of the pulp horns (36, 37, 46, 47), the supra-erupted molars (37, 47), and the relatively larger mandibular lateral incisors. The family would have been informed and the body released for burial.

1. **Uncomplicated extraction of the third molars, supported with well documented records of the procedure, and positive identification**

If the third molars had been extracted uneventfully, and the procedure was correctly documented with supporting pre-extraction radiographs, there would have been no conflicting evidence between the ante-mortem records and post-mortem findings. A positive identification would have been made based on the above-mentioned features as well as the missing third molars. (Note, this is presuming the 38 root had not been fractured, which was not the case.) This highlights the importance of conducting a thorough post-mortem investigation, with full mouth radiographs in every case, despite any seemingly obvious concordant features noted on the clinical examination. In this case, the retained root would never have been discovered without these radiographs.

1. **Complicated extraction of the third molars, supported by well documented records of the procedure, and a positive identification**

If the third molars had been extracted and the surgeon was aware of fracturing the 38 root, this should have been documented in the patient’s records, along with supporting pre- and post-extraction radiographs. The incident should also have been mentioned to the patient and his parents, alerting them to the possibility that it...
could cause problems in the future. Once again, there would have been no conflicting evidence, and a positive identification could have been made based on the above-mentioned features, the missing third molars, and the retained root fragment.

1.4. Uncomplicated extraction of the third molars, supported by well-documented records of the procedure, and a negative identification

If the teeth had been extracted uneventfully, and the procedure was correctly documented with supporting pre- and post-extraction radiographs showing NO retained root, there would have been an unexplainable discrepancy between ante-mortem and post-mortem records, and a negative identification would have been made. This would mean instituting a new search for the victim’s identity, and informing the awaiting family that the body being examined was not their son. They too would then have had to begin a new search for the missing lad.

1.5. Complicated extraction of the third molars, with no supporting records of this, and a delayed positive or negative identification

If the teeth had been extracted and the root had fractured, but there were no records of this event, (as indeed was the situation), a definitive positive identification could not be made due to this one discordant anomaly. The family would then have to wait at least six weeks for the results of the DNA analysis to confirm or refute their son’s identity. If positive, they could indict the dentist and / surgeon for many issues. Firstly, for poor record keeping; Secondly, for failing to inform them of the fractured root and warn them of possible future complications; Thirdly, for putting the family through the anguish of waiting six weeks before knowing whether this was their son; Fourthly, for delaying the funeral, and their having to endure the knowledge that their son’s body was lying in the mortuary all of this time, and finally, for delaying a new search for their son, which could already have begun six weeks ago.

Two further pertinent considerations arose during this investigation.

2.1 Justification for extraction of unerupted, asymptomatic third molars

Based on the panoramic radiograph, all of the teeth, with the exception of the third molars, were fully formed and erupted. The third molar is the most developmentally variable tooth, but is still a relatively reliable biological indicator of age in adolescents and young adults. In this case, the boy’s age was known to be 17 years at that time of the radiograph. However, Demirjian’s classification rated the third molars between stages E and F, and Moorrees’s system as between 8 and 9 (Cl and R1/4). In males this usually corresponds to average ages of between 13.6 and 14.6 years, indicating that in this case development of the third molars was delayed by at least three years. As such, it was unlikely that they could have fully matured into stage Ac a year later, when they had been extracted. This led to the question of why these teeth had been surgically removed before they were fully developed, as there were no radiographs or notes in the file to justify this decision.

 Millions of asymptomatic teeth classified as “impactions”, are “prophylactically” removed from healthy young people with no medical evidence to justify this procedure. Only 12% of truly impacted teeth have associated pathology such as cysts or damage to adjacent teeth. Considering all the potential complications that could arise from third molar extraction, (pain, swelling, trismus, haemorrhage, alveolar osteitis, periodontal damage, soft-tissue infection, injury to the temporomandibular joint, malaise, temporary or permanent paraesthesia of the lips, tongue, and cheek, fracture of adjacent teeth or surrounding bone, sinus exposure or infection, and anaesthetic complications), makes it difficult to justify the procedure. However, if there is insufficient anatomical space to accommodate normal eruption, removal of such teeth at an early age may be considered a valid and scientifically sound treatment. (It was later discovered that in the case under consideration, the third molars had in fact been extracted at the request of his orthodontist to facilitate future management).

2.2. Fractured root-germ development

Another issue relates to the stages of root development. In the panoramic radiograph, the roots of all the third molars were relatively immature (Demirjian stages E-F). The referring surgeon could not remember breaking off any root and had no records of this in the patient’s file. Given that the body was eventually identified as being the boy in question, it is clear that the root definitely originated from some residual fragment left by the surgeon. If this fractured segment had been acknowledged and documented with post-extraction radiographs at the time of extraction, it would have been possible to compare its size and shape with the image seen on the current radiograph, where the root appears to be fully formed. Based on the original panoramic radiograph and average developmental charts, it is highly unlikely that it could have matured that much in one year. This leads one to speculate on whether a retained root has any potential for further growth. Chrcanovic found that tooth buds in early stages of calcification as well as teeth widely displaced due to mandibular fractures, continued to develop and erupt. However, in a similar study by Suei et al., it was noted that in at least 45% of these teeth, there were developmental abnormalities. In both of these studies, the coronal sections of the affected teeth were still present, albeit slightly displaced. No studies were found on development of fractured root portions left behind when immature teeth were extracted. That possibility has led to a research question that is presently being investigated.

CONCLUSION

The case highlights the complexities of victim identification and emphasises the need for caution against making a hasty positive decision based on a few concordant features, without conducting a thorough clinical and radiographic examination. Considering that most positive identification decisions depend on matching ante-mortem records with post-mortem findings, it should also serve as a strong reminder to clinicians on the importance of good record keeping and retention, as prescribed by the HPCSA and the laws of the country. Clinicians are advised to familiarise themselves with the guidelines on record keeping as set out in the HPCSA Regulations, Booklet 14 of 2008). This covers the important issues of what constitutes a health record, the required time for retention of health records, the records that are compulsory to keep and describes the characteristics of good records.
References
INtRODUCTION

Protecting the airway is a critical aspect of safe sedation practice. Sedation practitioners must be able to identify the patient at risk for airway obstruction. We will discuss key aspects of airway evaluation, sedation monitoring, and practical points to prevent compromising the airway during sedation.

Keywords: Airway protection, sedation monitoring, pre-operative assessment

DISCUSSION

According to the 2015 SASA Sedation Guidelines for surgical procedures, no patient should be considered for sedation without having undergone a focused airway assessment. Becker and Haas state that the most important aspect of patient care is airway management.

Features that are commonly linked with difficult intubation are also associated with upper airway obstruction during sleep. Various evaluation tools are available to assess patency of the airway, e.g. Mallampati classification, LEMON law, Upper Lip Bite Test, and the simplified airway risk index. All factors that can compromise the airway leading to possible difficult bag-valve ventilation (rescue) or difficult intubation should be carefully evaluated. Risk identification for factors that may compromise the airway is essential. These include: obesity, maxillary hypoplasia, mandibular abnormalities, beards, edentulous patients, a short thyro-mental distance, restricted mouth opening, large neck circumference and specific obstructive lesions such as nasal obstruction or adeno-tonsillar hypertrophy.

There are particular conditions which preclude surgery-based sedation: for instance patients with severe obstructive sleep apnoea(OSA), poorly controlled respiratory disease (asthma or COPD) or patients with active respiratory tract infections. They may not be ASA 1 or 11 patients who would qualify for sedation outside the operating theatre. Tonsillar hypertrophy and excessive lymphoid tissue in the pharynx are predisposing factors to OSA in children.

Pre-operative fasting remains a controversial issue. In a sedation technique where dissociative and non-dissociative intravenous techniques are used we suggest that sedation practitioners follow the SASA Guidelines. The patient needs to be fasted from solid foods for six hours and from clear fluids (defined as a non-particulate fluid) for two hours before sedation.

Standards of monitoring differ slightly according to the level of sedation provided. Minimal sedation can be monitored with clinical monitoring, deep sedation with the same electronic and clinical monitoring as with general anaesthesia. However, it is important for the sedation practitioner to understand that sedation is a continuum. The more drugs we give the deeper the level of sedation may be. The sedation practitioner must be prepared to rescue any patient that inadvertently slips into a deeper level of sedation.

Moderate sedation levels require continuous monitoring that includes pulse oximetry, heart rate, respiratory rate and breathing pattern, and blood pressure recording. Capnography is said to be the gold standard for monitoring of effective breathing as it is more sensitive than pulse oximetry. It is not mandatory for moderate sedation but highly recommended in patients with respiratory disease, the obese, and where deep sedation is utilized.

Patients with a tendency to upper airway obstruction during sleep are more vulnerable for airway problems during sedation. This is especially so if we are not careful with the doses of sedative drugs used. During the sedation, the practitioner needs to be vigilant to monitor the possible reversible causes of airway obstruction, e.g. amount of pressure from the surgeon on the lower mandible, patient position, pushing the tongue backwards towards the soft palate, and over-extension of the neck, especially in the paediatric population. When a patient is supine, airway obstruction could be worsened due to gravitational effects on the tongue and soft palate. Neck flexion, mouth opening and the “head-down” position often used in dentistry can lead to airway compromise. Most patients will also find it difficult to swallow when their mouths are held open wide with a mouth prop or other devices in frequent use in dentistry. Good and effective suctioning, especially focused to the back of the mouth, is therefore vital.

ACRONYMS

ASA: American Society of Anaesthesiologists
COPD: Chronic Obstructive Pulmonary disease
OSA: Obstructive Sleep Apnoea
SASA: South African Society of Anaesthesiologists

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Certain drugs are known to decrease the muscle tone in the upper airway. Propofol and Midazolam are commonly used in sedation practice and are well known for their effects in inhibiting upper airway activity, resulting in airway compromise. Ketamine is probably a better drug if we want to prevent airway compromise. Titration still remains the best option when we administer drugs for sedation.

Opioids and sedation drugs are synergistic and may enhance the respiratory depression caused by opioids. Ketamine seems to protect against hypventilation when combined with Propofol (Ketofol). Similarly, during the post-operative period, the depression on breathing may be further exacerbated by residual effects of sedative pre-medications as well as any sedation drugs used. Protecting the airway means monitoring a patient in recovery until he/she is fully awake and able to maintain breathing.

When administering opioids, according to the SASA sedation guidelines, the specific antagonist, Naloxone, must always be immediately available. Pharmacological reversal should be considered as part of the treatment regime when unintentional apnoea occurs during procedural sedation, especially if breathing becomes difficult.

Various maneuvers can be used when the airway is threatened: Firstly, placing the head in the "sniffing the morning air" (extension of the neck) position decreases the upper airway collapsibility.

Secondly, when displacing the mandible forwards, the tongue will be pulled forwards too and increase the diameter of the retro-lingual and retro-palatal airway. Simply lifting the chin with mouth closure can also assist in increasing pharyngeal dimensions.

The sedation practitioner and the whole team are responsible to check the presence and working condition of all resuscitation equipment, emergency airway adjuncts and emergency pharmacological agents. Displaying protocols on the management of anaphylaxis and cardiac arrest is strongly advised. The facility where sedation is performed must be equipped to meet the requirements of recommended safe sedation practice.

The review of emergency procedures and protocols are fundamental to all sedation practitioners and members of the sedation team through practical and theoretical training. This highlights the importance of continuous education and training.

Table 1 is a recommendation from the SASA sedation guidelines of 2015 regarding the basic devices that should be present to administer oxygen and to assist with ventilation during any sedation in any procedure room. Sedation practitioners need to take note of this.

**CONCLUSION**

Adverse events in sedation can generally be prevented by careful preoperative assessment as well as attentive intra-operative monitoring and support. Protection of the airway begins with preoperative respiratory considerations, continues throughout the sedation with careful monitoring and immediate support to manage all types of complications as they arise. Collapse of the upper airway is common during sedation especially in the obese patient, and airway maintenance is a fundamental skill essential for those in sedation practice.

**References**


**Table 1:** Recommended by SASA: basic devices to administer oxygen and to assist with ventilation.

<table>
<thead>
<tr>
<th>Devices to administer oxygen and to assist with ventilation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen and oxygen tubing</td>
<td>Oxygen source must be reliable and able to provide at least 90% Oxygen via a self-inflating positive pressure delivery system at 15l/min for at least 60 minutes</td>
</tr>
<tr>
<td>Oxygen flow regulator</td>
<td></td>
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<tr>
<td>Nasal prongs</td>
<td>Delivering 40% Oxygen</td>
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<tr>
<td>Venturi masks</td>
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<tr>
<td>Nebuliser and mask</td>
<td></td>
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<tr>
<td>Self-inflating resuscitation bag with reservoir</td>
<td></td>
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<tr>
<td>PEEP valve</td>
<td></td>
</tr>
<tr>
<td>Catheter mount</td>
<td></td>
</tr>
</tbody>
</table>

Airway devices and equipment

- **Face masks**: Selection of sizes
- **Laryngeal mask airways or similar supraglottic devices**: Sizes 3 - 5
- **Range of cuffed endotracheal tubes**: Sizes 5 - 8
- **Laryngoscope set**: Two handles with long and standard blades, and spare batteries and bulbs
- **Water-soluble lubricant**
- **10ml syringe for inflation of pilot balloon**
- **Tape or equivalent to secure endotracheal tube**
- **Nasopharyngeal airways**
- **Oropharyngeal airways**: Sizes 3 - 5
- **Nasopharyngeal airway**: Sizes 6 and 7mm
- **Stylets and introducers**: Appropriately sized for endotracheal tubes
- **Magill® forceps**

Our next articles will focus on obesity and sedation, and the management of anaphylaxis.
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Dealing with non-compliant, abusive or aggressive patients in dental practice

There is increasing concern as to how health professionals respond to patients who are considered non-compliant, abusive or difficult. What are their responsibilities to the patient? What are their responsibilities to other patients and staff? Can the patient be refused treatment? What are the responsibilities that providers, as employers, have in relation to staff who might be treating violent or non-compliant patients? What are the competing rights and responsibilities of patients and of the dental provider? Are the above questions influenced by the threat posed by the patient to the safety of staff and other patients? There are many instances in daily practice where patient behaviour, while being difficult and emotive, is not necessarily wrong or inappropriate in the context of the service being provided and the circumstances relating to their particular dental condition. This paper discusses issues relating to circumstances where serious issues arise regarding the behaviour of persons receiving dental treatment in the context where such behaviour is clearly inappropriate, aggressive or violent.

A dentist’s primary concern is to do the best for their patients and this includes giving advice and providing treatment in accordance with the up-to-date evidence base and in the patient’s best interests. The principle of respect for autonomy is not absolute and there will be instances where a patient’s autonomous choice is in conflict with that of the dentist. Dentists have both legal and ethical responsibilities towards their patients and although there is no legal obligation for a dentist to provide a treatment requested by a patient that is not to their overall benefit, is no legal obligation for a dentist to provide a treatment in the context where such behaviour is clearly inappropriate, aggressive or violent.

The National Health Act1 provides that health establishments must implement measures that minimize injury or damage to the person or property of health care workers. This means that it is a general duty of employers to provide a safe and healthy workplace, free from hazards and that their employees are protected from physical harm, their working environment made safe and free from any hazardous incidents. In this regard, employees are responsible for identifying hazards in the workplace; assessing the risk posed by each of these hazards and to control the risk. Where a patient is known to be or has a history of violent and abusive behaviours, the management and treatment of that patient may be characterised as a workplace hazard. An employer who fails to take steps to control the risk posed by such a patient may have breached their obligation to protect the health and safety of their employees. In addition, it may not only be employees who

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shared care can be considered as an approach not so much as an attempt to prevent or manage the patient’s non-compliant behaviour, but to manage the impact of patient non-compliance on staff and other patients.

Refusal or discontinuation of treatment

There may be legitimate reasons for refusal to treat a patient. However one must aware of the possibility of it being misconstrued as abandonment of the patient. Discontinuation of treatment is usually a last resort, and is only recommended after all other strategies have been implemented and have been shown to be unsuccessful. The National Health Act of 2003 No. 61 Chapter 2 Item 19: “Rights of health care workers” states that health care workers may refuse to treat a patient who is physically or verbally abusive or who sexually harasses him or her. Refusal or discontinuation of treatment on account of non-compliance of the patient, posing a risk to the dental team, or if the patient is hostile, obnoxious or abusive to the dentist and staff becomes an option when the patient, who after having been informed about the practice’s policies and requirements, breaches these requirements. The patient can then be refused treatment at the time, or the treatment may be discontinued. If all interventions are unsuccessful and the relationship remains adversarial, the best option would be to terminate it, formally inform the patient that treatment will no longer be provided and to find a mutually acceptable alternative. The dentist should provide a list of other suitably qualified practitioners in the area or refer the patient to another healthcare institution.

To avoid abandoning the patient, dentists may discontinue treatment after reasonable notice has been given to the patient by the dentist of his intention to discontinue treatment and that the patient has had a reasonable time to secure the services of another dentist or after all other dental treatment begun has been completed. Furthermore, the dentist (i) must ensure that the health of the patient is not compromised, (ii) the notification for termination be by registered or certified mail, providing at least 30 days as the termination date after the receipt of the letter, (iii) the letter should include the names of witnesses, the content of any verbal or physical abuse occurs. These notes should include the names of witnesses, the content of any threats made, and the steps taken by staff in response to the situation. The importance of reporting such incidents should be reiterated to all staff.

CONCLUDING REMARKS

Dentists have an ethical obligation to care for patients, but are permitted to terminate the difficult dentist-patient relationship, provided an alternative is available. There is no duty incumbent on dentist to treat people who are not their patients, except in medical emergencies. Creative approaches are usually required to handle difficult dentist-patient relationships. The dentist must be able to first recognise that there is a problem and to determine the circumstances that may be contributing to a patient’s behaviour, including medical, mental and other factors. Interventions or other strategies should be considered that provide realistic solutions and options for both patients and staff and, if at all possible, reduce the potential for harm to either party. Every effort should be made to prevent the escalation of issues to such a level that denial of treatment is the only solution. While both patients and dental practices may have recourse to legal remedies, a range of other options, aimed at strengthening and continuing the treating relationship, also exist. Practices that offer a number of options, with trained staff, confident in the use of these strategies, will be better placed to respond to violent or abusive incidents, if and when they do occur.

The ethical principles of beneficence, respect for patient autonomy and do no harm should always be considered in the management of non-compliant, abusive or aggressive patients. It may not always be easy for a dentist to strike the right balance between a caring, supportive and patient-centered approach, but by acting ethically and professionally, they will find the elusive balance that will make patient care more rewarding and professionally satisfying.

Acknowledgement: With grateful thanks to Mr Punnaj Govan, Legal Advisor, SADA for his erudite and insightful comments.

References

INTERPRETATION

The cropped pantomograph and postero-anterior image (Figs.2&3) of the patient show a homogenous radiolucency in the right mandibular premolar and molar regions. Note the extensive calcification present in another case and the apparent dentigerous relationship to an impacted and displaced mandibular canine (Fig.4). A histological diagnosis of a calcifying odontogenic cyst (COC) was made. The calcifying odontogenic cysts are developmental odontogenic lesions which are believed to arise from odontogenic epithelial remnants in the gingivae or in the mandible or maxilla. Over the years since its first description, it has become clear that the COC has a number of variants, including features of a benign odontogenic tumour. The COC was first described by Gorlin et al. (1962, 1964) who were impressed by the significant presence of so-called ‘ghost cells’ and its histological resemblance to the cutaneous calcifying epithelioma of Malherbe. The eponym of ‘Gorlin cyst’ is frequently used. Since its early description the lesion has been widely recognised, occurring both peripherally and centrally in the jaws, while its origins, pathogenesis and histopathological variations have evoked considerable discussion in the literature. Patients range widely in age (1 to 87 years) with a peak incidence for detection in the second decade of life. Some reports suggest that the cysts have a predilection for females, whereas other studies show no gender bias. More than 70% of COC are associated with the maxilla. The anterior segments of the jaw are most commonly affected. The calcifying odontogenic cyst may appear initially as a unilocular or multilocular radiolucency with discrete, well demarcated margins. Irregular sized calcifications may be scattered in the radiolucency, producing variable degrees of opacity. This may produce a “salt and pepper” appearance. Denser opacities are likely to be present if the cyst is associated with a complex odontoma. The COC is treated by surgical enucleation unless it is associated with another odontogenic tumour in which case wider excision may be required.

Reference

This thirty five year old male patient presented with a slow growing swelling in the right body of the mandible (Fig.1). The patient also experienced intermittent pain from time to time in the region of the swelling. What are the most important radiological features and what is your diagnosis?
What’s new for the clinician?
Summaries of and excerpts from recently published papers

1. Are Oral Hygienists just as good as Dentists in identifying dental caries in children?


Preamble
Oral hygienists are considered the drivers of preventive oral health programs among children and adults. Both the proposed new National Oral Health Policy and the Re-engineered Primary Health Care Plan for South Africa have focused on school based programs for the prevention of dental caries in children. The prevalence of tooth decay among 4-5 year olds and 6 year olds nationally is 50.6% and 60.3% respectively with some provinces such as the Western Cape reporting prevalence rates of up to 77% for 4-5 year olds and 82% for 6 year olds. Consequently, huge prevention programs that are being planned/implemented in many provinces and Oral Hygienists will be expected to diagnose caries and record dmft scores among children.

Additionally, there are many rural areas without dental professionals and the endeavour to increase access to dentistry in these areas to meet the needs of the underserved, has resulted in new care models that include electronic health records (EHR), intraoral photographs and mobile radiographic equipment, all components of teledentistry. Utilization of dental hygienists, dental assistants, nurses, physicians and health educators has also been suggested to contribute towards meeting the oral health needs in many areas. Teledentistry or e-oral health uses encrypted patient electronic data that are stored and forwarded to another health provider for review, diagnosis and treatment options, or the patient data can be viewed in real time through videoconferencing for the same purposes. The use of teledentistry is an effective and efficient means for the identification of dental caries.²

Materials and Methods
This study was undertaken in the Department of Dental Hygiene at the University of Tennessee Health Science. A sample of 82 children (4–7 years of age) was selected from one elementary school to participate in the study. Participants were included if they met the age criteria and informed consent had been granted. Conversely, participants were excluded from the study if they did not cooperate or were unavailable for either the clinical screening or intraoral photography sessions.

Of the 82 participants, 78 met inclusion criteria. One child refused to cooperate with the taking of photographs, and three children were absent from school on the day scheduled for screening.

Four examiners participated in the study: two clinical examiners (dental hygienist and dentist) and two teledentistry examiners (dental hygienist and dentist). Each recorded the following on the patient chart: missing primary teeth, existing permanent teeth, dental caries and existing restorations.

Teledentistry examiners received written and oral instructions for accessing intraoral images posted on a specified site within Blackboard® (a course management software) accessible only by the principal investigator (PI) and teledentistry examiners. The PI conducted a one hour face-to-face training session with the teledentistry examiners. Photographic images of dental caries in primary teeth and missing primary teeth were reviewed on the face-to-face training session.

ACRONYMS
DFS: Decayed/filled surface
EHR: Electronic Health Records
PI: Principal Investigator

Kumar (2016) reported on a study that sought to compare the identification of dental caries by oral hygienists and dentists by both clinical and teledentistry methods.²
and transitional dentitions were used for training. Location of lesions, presence of colour change in enamel and examiner internal criteria for determining the presence of a carious lesion were discussed to arrive at an understanding of visual characteristics relevant to the identification of dental caries. Recording of existing restorations, missing teeth and dental caries on the geometric chart was reviewed. Both teledentistry examiners were provided a three-ring binder with instructions and with coded geometric charts for each participant.

All data (charts and photographs) were coded with the participant's number.

An Apple iPhone 4S® was used to capture photographs of the dentition on all children. Cheek retractors were held by the participant whilst photographs of the facial surfaces of anterior teeth were obtained, and paediatric intraoral mirrors were held by a dental hygienist when photographs of the maxillary and mandibular occlusal surfaces were taken. Photographs were placed in a coded album according to participant number.

The data recording dental caries and restorations for each participant were converted to Decayed/filled surface (DFS) scores by the PI, resulting in four DFS scores for each participant that could be used for examiner comparison and analyses. Decayed filled surface scores were also used to capture extent of disease.

RESULTS

The teeth of the 78 participants were identified by FDI number, resulting in data being collected for twenty categories of primary teeth and 21 categories of permanent teeth. Of these 41 categories, 25 presented with a DFS score of zero for all examiners. DFS scores ranged from 0 to 55 for participants in the study. With the large number of zero DFS scores, the data were negatively skewed requiring use of nonparametric statistics.

Spearman's correlations were conducted to examine the relationship between DFS scores by type of examiner. Results revealed a high positive correlation of $\rho = 0.993$ between the two clinical examiners, $P < 0.01$, and a correlation of between $\rho = 0.749$–$0.808$ between all other groups of examiners ($P < 0.01$).

The Freidman's test found a significant difference in DFS scores among the four examiners (clinical dentist, clinical dental hygienist, teledentistry dentist and teledentistry dental hygienist), $\chi^2 (3) = 83.43, P < 0.001$ but when the DFS scores were compared only between the clinical dentist and the clinical dental hygienist, there was no statistical difference. There was a statistically significant difference between the DFS scores of the teledentistry dentist and the other three examiners. Specifically, a significant difference was found between the teledentistry dentist and the teledentistry dental hygienist ($Z = 5.20, P < 0.01$), clinical dentist ($Z = 5.59, P < 0.01$) and the clinical dental hygienist ($Z = 5.74, P < 0.01$). Most importantly, there was no significant difference between the DFS scores of the clinical dentist and the teledentistry dental hygienist ($P > 0.10$).

CONCLUSIONS

The authors concluded that the clinical dental hygienist and the clinical dentist showed a significant positive correlation in diagnosing caries in children in the clinical setting. The teledentistry dental hygienist and the clinical dentist DFS scores were not significantly different ($P > 0.10$).

IMPLICATIONS FOR PRACTICE

This study found that dental hygienists and dentists performed essentially equally well in the clinical identification of dental caries in children. However, clinicians must note that this might not apply to all settings and training and calibration is essential for fair comparisons to be made.

Reference


2. The effects of preheated dental fissure-sealing materials on marginal and internal integrity.


The efficacy of pit and fissure sealing to prevent dental occlusal caries lesions is now well established. Recently, clinical trials have shown similar efficacy when resin-based materials are used as a secondary preventive approach in the management of non-cavitated occlusal carious lesions in dentin. These findings extend the use of pit and fissure sealants in clinical dentistry. However, retention is an integral requirement for the success of a resin-based sealant. Incomplete retention of resin-based sealant materials has been associated with the risk of subsequent caries or caries progression. Thus, attempts should be made to improve the material strength of sealing materials and their marginal adaptation to occlusal enamel.

The use of a flowable composite for fissure sealing has been suggested in order to provide higher retention rates and better physical properties than a traditional fissure sealant. Pre-heating composite materials before
photoactivation is assumed to improve the physical properties of the material. Preheated flowable composites have also been shown to provide superior hardness and resistance to softening under pH cycling than materials photoactivated at room temperature.

This finding may indicate that preheated flowable composites will provide superior retention rates on occlusal fissures.

Conventional methods for detecting interfacial gaps, such as dye penetration, bacterial leakage and electrochemical leakage tests, are all invasive. Furthermore, destructive techniques, such as microscopy on sectioned samples, are commonly used to characterise the microstructure and damage of polymer matrix composites on a small scale. Examining these features non-destructively would be very desirable, as the structure would remain intact because no sectioning is required. Optical coherence tomography (OCT) has been found to be a powerful, non-destructive tool for examining polymer matrix composites in terms of microstructure determination and mechanical property prediction, void and defect detection, and damage evaluation, with a high resolution and penetration depth of up to a few millimetres.

Borges and colleagues (2016) from Brazil undertook an in vitro study that sought to evaluate the influence of pre-photoactivation temperatures (room temperature, 25°C; and 68 °C) on the marginal and internal integrity (occurrence of voids) of a flowable composite and a traditional fissure sealant in occlusal fissures using OCT. The null hypotheses tested were as follows: (i) preheated materials (68 °C) would not favour improved marginal and internal integrity; and (ii) the flowable composite would not show better marginal and internal integrity than the fissure sealant.

MATERIALS AND METHODS

Forty totally erupted human third molar teeth, free of macroscopic caries, abrasions and staining on the occlusal surface (assessed by visual examination), and extracted for surgical reasons from 18- to 40-year-old patients, were used. The teeth were assigned to four experimental groups (n = 10 per group), according to the sealing material [a flowable composite, Permaflo (Ultradent), and a fissure sealant, Flurosheild (Dentsply)] and the pre-photoactivation temperature (room temperature, 25°C; and preheated, 68°C).

For sealing, the occlusal surface was cleaned using pumice slurry, etched with 37% phosphoric acid for 15 seconds, washed with an air/water spray for 30 seconds and dried with an air stream, according to the manufacturer’s recommendations. Sealing materials at room temperature were applied with a dental probe to help the material flow over the pits and fissures. The material was then light cured for 20 seconds using the Coltolux LED (Coltène/Whaledent) light-curing device at an intensity of 1263 mW/cm². The tip was positioned over the teeth in the centre of the occlusal surface so that light could propagate throughout the surface of the material. Preheated materials were warmed using a 700-W microwave device. 0.5mL of each material was measured, dispensed into a glass cup and heated for 60 seconds to reach a temperature of 68°C. After heating, the materials were immediately applied over the fissure, following the same steps described for the materials at room temperature.

After sealing, the teeth underwent thermocycling. Alternate baths at 5 ± 3°C and 55 ± 3°C were applied for 500 cycles, each for 30 seconds. An area of occlusal enamel (4mm in the mesiodistal direction × 4mm in the buccolingual direction) was selected in the centre of the main occlusal fissure involving the sealant and margins. The tooth was isolated with two coats of acid-resistant nail varnish, except for the occlusal-delimited area. The samples were then subjected to a 14-day pH-cycling model, simulating a high cariogenic challenge. Each cycle consisted of a 6-h immersion in a demineralising (DE) solution, followed by an 18-h immersion in remineralising (RE) solution. Each tooth was immersed in 40mL of DE solution, representing 2.5mL of solution/mm² of exposed enamel area. The teeth were washed in deionised water for 30 seconds, dried with absorbent paper and individually immersed in 20mL of RE solution, representing 1.25mL of solution/mm² of exposed enamel area. Both solutions contained thymol crystals to avoid microbial growth. The solutions (DE and RE) were changed after 7 days.

A commercially available OCT system was used for microstructure determination and mechanical property prediction, void and defect detection in each tooth and images were obtained.

The images were analysed with regard to the presence/absence of gaps in the margins and internal voids in the sealing material by a calibrated operator. The number of images with no gap or internal voids, interfacial gaps and/or internal voids was also measured and the mean values for each experimental group were obtained. Data were submitted to two-way analysis of variance and the Tukey test (P < 0.05).

RESULTS

There were statistically significant differences in the number of images with marginal gaps between materials and between temperatures (P < 0.01). Preheated materials had a lower number of marginal gaps than those at room temperature. The flowable composite had fewer marginal gaps than the fissure sealant, regardless of the temperature of the material.

There were statistically significant differences in the number of images with internal voids between the materials and between the temperatures (P < 0.01). Preheated materials had a lower number of internal voids than those at room temperature. The flowable composite presented fewer internal voids than the fissure sealant, regardless of the temperature of the material.

CONCLUSIONS

The authors concluded that preheating of fissure-sealing materials had a positive effect on the marginal and internal integrity of occlusal fissures. The flowable composite tested performed better than the traditional fissure sealant tested.

IMPLICATIONS FOR PRACTICE

Clinicians should note that this is an in-vitro study but the improved performance of the materials (especially flowable composites) at pre-heated temperatures suggest that clinicians should consider this mode of use in their practices to obtain better results.

Reference
The psychological impact of malocclusion on patients seeking orthodontic treatment at a South African oral health training centre. (p 200)
1. It appears that most patients do not seek orthodontic treatment to enhance their functional capacities.
   a. True
   b. False
2. This study and others have found that younger participants have more concerns about severe malocclusions.
   a. True
   b. False
3. The perceived increase in the numbers of Black patients seeking orthodontic treatment may be related to (identify the incorrect statement):
   a. improved socioeconomic positions,
   b. increased incidence of periodontal disease
   c. increased oral health awareness,
   d. changing perceptions about self-image especially in males,
   e. improved access to orthodontic treatment.
4. The clinician assessment of the status of malocclusion by the clinician was found to be less important to the patient than his or her own assessment.
   a. True
   b. False

‘Dentistry: Not a Critical Skill?’ (p 206)
5. Since the 2014 amendments to the immigration act, Dentistry is considered a critical skill
   a. True
   b. False
6. A foreign born dentist can immediately apply for independent practice
   a. True
   b. False
7. Dentistry is on New Zealand’s ‘Immediate Skills Shortage List’?
   a. True
   b. False
8. There are …dentists per 1000 population in South Africa?
   a. 0.11
   b. 0.25
   c. 2.43
   d. 0.77
9. The profession which would need the greatest percentage increase to meet WHO recommendations is:
   a. Public Health Managers
   b. Public Health Physicians
   c. Dentists
   d. Pharmacists
10. Despite a perception that postoperative exercises would be beneficial after surgical intervention for a fractured mandibular condyle no standardized regime of exercises could be found in the literature.
    a. True
    b. False
11. The Delphi method is based on reviewers achieving consensus at 70% agreement regarding all answers.
    a. True
    b. False
12. Stability amongst reviewers was reached regarding physiotherapy evaluation and treatment commencing day one after either ORIF surgery or closed reduction.
    a. True
    b. False

The development of a physiotherapy intervention program for mandibular condyle fracture patients. (p 212)
10. Despite a perception that postoperative exercises would be beneficial after surgical intervention for a fractured mandibular condyle no standardized regime of exercises could be found in the literature.
    a. True
    b. False
11. The Delphi method is based on reviewers achieving consensus at 70% agreement regarding all answers.
    a. True
    b. False
12. Stability amongst reviewers was reached regarding physiotherapy evaluation and treatment commencing day one after either ORIF surgery or closed reduction.
    a. True
    b. False

The importance of record keeping in Forensic Odontology: A case discussion and general medico-legal guidelines for all practitioners. (p 224)
13. Forensic identification may be achieved on the basis of matching the characteristics of one single tooth.
    a. True
    b. False
14. There are guidelines available from the HPCSA which detail correct record keeping.
    a. True
    b. False
15. Patients with severe obstructive sleep apnoea are considered good risks for surgery-based sedation.
   a. True
   b. False

Maxillo-Facial Radiology case 141 (p 234)
16. The Calcifying odontogenic cyst arises from odontogenic epithelium in the gingivae of the mandible and maxilla.
   a. True
   b. False
17. The Calcifying odontogenic cyst has a number of variants.
   a. True
   b. False

Clinical Windows (p 183)
18. In the Daniel & Kumar study, differences in the Decayed Filled Surface (DFS) scores between the clinical dentist and the clinical dental hygienist were not statistically significant.
   a. True
   b. False
19. In the Daniel & Kumar study, there were no significant differences between the DFS scores of the clinical dentist and the teledentistry dental hygienist.
   a. True
   b. False
20. In the Borges et al study, preheated materials had a lower number of marginal gaps than those at room temperature.
   a. True
   b. False

ETHICAL
Dealing with non-compliant, abusive or aggressive patients in dental practice (p 232)
21. Chapter 2 of the National Health Act makes provision for a healthcare provider to refuse to treat a patient who is physically or verbally abusive or who sexually harasses him or her.
   a. True
   b. False
22. The ethical principles of beneficence, respect for patient autonomy and do no harm should always be considered in the management of non-compliant, abusive or aggressive patients.
   a. True
   b. False
23. Difficult patients and situations should be contained in a manner that
   a. Avoids placing patients at risk
   b. Maintains the continuity of patient care and safeguards their rights and the quality of the dental care they receive
   c. Avoids bringing the profession into disrepute
   d. Maintains public confidence in the profession
   e. All of the above
24. The principle of respect for autonomy is absolute
   a. True
   b. False
25. Dentists may discontinue treatment of a patient
   a. only after reasonable notice has been given to the patient
   b. if the patient has had a reasonable time to secure the services of another dentist
   c. when all other dental treatment has been completed.
   d. All of the above

Readers will note that we have reduced the number of General Questions to twenty whilst retaining five Ethics based questions. Our allocation of CPD points remains unchanged. There is optimism that this section will continue to provide members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure Continuing Education. Please note that SADA is no longer offering the ‘CPD via SMS’ service.

Contact Ann Bayman at SADA, Tel: 011 484 5288, for any enquiries and assistance.

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or via fax to 086 683 0392

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