Gloriosa superba the familiar- and attractive- Flame Lily. Belongs to the family Colchicaceae, which are bulbous plants. The white fleshy Flame Lily tuber yields a juice which is used to calm toothache and as a mouthwash to treat oral infections.

9TH WORLD CONGRESS OF THE INTERNATIONAL FEDERATION OF ESTHETIC DENTISTRY

The greatest speaker line-up SA has ever seen!

Maurice Salama
Henry Salama
Guilherme Cabral
David Garber
Larry Riskin
Silas Duarte
Irena Salter
Peter van der Meulen
Avishai Sadan
Peter Moy
Howard Gluckman
Peet van der Vyver
Renato Cocconi
Oded Bahat
Homa Zadeh
Marcus Hurzel

www.ifed-2015.com

HOSTED BY THE SOUTH AFRICAN ACADEMY OF AESTHETIC DENTISTRY AND THE INTERNATIONAL FEDERATION OF ESTHETIC DENTISTRY
**CONTENTS**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>Redolent olfaction - WG Evans</td>
</tr>
<tr>
<td>91</td>
<td>Adrian Werendly Roux Rademeyer - W Dreyer</td>
</tr>
<tr>
<td>92</td>
<td>Brian Charles Preston - B Preston, WG Evans</td>
</tr>
<tr>
<td>93</td>
<td>Herman Adolphe Reinach - P Botha</td>
</tr>
<tr>
<td>94</td>
<td>Managed care contracts - P Govan, M Khan</td>
</tr>
<tr>
<td>96</td>
<td>Dr Johan Smit receives an honour</td>
</tr>
<tr>
<td>98</td>
<td>The prevalence of musculoskeletal disorders among dentists in KwaZulu-Natal - R Moodley, S Naidoo</td>
</tr>
<tr>
<td>104</td>
<td>Microbial contaminants on dental bib chains with attached clips - J Molepo, M Molaudzi, TRMD Ralephenya</td>
</tr>
<tr>
<td>118</td>
<td>Who visits a periodontist and why? - A Volchansky, S Prinsloo</td>
</tr>
<tr>
<td>120</td>
<td>Oral medicine case book 68: Oral ulceration caused by rifampicin-resistant tuberculosis - MT Peck, J Hille, A Snyman, WP Dreyer</td>
</tr>
<tr>
<td>123</td>
<td>Maxillo-facial radiology case 129 - CJ Nortjé</td>
</tr>
<tr>
<td>124</td>
<td>Ethical considerations when treating patients with eating disorders - S Naidoo</td>
</tr>
<tr>
<td>126</td>
<td>What’s new for the clinician? - V Yengopal</td>
</tr>
<tr>
<td>132</td>
<td>Continuous Professional Development</td>
</tr>
<tr>
<td>134</td>
<td>Listing of dental product and service providers</td>
</tr>
<tr>
<td>136</td>
<td>Short advertisements: practices, equipment, locums, employment etc.</td>
</tr>
</tbody>
</table>

**EDITORIAL**

90    Redolent olfaction - WG Evans

**OBITUARIES**

91    Adrian Werendly Roux Rademeyer - W Dreyer
92    Brian Charles Preston - B Preston, WG Evans
93    Herman Adolph Reinach - P Botha

**COMMUNIQUE**

94    Managed care contracts - P Govan, M Khan

**PERSONALIA**

96    Dr Johan Smit receives an honour

**RESEARCH**

98    The prevalence of musculoskeletal disorders among dentists in KwaZulu-Natal - R Moodley, S Naidoo
104    Microbial contaminants on dental bib chains with attached clips - J Molepo, M Molaudzi, TRMD Ralephenya

**CLINICAL COMMUNICATION**

118    Who visits a periodontist and why? - A Volchansky, S Prinsloo

**CASE BOOK**

120    Oral medicine case book 68: Oral ulceration caused by rifampicin-resistant tuberculosis - MT Peck, J Hille, A Snyman, WP Dreyer

**RADIOLOGY CASE**

123    Maxillo-facial radiology case 129 - CJ Nortjé

**ETHICS CASE**

124    Ethical considerations when treating patients with eating disorders - S Naidoo
126    What’s new for the clinician? - V Yengopal

**CONTINUOUS PROFESSIONAL DEVELOPMENT**

132    CPD questionnaire

**BUSINESS DIRECTORY**

134    Listing of dental product and service providers

**CLASSIFIEDS**

136    Short advertisements: practices, equipment, locums, employment etc.

---

**Editorial, Advertising and Copyright Policy**

Opinions and statements, of whatever nature, are published under the authority of the submitting author, and the inclusion or exclusion of any medicine or procedure does not represent the official policy of the South African Dental Association or its associates, unless an express statement accompanies the item in question. All articles published as Original Research Papers are refereed, and articles published under Clinical Practice or Reviewed Notes are submitted for peer review.

The publication of advertisements of materials or services does not imply an endorsement by the Association or its associates, unless an express statement accompanies the item in question. All articles published as Coffee Break or Practice Notes are subject to the approval of the Editor. Guidelines for authors can be obtained from the editorial office. All rights are reserved.

**Accredited by the Department of Education**

SADJ is published 10 times a year by E-Doc cc on behalf of The South African Dental Association. © 2015 E-Doc cc
Redolent olfaction

An acquainted scent....
That of soft, wet mud stepped on...
Oh, the good old days!

It may not be surprising that it is in Haiku that we may find the most expressive description of just how evocative are smells... the three lines above, written by Sneha RV, present as a "smell memory" an entire image of youthful exuberance in the enjoyment of... slush! Haiku is a traditional form of Japanese poetry which originated as the concept of "the introductory lines of light-linked verse". There are three lines in strict Haiku verse, the first having five syllables, the second, seven, whilst the third has again five syllables. In English, attempts at meeting the 5/7/5 syllable rule are sometimes waived to a compromise 6/7/6 as English is not as precise as Japanese. The imagery may be described as a "Zen Snapshot" of a scene, an everyday occurrence, or a natural phenomenon.

For generations of patients, the iconic aroma of Oil of Cloves has remained deeply ingrained in olfactory memory with the immediate identification of the proximity of a dental surgery. As you exited the lift on the fourth floor, there it was, both the recognition of the dentist and the realisation that soon it would be your turn in the chair.

Dentistry has made phenomenal progress over recent decades. That has been particularly evident in the fields of technology and treatment techniques. Markowitz and Vassilou,\(^3\) in an Editorial published last year by Quintessence International, observed, on the other hand, that "little progress has been made applying the existing vast arsenal of pharmacological tools to the treatment of reversible pulpal pathologies". That statement could be widened to include all facets of clinical dentistry. Would it be too ambitious to consider the possibility that there are indeed "wondrous" medications awaiting discovery amongst our rich flora?

And so to a Haiku to do homage to Eugenol:

Memories of clove
Open mouthed in the surgery
Bless’d relief from pain

In low concentrations Eugenol has been identified as having local anaesthetic, anti-microbial and anti-inflammatory effects. The oil is derived from \textit{Eugenia caryophyllata}, the Clove tree found in Madagascar, Zanzibar and nearby lands. It is at least partly because of the considerable role Eugenol has played in Dentistry that the theme this year for the front cover of the Journal is Medicinal Plants of Africa. Even at this early stage of the year, it is evident that there are many botanical candidates, all relevant to the practice of dentistry, which will vie for the Front Cover picture.

References
2. Dr. David Pashley, BS, MDDS, PhD, Regents’ Professor of Oral Biology, School of Dentistry, Medical College of Georgia, Augusta, USA. Visited South Africa last year at the 19th International Symposium of Dental Hygiene.
Adrian Werendly Roux Rademeyer
29 June 1939 – 18 March 2015

Adrian Rademeyer, or “Boeloe” as he was affectionately known to his colleagues and friends, passed away on 18 March 2015, at his home after a courageous battle with cancer, and in the company of his loved ones. With this, the profession lost one of its stalwarts and his family lost a loving husband and father. But his legacy of caring, to both family and patients, and his commitment to his chosen profession, will sustain his memory for many years to come.

Adrian was born in Bulawayo, Zimbabwe (then Southern Rhodesia), hence his nickname of “Boeloe”. He matriculated at the Hoërskool Jan van Riebeeck in Cape Town in 1956, whereafter he completed his BChD studies at the University of Pretoria in 1961. During the years 1962 to 1977 he practiced as a dentist in Tzaneen, London and Cape Town. In 1977 he was appointed as Senior Lecturer in the Department of Restorative Dentistry at the Faculty of Dentistry, Stellenbosch University, a position he occupied until his return to general practice in Claremont, Cape Town in 1982. He was awarded the degree MSc(DentSci) by Stellenbosch University in 1986 and, even whilst in private practice, he maintained his academic involvement as part-time lecturer at the Faculties of Dentistry of Stellenbosch University and later of the University of the Western Cape, until his final retirement in 2013.

Boeloe remained actively involved in the affairs of his profession in many capacities: As long-time member of the local branch committee (Western Cape) of the former Dental Association of South Africa (DASA) and its successor, the South Africa Dental Association (SADA) and branch President in 1984/5; elected member of Federal Council and member of Exco (1984–1996); chairman of the Practice Review Committee, 1987 – 1995; Managing Editor of the South African Dental Journal (Feb 1999 – April 2002); Editorial Director, SA edition of Dental Update, 1982 – 1999; and Dental Mediator since 2011. These sterling services were recognized by his peers when he was awarded the DASA Bronze Medal and later Honorary Life membership of SADA. In addition, Boeloe was an elected dental member of the SA Medical and Dental Council (predecessor to the current HPCSA) and member of its Committee of Preliminary Enquiry (Dental) for the period 1990 – 1994.

Impressive as Boeloe’s service to his profession may be, it was his inherent qualities of caring, compassion and unwavering ethical commitment that have endeared him to his colleagues, one of whom recently expressed these sentiments succinctly: “Boeloe was a moral compass to his peers”. On a more personal note, Boeloe will be best remembered as the friend with the soft, sincere and engaging smile whilst enquiring about your well-being. Moreover, his artistic achievements and love of nature reveals a tender side to this remarkable man. Many colleagues are the privileged owners of one of Boeloe’s stunning watercolour paintings and will thus be constantly reminded of a colleague who had made an indelible impression on the world around him.

Our condolences are extended to his wife, Patricia, and their three charming children, André, Charlotte and Jane, and his five granddaughters. It is touching to note that, in his CV, he lists these five granddaughters as his primary interest. May his family be sustained in this time of grief by the lasting and happy memories of a remarkable husband, father and grandfather. Our sincere thanks that we, his colleagues, were allowed to share Adrian’s life with you.

May this gentle giant of the profession rest in peace; his task completed with unwavering integrity and sincere compassion. We salute a champion.

Wynand Dreyer
Brian Charles Preston
19 November 1937 - 25 March 2015

Brian Charles Preston, also known as “CBP”, was born, grew up and was schooled in Johannesburg, South Africa. He took a momentous decision to become a dentist and studied at the University of the Witwatersrand, Johannesburg. Graduating in 1961 with the degree Bachelor of Dental Surgery from the Faculty of Dentistry, he then spent a few years in London where he opened a general dental practice. After gaining that experience, Brian returned to South Africa in the mid-1960’s and entered private practice in the Northern Cape. However, academe called and it was not long before Brian assumed a post as Junior Lecturer in his Alma Mater in 1967. That was the start of an illustrious academic career. He soon focussed on the discipline of Orthodontics and successfully applied to become an Orthodontic Registrar, completing the degrees Diploma in Orthodontics in 1973 and Master of Dentistry in the branch of Orthodontics in 1974.

CBP established an orthodontic practice which he operated on a part-time basis as he retained an intense interest in the academic challenges and continued to hold a post at the Faculty. By 1978 Brian had been appointed Head of the Department of Orthodontics and held the Chair as Professor. His research commitments focused on growth and were directed towards a doctorate, studies which he continued despite his assuming ever greater administrative responsibilities in the Faculty, for in 1987 Professor Preston was appointed Dean of the Faculty of Dentistry and Director of the Oral and Dental Hospital, a joint position between the University and the Gauteng Department of Health. The PhD was successfully achieved in 1988 and was awarded by the Faculty of Medicine, University of the Witwatersrand. Brian conducted with distinction the affairs of the Faculty of Dentistry through to his retirement from Wits when his service and achievements were recognised by conferment of the title Emeritus Professor.

“CBP” was far from abandoning academe, however, and in 1997 he joined the faculty of the State University of New York (SUNY) at Buffalo as Chairman and Professor, Department of Orthodontics, within the School of Dental Medicine. He soon brought to bear his considerable commitment and foresight and his Department has become a highly sought-after centre for postgraduate studies by national and international students. Over the last several years, Professor Preston travelled extensively as an acclaimed lecturer, visiting and conducting courses in the Middle East, China, Japan, Australia, and South Africa. He relied on evidence-based material, largely his own work, and drawn from his comprehensive list of publications.

Just how many students, dentists and orthodontists are indebted to Brian, for his enthusiasm, his mentorship, his guidance and his example? How many families, how many patients, how many friends? His is a legacy which will remain firm in their memories.

As may be expected, Brian's alert and ever enquiring intellect lead him into many pursuits beyond orthodontics...he was a player of the piano, an incisive, but constructive, critic of professional papers, a Fellow of the College of Surgeons (South Africa), a builder, an accomplished tennis player (University teams), an avid cyclist. Whilst in the UK he took up flying as a hobby, held a Private Pilots Licence and was President of the Wits Flying Club for many years. Speed was obviously a fascination and he revelled in the sport of skiing, where he became an Instructor. Not satisfied with above the ground action, Brian dived into the world of scuba ...and he and daughter Bridgette enjoyed many hours of entrancement under water.

Brian was a constant and reliable friend, one who could arrive unannounced but would always be welcome, one whose intuitive advice was invaluable, one who would lend support and succour whatever the circumstances. He combined insight and foresight to a remarkable degree, characteristics which took him to the top of the Orthodontic tree.

He was also courageous and determined…and his struggle to sustain his life was evidence of his total commitment in all his endeavours.

It has been a signal privilege to have known and worked with Brian. For all those who knew him, but especially for Joy, his wife and for Bridgette, life with Brian was one of constant surprises as he opened new pathways, of sharing new opportunities, of close companionship and love. Their wonderful support over the last months of his final illness was testimony to that commitment together.

So many in so many places will deeply miss Brian and his impact on their lives. He was, quite simply, my true friend.

Bridgette Preston, Bill Evans
Herman Adolph Reinach
7 August 1936 - 26 March 2015

A giant - in figure, voice and deeds – has passed away!

When he retired, it left a gaping hole that took a while to fill. He was a man with a heart to match his imposing manner and figure - Herman just could not be ignored. He was where the action was and if there were none, he made something happen... he was simply too industrious and active and even towards the end of his life, in spite of failing health - he was fulfilling a function to actively assist his fellow man in the facility where he resided. An unfortunate motor car accident cut his orthodontic career short and led to the request by his children and other family members that he should close his practice and move to his last abode, a retirement facility in Bloemfontein.

Herman had many firsts but the name “Dr Reinach” first came to public attention after the earthquake in Ceres in 1969. He had been elected Mayor of this Boland town in 1964 at the young age of 28... and when the earthquake struck he immediately handed his practice over to a locum in order to concentrate on relief work for the next year.

After qualifying at Maties in 1975 he was the first orthodontist to practice full time in Bloemfontein with branch practices in Kimberley and Welkom. He spotted an opportunity and founded the orthodontic supply company Reinor in 1981 and successfully did business from the unlikely base of Bloemfontein. Thus he was the first person to save us all the hassle involved in the direct importation of our orthodontic materials and thereby to rescue us from many hours of queuing at the post office and arguing with recalcitrant officials about import duty.

On top of this all he was involved in stud sheep farming, cattle farming, fresh-water crayfish, gold fish and other business enterprises as well as a caravan park. Herman’s achievements could fill several columns. One of his early enterprises was a holiday resort in the Cape for the exclusive use of a section of the nation that had no/or very little access to other holiday accommodation at that time. A younger Herman would have been seen on a bull-dozer, levelling the building site in his spare time!

He was City Counsellor in Bloemfontein, member of SADA Federal Council for many years, member of SAMDC for most of his active life, but also consultant for post graduate students at Medunsa for 10 years, helping to qualify two Heads of Orthodontic Departments and a present Dean.

Indeed, how many lifetimes did he fit into one!...?

Herman, we will miss your arguments at meetings, your drive and enterprise arranging tours to congresses, your hearty, booming laughter at socials and, not to forget, your ability to laugh at yourself when you made the odd mistake! It was an honour to have worked with you, to see how you stayed true to Herman Reinach, walking by the light you had.

To Sareze, your children and your family, our condolences and everlasting gratitude for your continued support to Herman, especially during his last days. To his children Ronel and Herman, as well as to all the close family who shared his life, every condolence and especially to our colleagues, Norman and Monica who followed in his footsteps. It could not all have happened if he had not led by example. Also a deep appreciation to his cousin Dr Andre Delport, who so ably supported him through challenging times and who had to make extremely difficult decisions in managing Herman’s orthodontic practice after the motor car accident.

And to you, our friend, but also a friend to all those people you served by way of all your endeavours, may those that stay behind experience joy and comfort in knowing that you not only did what you had to do, but above all... you walked the extra mile and more... and did it with big strides! Great friends are hard to come by, and many of us, both professionally and personally, have lost a great friend.

We wish you a safe journey to your spiritual home. It was a privilege to have known you and your spirit and example will forever leave deep footprints in our hearts.

Until we meet again.

Piet Botha
At the end of each year SADA is inundated with calls and emails regarding Managed Care contracts presented to them by Medical Schemes and their contracted Managed Care companies. Members call the Association for guidance on these contracts. Some are adamant that SADA should advise its members not to sign these contracts, whilst other members argue that they are still third party funder dependent and therefore would consider signing contracts.

Every contract sent to SADA by members is thoroughly studied for possible clinical and legal implications. We make suggestions and recommendations that would be beneficial to members as well as the patients and amended contracts are then sent to the Managed Care organisations (MCO). Financial constraints are reasons usually given by the organisations for not acceding to requests made by SADA.

Often, existing contracts that were not cancelled by either party remain in force and our members are then reminded about their contractual obligations.

Members must appreciate that a ‘one size fits all’ response cannot be given for all the different types of contracts presented to dentists. SADA will assist in highlighting the pitfalls so that members are aware of the restrictions before signing these contracts.

Practitioners who do not want to deal with third party funders are under no obligation to sign any network, preferred provider or designated provider contracts or to charge fees equivalent to those determined by Medical Schemes or Managed Care organisations.

We emphasise that those contracts offered to members and reviewed by SADA from time to time, almost all contain provisions that place obligations on practitioners that may cause conflict with their professional, clinical and ethical responsibilities. Practitioners are urged to consider these and other issues mentioned below before signing contracts.

Managed Care assesses clinical and financial risks and determines healthcare in terms of what is cost-effective within the constraints of what is affordable, and prescribes clinical management-based programmes which may not necessarily be appropriate for patients.

MCO’s use a set of formal techniques designed to monitor and evaluate criteria such as clinical necessity, appropriateness, efficacy and efficiency of health care services, procedures or settings on which are based “appropriate” and predetermined managed health care interventions.

Members are also offered contracts appointing them as “Designated Service Providers” (DSP) who will deliver treatment or services to satisfy Prescribed Minimum Benefits (PMB), at a contracted rate. Schemes can prescribe treatment protocols in terms of PMBs to improve risk management. These must be developed on evidence based medicine. PMBs are a set of defined benefits to which medical scheme members have access, regardless of which benefit option is selected.

The Regulations under the Medical Schemes Act specifically provide for managed care contracts, stating that managed health care contracts must clearly set out each party’s responsibilities, that the MCO has been accredited and that the Medical Scheme remains responsible for services rendered to their members.

The Regulations also provide that when Managed Care entails the use of protocols, these must be evidence based and must take into account cost-effectiveness and affordability. Dentists must be supplied with protocols on request and must motivate for exceptions.

Dental practitioners are entitled to challenge the scientific basis of these programmes. They should also enter into discussions with the particular scheme (together with their peers) on the conclusions reached in any instance. Practitioners must remember they will be placed in a dual loyalty situation, and should respect the fact that their primary duty is to their patients.

**MINIMUM PROVISIONS IN MANAGED CARE CONTRACTS**

The Regulations stipulate minimum provisions in Managed Care contracts, which include:

1. P Govan: Legal Advisor to the Association.
• Provision for at least 90 days’ notice before terminating the contract except where there is material breach and the availability of health care is likely to be compromised.
• Confidentiality of beneficiary’s information.
• Right of access of Medical Schemes to treatment records relating to diagnosis and treatment of beneficiary, which are held by MCOs or a practitioner;
• Determination of the duration of the agreement;
• Clearly defined termination arrangements;
• Formal mechanisms which must deal with disputes between contracting parties;
• The right of the patient to complain and appeal against the organisation. Such complaints must be lodged with the Scheme;
• The lack of liability of any beneficiary to the MCO or any participating provider in the event that the Managed Care services are sub-contracted to another provider;
• The availability of service assessment, including service levels required of providers, performance measures and penalties or remedies for non-performance by contracting parties;
• The recording in writing of all fee adjustments, signed by the parties.

The Health Professions Council has also issued a note dealing with Managed Care contracts. Practitioners who are not happy with MCO contracts are advised to consult the HPCSA. Practitioners must not allow intervention by advisors in the management of patients. The contractual terms must be aligned with the professional conduct expected from practitioners and the professional independence of practitioners must not be compromised.

In terms of the Consumer Protection Act (CPA), all schemes, MCO’s and practitioners are required to provide, in language the patient can understand, information on the services they render and the terms and conditions to which they are subject. The patient must thus know the details of any Managed Care contract and whether the practitioner is a DSP or a Preferred Provider.

SOME COMMON CLAUSES

1. Medical schemes and MCO usually promote your practice as a ‘Preferred Provider’ or ‘Network Provider’ or ‘Designated Service Provider’ to their members. Although practitioners may see this working to their advantage by increasing their patient base, these designations may contravene the provisions of the ethical rules of conduct against touting, in terms of which attention is drawn to the rendering of professional services to entice the public to the practice.

2. Most contracts force practitioners to sign the contract for benefits plans and rates which do not necessarily suit the practitioner’s needs. Plans with primary oral health care services are sometimes combined with those offering specialist services. Practitioners are not afforded an opportunity of choosing to which plans they are willing to contract.

3. Some contracts force practitioners to sign as both Preferred Provider and as a DSP and do not permit a choice. It also seeks to reimburse providers who sign DSP and Preferred Provider contracts at scheme rates for prescribed minimum benefit (PMB) conditions. This is contrary to the provisions of Regulation 8 in terms of which PMB conditions must be paid in full.

4. The majority of contracts also provide for ‘practice profiling’ of practitioners. This is a tool used to measure the financial performance of the practitioner. The more the practitioner saves the scheme money, the more the scheme incentivises the practitioner by providing preferential rates. While practitioners should strive towards being cost-effective, this should not induce them to not render the best possible care to their patients.

5. Some contracts also require the participating provider to participate in data gathering processes on disease management, clinical review or information sharing which are used to formulate recommendations to the Scheme or MCO. Dentists may then have guidelines imposed upon them without participating in their determination.

6. MCOs determine sets of treatment protocols and formularies which means they prescribe what medicines and treatment practitioners will recommend to their patients and not necessarily what is clinically appropriate or necessary.

CONSIDERATIONS BY PRACTITIONERS

How important is the contract to your practice and patient profile?

• Are you in a position to replace any patient or revenue you may lose if you do not sign contracts?
• Are the remuneration levels acceptable?
• What are your costs in providing service when compared with the remuneration levels in the contracts?
• If contracts do not compensate you beyond the covered services which are to be provided, you may lose money on the contract. What are the alternatives to the contract?
• Does the contract allow you to offer other services which are not covered and then to recover fees from patients? Does the contract allow you to balance bill for certain procedures and is this to the advantage of your practice?
• Are Clinical Management Programmes objectively based on evidence based dentistry or does the MCO retain the right to determine what is clinically necessary?
• What is the duration of the contract and what are the termination provisions?
• How does the MCO enrol a patient on the plan and how easy is it to verify patient details, membership, limits and covered services?
• When a patient comes into your practice, is there a quick and efficient mechanism in determining whether patient is a member of the plan by website, telephone or e-mail?
• Does the contract provide for review and audit of your practice?
• Does the contract clearly spell out what services require pre-authorisation?
• Does the MCO provide an efficient and reliable mechanism, available 24/7, to obtain pre-authorisation?
• Does the contract provide information sufficient to ensure that you will be paid for the services you provide?
• Does it have a comprehensive fee schedule?
• What are your rights to appeal a claims payment decision?
• Is the appeals process fair, or weighted heavily in favour of the MCO?
• Can MCO change the terms of the claims payment unilaterally?
• Does the contract require the MCO to provide you with notice of any claims payment changes?
• Is there a mechanism for you to terminate the contract if you object to the changed reimbursement terms?
• Does the contract include a specific payment time period, and does the MCO agree to pay interest if it delays payment beyond that time period?
• Does the contract give the MCO the right to unilaterally reverse payment for overpayments?
• Does the contract allow you to select in which products you participate or does the contract require you to participate in ‘all products’?
• Does your termination as a Provider in respect of one product terminate your participation in all plans?
• How can you terminate the contract and what are the provisions if the MCO breaches the contract?
• Does the contract renew annually or does it need to be renewed every year?

CONCLUSION

SADA reiterates:
• Every practitioner will have to make an individual decision whether or not to sign the contract.
• Every member has access to the SADA Practice Profitability simulator (DCalc) to determine whether reimbursement levels in these contracts are financially viable.
• Members must consider their professional, ethical and clinical responsibilities to their patients.

PERSONALIA

Dr Johan Smit receives an honour

IT is never too late to acknowledge an accolade and an achievement and it is with pride that we salute Dr Johan Smit on the recognition last year by the IADR of his enormous contribution to Dentistry RSA. He will next year be celebrating a full 25 years of continuous service as Chief Dental Officer of South Africa.

At the 2014 IADR Congress held in Cape Town, Johan was accorded a signal honour…. to be appointed the Honorary Member for 2014. A marvellous recognition of dedicated service and commitment. The Illuminated plaque which commemorates the award is inscribed:* With sincere appreciation for your commitment to improving the Oral Health of all South Africans.*

The Association congratulates Dr Smit and is deeply appreciative of all that unwavering commitment these many years. The award reflects on the profession and community served by Dr Johan Smit, Honorary Member IADR 2014.

International Association for Dental Research.

To: Dr Johan Smit
Chief Dental Officer (South Africa). National Oral Health Directorate.

Dear Dr Smit,

On behalf of the International Association for Dental Research, I congratulate you as the recipient of the 2014 IADR Honorary Membership. Honorary membership is bestowed each year by unanimous recommendation of the three most recent living Past Presidents of the Association and approved by Council. Such Honorary Members shall have all the rights and privileges of membership. An Honorary Member is selected on the basis of the candidate’s significant contributions to dental research.

You will receive a commemorative plaque which will be presented during the Opening Ceremonies of the IADR/AMER General Session and Exhibition at 5pm on Wednesday, June 25th, 2014 in Auditorium 1 of the Cape Town Convention Centre in South Arica. We sincerely hope that you will attend.

Congratulations on this prestigious award.

Sincerely,

Christopher H Fox, DMD, DMSc
Executive Director.
Dear Prof. Evans

My name is Gerhard Steenkamp and I am a veterinarian working at the Veterinary Faculty of the University of Pretoria, Onderstepoort. My chosen field of interest is Dentistry and Maxillofacial Surgery for animals. My wife, a member of SADA, passes her SADJ to me every month and understandably I was very excited to see your monthly focus on ‘The Wild Teeth of Africa’. The dental formulas you are publishing however do not show any references and hence the reader is not able to see where these were obtained from.

Personally I do not agree with the dental formulas you have published for the rhinoceros (September 2014) and the crocodile (October 2014).

Rhinos do not have incisors or canines. They are herbivorous and will have no need for them. Maybe if they did have canines it could have helped them fight the poachers?

Crocodiles like cetaceans have unspecialised teeth and therefore they are called homodont. There would be no reason for crocodiles to have teeth of a distinct variety (incisors, canines, premolars or molars). The readers of your journal will be very familiar how we classify bunodont teeth of humans into these different categories based on development and function. This will be superfluous in crocodilians as their teeth are merely adapted to grab hold of prey. Another interesting fact to your readers is that a crocodile continuously produce teeth throughout its life. For them to lose teeth would be life threatening. Would it not be wonderful if we could harness some of those genetics to give edentulous people functional teeth?

These two examples illustrate the very importance of comparative odontology when dealing with more than one species. As veterinarians we need to be aware of this as it does not only give us insight into what our potential patients need (eat) but also what the teeth are used for when faced with treating them. This helps us decide if we can/should save a tooth (or not) and by which means. Furthermore it also helps us understand the management of a patient post extractions and how their diet may have to be adapted.

Thank you for highlighting wildlife dentistry, not only is this my very vocation but indeed my passion.

With kind regards
Dr. Gerhard Steenkamp
Senior lecturer: Companion Animal Clinical Studies
Faculty of Veterinary Science
University of Pretoria

References

ERRATUM: COVER PICTURE DATA INCORRECT

Dr Steenkamp does The South African Dental Journal a considerable favour by correcting errors which slipped past the Editor. As regards the Rhinoceros, the Cover Picture for September, I had the correct teeth listed in the text… BUT not in the formula itself. The crocodile on the October cover fared a little better as the text section was indeed correct as far as it went… and the formula may apparently be given as it appeared on the cover… but the teeth are given labels (Incisor, canine, molar etc) simply because of their positions in the jaws. So I should have placed inverted commas around each of the items in the formula. Ian Corfe of the Institute of BioTechnology, University of Helsinki, even comments that there are indeed slight differences in the shape of the teeth so they could perhaps be designated differently.

Every apology to all readers for committed errors… and sincere appreciation to Dr Steenkamp for gentle correction and for providing additional data. I hope he will continue to peruse the JOURNAL.

W G Evans, Managing Editor.

PS. I referred to Austin Roberts: The Mammals of South Africa, The Larousse Encyclopaedia of Animal Life and to Wikipedia. The mistakes are in both cases are mine.

Dr. Gerhard Steenkamp
Senior lecturer: Companion Animal Clinical Studies
Faculty of Veterinary Science
University of Pretoria
The prevalence of musculoskeletal disorders among dentists in KwaZulu-Natal

ABSTRACT
Occupational hazards in dentistry can result in injuries and reduced income if work-time is lost. Injuries include percutaneous insults, inhalation of noxious chemicals, hearing loss and musculoskeletal disorders (MSD). The prevalence of MSD among South African dentists is uncertain. This descriptive, cross-sectional study was conducted to determine that prevalence and associated risk factors among dentists in KwaZulu-Natal (KZN), South Africa. A convenience sample (n=350) of dentists registered with the South African Dental Association (SADA) were sent a questionnaire interrogating their medical and work history and their work-related posture. One hundred and nine (31%) responded.

Almost all (99.1%) reported pain in the hands, neck, lower back and/or a shoulder, while 22.5% reported hand symptoms. Nearly three quarters (73.6%) rotated their necks during clinical work and 68.6% tilted a shoulder towards their dominant hand. A strong association (p value = 0) was found between the number of years in practice and work-related pain in the neck. The prevalence of MSD was very high when compared with international data.

Self-recognition is most important in preventing occupational injuries. This study suggests the need to include ergonomic work practice during training to create awareness of the risk of MSD and to promote wellbeing.

Keywords: Prevalence, musculoskeletal disorders, dentists, risk factors, ergonomics

INTRODUCTION
Occupational hazards are common among many professions and dentistry is no exception. The occupational hazards reported by dentists include percutaneous injuries, inhalation of noxious chemicals, loss of hearing and musculoskeletal disorders (MSD).1

The high prevalence of MSD pain among dentists is well documented, constituting a major health problem, especially as back pain.2 A summary of published MSD prevalence rates are provided in Table 1 and the paucity of data relating to dentists in South Africa is noted. Possible risk factors of MSD have been classified as biomechanical, ergonomic and work factors (psychosocial risk factors due to job stress).3 "Self-recognition” of the problem is generally the first step in alerting the clinician of the need to consider changes. Dentists have also been advised to seek and receive education about their musculoskeletal health, injury prevention and ergonomics to improve their working environment.4,5

Ninety four per cent of dentists in a study in South East Turkey reported one or more pain symptom while a high prevalence of pain was also reported among Taiwanese (92.4%)9 and Australian dentists (87.2%).2 Similar high prevalences were found in Spain (79.8%)7 and Greece (62%). Moradia and Patel reported that 63.6% of dentists in Surat City in Gujarat, India, had at least one kind of occupational pain either in the neck, back or shoulder or a combination of these conditions and nearly 96% recorded that the pain had begun when they started practising dentistry.8 Shrestha, Singh and Niraula researched the work-related complaints among dentists in Biratnager and Daran in Nepal.13 Seventy nine per cent of respondents in those studies had experienced backache in the previous year.13 A systematic review by Hayes et al. reported an overall MSD prevalence among dentists of between 64-93% with back and neck listed as the most prevalent regions for pain.14 Rising et al.’s study investigated the body distribution and severity of musculoskeletal pain in dental students and reported an incidence of between 46%-71%.20 The most frequently affected area was in the neck and shoulder area, followed by mid back, lower back, right arm/hand and left arm/hand. A significantly higher prevalence of pain was reported among dental students who were enrolled in
clinical skills training and who were engaged in performing dental procedures.\textsuperscript{20}

Ellapen et al. reported in a study carried out in South Africa (on dentists from Durban and Verulam) that the frequency of pain and discomfort was 49.3\% in the vertebral area, 18.7\% in the wrist, 16.6\% in the shoulder and 12.5\% in the lower leg.\textsuperscript{6}

The data presented in Table 1 confirms that MSD is a problem internationally which stems from poor postures, extended work hour and working without an assistant. Instrument and surgery design and education and training can help to address some of these issues. Given the lack of data on prevalence and distribution of MSD among South African dentists, this study aimed to measure the prevalence of MSD among dentists in KZN and to determine the risk factors associated with the affliction.

**METHODOLOGY**

This cross-sectional, descriptive study was conducted to determine the self-reported prevalence of MSD among dentists (n=350) who attended the regional South African Dental Association (SADA) conference in March 2011. This convenience sample was informed about the study and invited to participate. Completed questionnaires were received from 109 conference attendees.

The explorative nature of the study both in Africa and in this field was taken into consideration when the questionnaire was developed by the researcher. It was self-administered and contained questions aimed at gathering quantitative data. Information was collected on the socio-demographic details of the respondents (age, gender, height, weight and practice), their medical history and the nature of their daily work (intensity, work load, hours spent at work and the average number of days worked per week) and their habitual work posture (patient positioning, chair position). A pilot study was conducted to test the data collection instrument for reliability and validity. Pain was reported by the dental respondents themselves and measurement bias was prevented by requesting them to plot the pain on a body chart which illustrated well-defined anatomical boundaries, a process which was based on an approach by researchers who investigated carpal tunnel syndrome amongst dental hygienists.\textsuperscript{21}

<table>
<thead>
<tr>
<th>Author &amp; Year</th>
<th>Country</th>
<th>Participants</th>
<th>Overall MSD(%)</th>
<th>Back (%)</th>
<th>Hand &amp; wrist (%)</th>
<th>Neck (%)</th>
<th>Shoulder(%)</th>
<th>Lower extremities(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ellapen et al. 2007\textsuperscript{6}</td>
<td>South Africa</td>
<td>Dentists n=94</td>
<td>54.26</td>
<td>49.32</td>
<td>18.75 (wrist)</td>
<td>16.7</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>Harutunian et al. 2011\textsuperscript{7}</td>
<td>Spain</td>
<td>Dental students &amp; staff n=74</td>
<td>79.8</td>
<td>40.0</td>
<td>27.1 (wrist)</td>
<td>58</td>
<td>24.3</td>
<td></td>
</tr>
<tr>
<td>Moradia &amp; Patel, 2011\textsuperscript{8}</td>
<td>India</td>
<td>Dentists n=77</td>
<td>63.6</td>
<td>75.5</td>
<td>2.04 (wrist)</td>
<td>42.9</td>
<td>22.5</td>
<td>2.04</td>
</tr>
<tr>
<td>Lin et al. 2012\textsuperscript{9}</td>
<td>Taiwan</td>
<td>Dentists n=197</td>
<td>92.4</td>
<td>66.5 (lower)</td>
<td>71.6</td>
<td>75.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samat et al. 2011\textsuperscript{10}</td>
<td>Malaysia</td>
<td>Dental team</td>
<td>44.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pargali &amp; Jowkar, 2010\textsuperscript{11}</td>
<td>Iran</td>
<td>Dentists n=82</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Booyens et al. 2009\textsuperscript{12}</td>
<td>South Africa</td>
<td>Dental Hygienists n=362</td>
<td>59.6</td>
<td>61.3 (hand)</td>
<td>66.5</td>
<td>56.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shresta et al. 2008\textsuperscript{13}</td>
<td>Nepal</td>
<td>Dentists n=68</td>
<td>79.4</td>
<td>58.8</td>
<td>47</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polat et al. 2007\textsuperscript{14}</td>
<td>Turkey</td>
<td>Dentists n=120</td>
<td>94</td>
<td>30.63</td>
<td>23.75</td>
<td>23.3 (arms and legs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leggat &amp; Smith, 2007\textsuperscript{15}</td>
<td>Australia</td>
<td>Dentists n=285</td>
<td>87.2</td>
<td>53.7 (lower back)</td>
<td>57.5</td>
<td>53.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alexopoulos et al. 2004\textsuperscript{16}</td>
<td>Greece</td>
<td>Dentists n=430</td>
<td>62</td>
<td>46 (lower back)</td>
<td>26</td>
<td>26</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Hayes et al. 2006\textsuperscript{17}</td>
<td>Review</td>
<td>Dentists</td>
<td>64-93</td>
<td>36.3-60.1</td>
<td>19.8-85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rucker &amp; Sunell, 2002\textsuperscript{18}</td>
<td>Canada</td>
<td>Dentists n=421</td>
<td>19</td>
<td>9</td>
<td>24</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Szymanska, 2002\textsuperscript{19}</td>
<td>Poland</td>
<td>Dentists n=268</td>
<td>60.1</td>
<td>44</td>
<td>56.3</td>
<td>51.5</td>
<td>47.8</td>
<td></td>
</tr>
<tr>
<td>Al Wazzen et al. 2001\textsuperscript{20}</td>
<td>Saudi Arabia</td>
<td>Dentists n=91, Assistants n=72, Technicians n=29, Hygienists n=12</td>
<td>73.5</td>
<td>54.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ethical approval to carry out the study was obtained from the Senate Research Ethics Committee of the University of Western Cape (ref no. 11/4/28).

DATA ANALYSIS
Data were coded and entered into an Excel spread sheet. Basic descriptive analysis of the demographic factors was completed using Excel and then the data was imported into SPSS® version 20 for more complex statistical analyses. An independent t-test was used to determine any correlation between the scale variables and the Chi-square test was used to determine the association between the nominal and the ordinal variables. The level of significance was set at 0.05.

LIMITATIONS OF THE STUDY
Self-reported data is sometimes considered a limitation. Dentists could over- or under-report data about pain. However, completing the questionnaire posed no direct benefit to the respondent so there was no incentive to provide any other than accurate responses. The study might have been strengthened by actually observing the dentists at work when more accurate data on the presence and extent of muscle strain could have been secured.

RESULTS
One hundred and nine dentists (31%) responded to the questionnaire, the majority of whom were male (72.5%). A third of the respondents were aged between 30 – 39 years (30.8%). Nearly two thirds (62.4%) of the dentists considered that they were in good health and reported no medical conditions. However, 18 had hypertension, 15 were diabetic, five reported having arthritis and two reported carpal-tunnel syndrome. The body mass index of the respondents indicated that more than a third (37.3%) were overweight and 16.7% obese. A quarter of the sample (25.5%) did not participate in any form of exercise. Nearly 50% of those who indicated that they exercised performed high impact cardio- routines. Other exercises included stretching and toning (28.4%) as well as yoga and relaxation (9.2%).

A third of the respondents had been in practice for more than 21 years. The majority of the dentists worked five to six days per week (88.2%) and seven to nine hours per day (78.9%). There was no significant relationship between the number of years in practice and the levels of pain experienced (p=0.364).

Nearly one hundred dentists (90.8%) were right handed. Slightly more than half of the respondents (52.7%) spent more than 45% of their time on restorative dentistry and about half reported spending approximately 50% of their time in the standing position.

Two-thirds (67%) of the respondents performed four-handed dentistry (working with one dental assistant) and less than 6% performed six-handed dentistry (working with two dental assistants). Almost a third (27.4%) of dentists worked with no dental assistant (Figure 1).

Three quarters (74.8%) reported using a finger rest while doing restorative procedures and during scaling and polishing. Most dentists in this study (58.5%) used the 9 to 10 o’clock position when working with a dental assistant. Two thirds (62.7%) reported that they worked with their dominant hand below the work area and sixty four dentists reported working with their dominant elbow below. Nearly three quarters of the responding dentists (73.6%) rotated their necks while performing clinical work while a third tilted their shoulders towards their dominant hand.

The overall reported prevalence of MSD was 99.1% (dentist reporting pain in one or in multiple sites). As illustrated in Table 2, nearly the entire sample reported pain in the neck (98.2%), lower back (99.1%) and the shoulder (98.2%). Less than a quarter (22.5%) reported hand pain, 19.4%, numbness in the hands and 24.4%, a tingling sensation in the hands while performing clinical work. More than half (53.3%) reported severe neck pain and 78.2% reported mild and moderate lower back pain. The ratings for shoulder pain were the lowest. As indicated in Figure 2, clinical work was perceived as the most common reason for pain (81%).

Respondents with hand pain were asked to plot the location of the pain on a chart depicting a hand. These results are illustrated in Figure 3. The thenar eminence is a muscle group located in the thumb and on the palm of the hand which allows for different movements of the thumb and this was the most plotted site for pain.

PAIN IN THE HANDS
The majority of the respondents (78%) indicated that they had no negative effects when performing restorative work and scaling and polishing. When asked about numbness...
as an effect of pain, one dentist indicated extreme levels (Table 3). These respondents noted a slight increase in pain which extended from their working hours and continued into the night.

DISCUSSION

The present study investigated the prevalence of, and identified risk factors associated with, musculoskeletal disorders among dentists in KwaZulu-Natal.

The prevalence of pain in the neck, lower back and shoulder is extremely high among this group (99.1%). These findings are similar to those of Lin et al. (2012) who reported (92.3%) of pain among Taiwanese dentists, as did Leggat and Smith (2006) among Australian dentists and Polat et al. (2007) who found that 94% of dentists suffered at least one MSD. Nearly 80% pain prevalence was reported by Harutunian et al. while a Greek study reported 62% of dentists with at least one musculoskeletal complaint. The high prevalence of MSD sets the scene for poor health outcomes among dentists.

Symptoms of pain, numbness and tingling in the hands were found to be more intense at night than while performing restorative procedures and scaling and polishing. Similar results were reported by Alexopoulos et al., Elappen et al. and Harutunian et al. but were not as high in the Taiwanese study by Lin et al., who recorded a 41% prevalence of hand symptoms.

BMI was not identified as a significant risk factor, despite the fact that just over a third of the respondents were overweight or obese (16.7%). Similar results were found in the Malaysian study conducted by Samat et al. Although there was no significant relationship between pain and BMI, weight control is critical in the overall health of a dentist, as an increase in weight increases the load on the back muscles, and may be the cause of any subsequent pain. Although there was no correlation between BMI and MSD in this study, BMI should not be ignored as a risk factor for MSD.

More than half of the respondents spent more than 45% of their time on restorative dentistry. Nearly a third of the time was spent on administration, prosthetics and scaling and polishing. The ideal workday should be divided between all categories of dentistry. If one performs clinical work in a seated position for a long time it impacts on the muscles of the lower back especially if these muscles are not supported. This is aggravated when the dentist works with his/her neck in the forward position, resulting in neck and shoulder pain.

The high prevalence of neck and back pain recorded in this study could be due to the numerous dentists who acknowledged they routinely performed neck rotation. These colleagues spent approximately half their working time in the standing position. This proportion was slightly higher than that reported by Symanska (27.6%), and much less than Marklin and Cherney who reported on dentists who spent 78% of their time in a seated position. Standing was the preferred practice position for dentists in the Polat et al. study.
Dentists should adopt various positions while at work. In fact, it is recommended that they alternate between standing and sitting. When one does so, different sets of muscles alternate thereby allowing the other set of muscles to relax. Furthermore, Moradia and Patel also reported that sitting or standing for a long time was the factor that most aggravated the pain. Prolonged standing further puts the dentist at risk of varicose veins and haemorrhoids. Static postures for long periods cause fatigue and a decrease in microcirculation, increase in pressure and insufficient removal of lactic acid, all leading to pain.

In the present study, just over two thirds of the dentists performed four-handed dentistry; lower than the 99% reported by Rucker and Sunnell and the 100% reported by Polat but similar to results reported by Szymanska in which just over a third worked without a dental assistant. Practising four and six handed dentistry offers an advantage as it allows the dentist to save time and permits resting of the back muscles and lower extremities. From an ergonomic point of view, six handed dentistry is the ideal and in this study less than 6% of the sample practised in this way. Dentists in KZN should consider working with two assistants to enhance efficacy and to reduce the possibilities of pain. However Kumar reported that dentists working with assistants described a higher prevalence of hip and thigh symptoms and as noted above, it is recommended that while working with an assistant, it is advisable to alternate between standing and sitting.

Nearly three quarters of dentists in this study indicated that they used a finger rest all of the time whilst undertaking restorative procedures and scaling and polishing. The use of hand and finger rests balances the fatigue of the forearms during fine motor activities and therefore can prevent shoulder and hand injuries. This is supported by the findings of the present study as nearly 80% reported no pain during delivery of restorative treatment and of scaling and polishing.

The most common work position reported in this study was the 2 o’clock position, and the range of work positions varied from 9 to 12 o’clock. This was similar to the findings of Chaikumarin, who found that 80% of the dentists in that study preferred the 10 o’clock position. There is an increase in MSD associated with the use of the 7 to 8.30 position and 3.30 to 5.30 positions, due to the difficult adaptive postures the dentists have to then adopt. These poor postures include neck rotation, torso twisting and elbow raising and all increase the probability for MSD.

In the current study two thirds of dentists reported that they worked with their dominant hand below the work area - unlike a report by Rucker and Sunnell who found that 66% of their sample raised their dominant elbow while working. Elbow raising increases the risk of MSD. Dentists who do so while working have a 50% chance of experiencing hand, neck, shoulder and upper back pain.

Shoulder tipping is associated with hand pain while neck rotation is associated with neck pain. Nearly three quarters of dentists in this study rotated their necks while performing clinical dentistry, which predisposes them to pain. Only a third of the respondents tilted their shoulders towards their dominant hand, a posture which predisposes them to hand pain. The frequency of neck rotation is high in this study when compared with other reports in the literature and this is a possible explanation for the high prevalence of neck pain.

More than 80% of the present respondents identified clinical work as the major reason for their pain. This figure is very high when compared with findings from Rucker and Sunnell where only one in three dentists attributed their pain entirely to their clinical work. In review studies conducted by Hayes et al. and Leggat et al. the authors recognised the contribution of MSD to increased sick leave, reduced productivity and early retirement from the profession. Literature in this regard is however, conflicting. Shrestha et al. found no relationship between absenteeism and pain. Rucker and Sunnell, on the other hand, reported that nearly 60% of dentists experienced work loss due to MSD and 13% had been obliged to reduce the number of working days per week. A study found that only 15% of dentists applied for sick leave due to pain whilst chronic pain was the cause of absenteeism and seeking medical attention. In the present study, despite having neck, shoulder, hand or back pain in the last year, nearly 70% did not miss work. Only 5% of the participants in the present study reported being absent from work due to severe pain. The fact that most were self-employed dentists in the private sector who are directly responsible for their income could be a possible reason for this relatively low percentage.

There was no significant relationship between absenteeism and pain in the neck, nor any relationship between neck rotation and pain in the neck while clinical work was performed. However, a strong association was found between pain in the neck during clinical work and the number of years in practice (p<0.001).

With regard to exercising, two statistically significant relationships were identified, firstly between pain while performing clinical work and frequency of exercise and secondly between the severity of the pain and frequency of exercise. Nearly a quarter of the present sample was not involved in any exercise routine; however, there was no significant relationship between exercise and pain.

Harutunian et al. reported that aerobic activity decreases experience of pain, assists in weight loss and strengthens the torso. Stretching of muscles also assists in relieving back pain. Muscle relaxing exercises and rest were found to ease the pain; while lack of exercise was strongly associated with back pain. Szymanska’s study, however, found no significant relationship between physical activity and pain.

A study by Marklin and Cherney reported that dentists spent nearly half their working time with their necks flexed. A reduction in neck and trunk rotation would improve the occupational health of dentists. In the present study, there was no significant relationship between neck rotation and pain in the neck while performing clinical work (p-value=0.16), but a very strong association between the number of years in practice and pain in the neck while doing clinical work (p-value=0.001).

Dentists should not ignore pain as medical intervention may be required. Ergonomic changes in their practice and practice environment, lifestyle changes, reduction of...
stress and involvement in an exercise routine should all be considered. Dentists are responsible for their own muscular skeletal health and that of their staff. Ignoring pain in the early stages and taking no account of risk factors predisposes dentists to more severe pain which would ultimately require more costly intervention and cause further inconvenience.

CONCLUSION

MSD is a major occupational health problem among dentists in KZN. Ergonomic work practice should be included in the training of dentists, should be reinforced in clinical training and should be included in CPD activities. The working conditions in dentistry should be improved and there is a need for a preventive program to reduce the risks of MSD. The profession should take these steps to prevent MSD and to make dentistry a safer, healthier career.

A limitation of the study was the relatively low response rate on self-reported data. However it can be deduced that there is a need for dentists in this sample to increase their knowledge of ergonomics and to improve their routines in the practice of dentistry.

There is a need for further studies in South Africa to establish the prevalence of MSD at a national level, and indeed to include in the survey dental therapists, oral hygienists, dental assistants and dental technicians. Investigations are indicated into establishing ergonomically correct dental procedures and in designing ergonomic dental units. Studies in clinical training in dental schools in South Africa should be conducted to improve teaching and clinical supervision so that MSD can be prevented.

Acknowledgements

The authors would like to thank Jacqueline Van Wyk for her kind assistance and encouragement.

References

Microbial contaminants on dental bib chains with attached clips

SADJ April 2015, Vol 70 no 3 p104 - p107
J Molepo¹, M Molaudzi², TRMD Ralephenya³

ABSTRACT

Introduction: Reusable dental bib chains are considered to carry a low risk for transmission of infection, and are therefore simply cleaned and disinfected between patients. There is a paucity of information in South Africa on the potential risk of cross infection.

Aim: To investigate the extent of microbial contaminants present on such bib chains, after their use on patients having dental treatment and again after they had been disinfected.

Methods: Tests were conducted on forty-four reusable metal bib chains with attached clips which had been used in patient treatment at the Wits Oral Health Centre. The bacterial contaminants remaining on used, and then later disinfected, bib chains were assessed. Microorganisms were identified using conventional microbiological methods. Data were analyzed using STATA 11 software.

Results: A high number (84.1%) of the used bib chains harbored microbial contaminants after dental treatment. Thirty-four percent of the bib chains still carried microbial contaminants after disinfection. Enteric, environmental and skin bacteria were observed.

Conclusion: The used bib chains in this study carried potentially infectious microorganisms. The disinfection procedure was only partially effective. These findings reveal the risk of potential cross infection of these microorganisms from patient to patient or from patient to healthcare worker.

Key words: Dental treatment, Microbial contaminants, Bib chains, Disinfection.

INTRODUCTION

During a dental procedure, the chains holding the protective bib come into contact with aerosols, hair and skin, and with saliva, blood and other oral substances that spray out of the mouth.¹ Re-useable dental bib chains are considered to carry a low risk for transmission of infection, and standard procedures, followed by Dental Practitioners, are therefore that they need only be cleaned and disinfected between patients.²

Very few studies have been conducted on dental bib chains and their disinfection. Molinari³ reported microbial contamination of metal and plastic bib holders post-treatment and post-disinfection, and warned that repeated use of bib chains amongst patients may increase the number of pathogens on the bib chain. In a recent study, aerobic bacteria including Pseudomonas and Staphylococcus epidermidis, and anaerobic bacteria including Propionibacterium acne, Eikenella corrodens and Prevotella were identified on the chains after their use in treatment and were demonstrated again after disinfection of the bib clips.⁴

Alt-Holland et al.⁵ reported that between 20% to 30% of the surfaces of bib clips carried microorganisms, even after disinfection. A study conducted at a university in the southeastern United States revealed Pseudomonas, Staphylococcus aureus and Escherichia coli present on the chains after dental treatment and after disinfection.⁶ Similarly, researchers in Germany found that 70% of bib holders remained contaminated after disinfection.⁷ It is suggested that the design of the bib chain has a role to play in the

ACRONYM

TSB: tryptone soya broth

1. J Molepo: PhD (Medical Microbiology). Head of Department, Oral Biological Sciences, School of Oral Health Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
2. M Molaudzi: MSc (Medical Microbiology). Senior Technician, Department of Oral Biological Sciences, School of Oral Health Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
3. TRMD Ralephenya: Oral Hygienist, MA (Developmental Studies). Head: Oral Hygiene Division, Department of Community Dentistry, School of Oral Health Sciences, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.

Corresponding author
J Molepo:
Department of Oral Biological Sciences, Faculty of Health Sciences, University of the Witwatersrand, Private Bag 3, Wits 2050, Johannesburg, South Africa. Tel: 011 717 2229 Fax: 011 717 2121 Email: Julitha.Molepo@wits.ac.za
harboring of microorganisms as any cracks, crevices and indentations enhance the chances of an increase in the bacterial count on the bib chains.1

Whilst it may be likely that the South African experience may be similar, there is a paucity of local information which describes microbial contaminants on bib chains and the effect of disinfection of these bib chains. This study undertook such an investigation at an Oral Health Centre in South Africa.

MATERIALS AND METHODS

Study population and methodology

Tests were carried out on 44 reusable metal bib chains (Prodent, NJ, USA) used on patients presenting at the Wits Oral Health Centre. The study was approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg (W-CJ-131104-1).

Sampling was done in the patient examination room and a total of 88 samples were collected (two from each reusable metal bib chain). The first (post-treatment) was collected immediately after oral examination and treatment of the patient had been completed. The chain was removed at once and was placed into 20ml of sterile tryptone soya broth (TSB; Sigma Aldrich, Steinheim, Germany). The mixture was then vortexed for 30 seconds to remove and collect microbial contaminants from the bib chain, which was then removed aseptically from the TSB and was disinfected by spraying with Tristel®-Chlorine Dioxide 99.99% (Wright-Millner’s, South Africa). The chain was then allowed to dry for one minute. Now the second sample (post-disinfection) was collected, following the same procedure as for the first.

Identification of Microorganisms

In the laboratory, each TSB suspension was centrifuged at 3000rpm for 5 minutes. The pellets were suspended in 2ml of sterile unused TSB served as a negative control. All the colonies which developed were counted, sub-cultured and identified, based on bacterial characteristics, morphology and Gram staining. Catalase and coagulase tests were used to identify gram positive cocci. Staphylococcus aureus identification was confirmed using DNAse test and culture on MSA agar. Gram-negative bacilli were subcultured onto MacConkey plates and tested with API20E according to the manufacturer’s directions.

DATA ANALYSIS

Data were analyzed using the Stata statistical package (STATA 11 for Windows; Stata Corp., College Station, TX, USA). All statistical significance was calculated at the 5% significance level.

RESULTS

A large number of bib chains were shown to be contaminated with microorganisms post-treatment (84%), which reduced to 34% post-disinfection.

The total number of bacterial colonies observed post-treatment was considerably higher (583) than that observed post-disinfection (69) (Table 1). There was a statistically significant difference (p=0.000145) between colony counts done at the post-treatment and post-disinfection stages (Table 2). Coagulase-negative staphylococci were the most dominant organisms identified in the post treatment samples (on all the infected chains, ie 84%
of the total chains), followed by *Staphylococcus aureus* (16% of the chains) and *Pseudomonas aeruginosa* (16% of the chains). *Escherichia coli* was the least commonly isolated organism (9% of the chains). After disinfection, coagulase-negative staphylococci were again the most dominant (34% of the infected chains), followed by *Staphylococcus aureus* (9% of the chains). *Escherichia coli* and *Pseudomonas aeruginosa* were not observed after disinfection (Figure 1).

**DISCUSSION**

As metal bib chains and their clips are always used together at this Health Centre, they were investigated as one unit, in contrast with other studies where they were tested individually. The finding that 84% of the bib chains and clips in this sample carried potentially infectious microorganisms after their use during dental treatment procedures agreed with the results of previous studies. Contamination of bib chains with skin bacteria (coagulase-negative staphylococci and *Staphylococcus aureus*), environmental bacteria (*Pseudomonas aeruginosa*) and enteric bacteria (*Escherichia coli*) could have been caused by prolonged contact with the patient’s neck with subsequent acquisition of normal skin flora, by exposure to contaminated aerosols and spatters during treatment, as well as during the handling of bib chains with contaminated gloves.

Coagulase negative staphylococci, which are normal inhabitants of the skin, were the most frequently identified microorganisms at both the after treatment (84%) and the post-disinfection (34%) stages. Similar results have been reported in a previous study. The possibility of cross-contamination between patients is of concern, as infections caused by these organisms are increasingly reported, especially in immuno-compromised patients.

The continued presence of *Staphylococcus aureus* after disinfection is serious, as these bacteria have been implicated in respiratory infections in immuno-compromised patients, and may become resistant to many antibiotics, leading to life-threatening infections. *Escherichia coli* and *Pseudomonas aeruginosa*, found to be present after the delivery of treatment, can survive in waterlines, and therefore contamination of chains and clips is quite feasible. Infection by these organisms may also lead to respiratory disease, again especially in immuno-compromised patients. *E. coli* is a gram-negative bacterium commonly found in the intestines of animals and humans, and is transmitted via the faecal–oral route, causing disease. The organism can survive outside the body, making it an ideal indicator organism for testing for faecal contamination. The observation in the current study of the presence of this organism after treatment may indicate contamination of or insufficient treatment of the water reservoir supplying the dental units. Further studies are indicated. It is of some reassurance that this study showed that these organisms were successfully eliminated from bib chains after disinfection, in contrast to previous reports.

Although bacterial contaminants were not observed on the majority of bib chains after disinfection, 34% still carried contaminants. Nevertheless a statistically significant difference was shown between the bacterial counts on bib chains following treatment and after disinfection (p=0.000145). These findings indicate that disinfection with Tristel®-Chlorine Dioxide 99.99% was partially effective, completely eliminating some bacteria whilst allowing others to survive. This is in agreement with previous studies.

The potential cross-contamination risks of these organisms which can cause respiratory infections in immuno-compromised patients is a cause for concern, especially in South Africa. South Africa has one of the largest HIV-infected populations in the world, with an estimated 5.6 million people living with HIV and AIDS. To reduce the risk of infection, we recommend, firstly, that bib chains be cleaned thoroughly before disinfection and/or sterilization to remove organic or inorganic material which could interfere with the inactivation of microbes. Failure to thoroughly clean bib chains could compromise the disinfection or sterilization processes. Secondly, we advise the use of alternative chemical disinfectants such as glutaraldehyde, which is effective and will not affect the skin or the bib chains. Alternatively, and most efficient, bib chains may be sterilized between patients, which will kill all microorganisms including spores. Various sterilization methods such as moist heat (autoclave), dry heat (hot air oven) or UV light can be used to sterilize bib chains.

**CONCLUSION**

This study demonstrated that bib chains and clips are readily contaminated by bacterial attachment during the delivery of dental treatment, with a high proportion (84%) shown to be harbouring enteric, environmental and skin bacteria. As the routine disinfection procedure was only partially effective, alternative procedures are recommended to minimize the risk of cross infection.

**CLINICAL SIGNIFICANCE**

Dental Practitioners should be aware that despite all their laudable efforts at achieving successful disinfection, their bib chains and clips pose a real risk of introducing cross infection. The risk may be aggravated in immuno-compromised patients, especially in South Africa, which has one of the largest HIV-infected populations in the world. There is a need to use alternative methods such as sterilizing bib chains in an autoclave or using disposable bib chains.

**Acknowledgements**

The authors are grateful to MR Ramoncha for her technical assistance and TB Mokale for assisting with the collection of samples. We thank the Department of Oral Biological Sciences, School of Oral Health Sciences, at the University of the Witwatersrand, for funding this project.

**Conflict of interest**

The authors declare no conflict of interest.

**References**

   Park QA, Finkelstein JB, Hanley JB, Paster BJ, Kugel G. Comprehensive analysis of 
   aerobic and anaerobic bacteria found on dental bib clips at a hygiene clinic. Com- 
   man M, Kawai T, Paster BJ, Kugel G. Do bib clips pose a cross-contamination risk at
6. Study finds bib chain a potential source of bacteria. Dent Health Mag; 2010. Avail-
   able at http://worlddental.org/dental-news/study-finds-bib-chain-potential-source-of-
7. Study: Bacteria found on 70% of dental bib holders [news release]. San Francisco, 
   editors. Methods for General and Molecular Bacteriology. Washington D.C: ASM
9. Aas JA, Paster BJ, Stokes LN, Olsen I, Dewhirst FE. Defining the normal bacterial 
10. Moller DV, Bruun NE. Substantial myocardial abscess in an immunocompromised 
    patient: Fatal outcome after coagulase-negative staphylococcal native valve infec-
11. Piette A, Verschaeren G. Role of coagulase-negative staphylococci in human dis-
12. Lobo LJ, Reed KD, Wunderink RG. Expanded clinical presentation of community-
    Phung TO, Spellberg B. Necrotizing fasciitis caused by community-associated
    352:1445-53.
    Pozzetto B, Berthelot P. Nosocomial transmission of NDM-1-producing Escherichia
    Coliform Bacteria”. Bacteriological Analytical Manual (8th ed.). FDA/Centre for Food
    ADA/Member%20Center/Files/cdc_sterilization.ashx (Accessed 07 January 2015).
Potential of clove of *Syzygium aromaticum* in development of a therapeutic agent for periodontal disease. A review

**SUMMARY**

**Introduction:** Clove (*Syzygium aromaticum*) is a plant-derived spice that has been traditionally used as a natural medicine for the treatment for various ailments including dental diseases.

**Aim and objective:** To present a comprehensive report on the properties of clove based on an analysis of contemporary scientific and professional literature in order to explore the prospects for its application in the treatment of plaque-induced periodontal diseases.

**Methods:** An online search was performed in PubMed and Google Scholar using a combination of key words which included clove buds, clove essential oil, eugenol, *Eugenia caryophyllata*, spices, medicinal plant, chemical composition, biological effect, therapeutic use, anti-bacterial, anti-fungal, anti-viral, anti-oxidant, anti-inflammatory, anaesthetic, periodontal, dental, and periodontitis.

**Results:** In vitro studies have shown *Syzygium aromaticum* to have bacteriostatic, bactericidal, anti-viral, anti-myocotic, anti-oxidant, anti-carcinogenic, anaesthetic and analgesic properties. Clove oil has a specific anti-inflammatory property as it inhibits the cyclo-oxygenase-2 and lipo-oxygenase enzymes.

**Conclusion:** Clove and its derivatives have a definite potential to be used as specific anti-plaque and anti-inflammatory agents for the treatment of periodontal disease. Future research should concentrate on designing new formulations based on clove derivatives in the form of local drug delivery system or topical agents for the treatment of periodontal diseases.

**Keywords:** *Syzygium aromaticum*; periodontitis; biofilm; non-surgical periodontal therapy

**INTRODUCTION**

Periodontitis is a multifactorial inflammatory disease process that leads to the destruction of the tissues supporting the teeth.¹ The presence of bacterial plaque is the main etiologic factor involved in the initiation and progression of periodontitis and is related to gingival crevice colonization by microorganisms such as *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythia*, and *Treponema denticola*.² These bacteria elicit an immune response that results in periodontal breakdown, causing destruction of soft tissues and bone. The primary goal of periodontal therapy is to remove periodontal pathogens by providing patients with adequate oral hygiene methods combined with professional mechanical plaque control.³ However, this conventional treatment strategy is not always successful and the addition of chemical agents as an adjunct has been suggested to enhance efficacy in achieving better oral health.⁴ Another line of treatment involves modulating the host responses.⁵ Chemotherapeutic agents have been used commonly as adjuncts but increasing incidence of failure and the development of resistance to conventional antibiotics has led to the screening of several medicinal plants for their potential antimicrobial activity and host modulating effects.⁶

Down the ages natural products such as essential oils and other extracts of plants have evoked interest in their possible application in the treatment of oral diseases.⁷⁻⁹ Natural plant products represent a significant source of substances for managing plaque-related diseases such as gingivitis and periodontitis.⁸,⁹ The World Health Organization observed that the use of traditional medicine for pri-
NEW!

3X BETTER PROTECTION
VS. LEADING TOOTHPASTE*

THE NEW STANDARD IN TOOTHPASTE

*against acid erosion

continuing the care that starts in your chair
mary healthcare is more popular in many populations than hospital-based conventional care. Many spices possess medicinal properties and their use in traditional systems of medicine has been on record for a long time.

Clove is a spice obtained from the dried flower bud of the clove tree, *Eugenia caryophyllata* Thunb. (syn. *Syzygium aromaticum*, *Eugenia caryophyllata*, Family: Myrtaceae). Clove has a nail-like appearance and is known by different names in different languages, such as Dutch (nagel), Spanish (clavo) and Portuguese (cravo). They vary in length from about ½ to ¾ inch and contain 14-20% essential oil. Clove oil is extracted from the buds, leaves or stems of the tree *Syzygium aromaticum* by steam or water distillation. Traditionally clove leaf oil has been used to treat burns and cuts and even in dental care for alleviating tooth ache and infection. Clove has been shown to be effective against bacteria associated with dental caries and periodontal disease as well as against a large number of other bacteria. In addition, studies have reported anti-fungal, anti-carcinogenic, anti-allergic and anti-mutagenic activity of *Syzygium aromaticum*. Eugenol, the primary component of clove oil, displays antioxidant and anti-inflammatory properties. The aim of this review is to explore the pharmacological effects of clove and its active components in order to identify the potential for the development of a therapeutic agent in treating periodontal disease.

**SEARCH STRATEGY**

MEDLINE/PubMed (National Library of Medicine, Bethesda, Maryland) and Google-Scholar was searched for appropriate articles using the following keywords in various combinations: “clove”, “Syzygium aromaticum”, “eugenol”, “clove essential oil”, “Eugenia caryophyllata”, “spices”, “medicinal plant”, “herbal medicine” “chemical composition”, “biological effect”, “therapeutic use”, “anti-oxidant”, “anti-inflammatory”, “anti-bacterial”, “anti-viral”, “anti-mycotic”, “periodontal”, “periodontitis” and “dental”. All articles on human, animal, *in vitro* and *in vivo* studies and reviews published in English were selected. Preference was given to articles that described the composition, pharmacological effects and toxicity of clove. Titles and abstracts of articles that satisfied the eligibility criteria were screened and checked for agreement. The full text of the articles judged by title and abstract to be relevant were read and independently assessed by two reviewers (SJP and SN).

**HISTORY OF SYZYGIUM AROMATICUM**

The West Indies, Madagascar, Tanzania and Zanzibar are major producers of clove. However, Asian countries such as Indonesia, India, Malaysia and Sri Lanka produce clove in greater quantities. Clove has been used as a spice and fragrance for more than 2,000 years in China. Since ancient times clove has been used to treat medical conditions like dyspepsia, acute or chronic gastritis and diarrhoea. Clove oil was used medicinally in France for the first time (1640), as a remedy for treating toothache and was documented in ‘Practice of Physic.’ Kim et al. used it for the treatment of asthma and various allergic disorders by oral administration. In the food industry clove oil or its extract has found use as a flavouring agent in whisky, ice cream, baked goods, candy and mouthwashes. Clove has been used in clinical dentistry in root canal therapy, surgical dressings, pulp capping agents, cavity liners and in temporary fillings.

**COMPONENTS OF CLOVE**

Three essential oils are available from clove spices: clove bud oil, clove stem oil and clove leaf oil. Each has a different chemical composition and flavour. The major components of clove oil are eugenol, β-caryophyllene, eugenol acetate and in lesser amounts, benzyl alcohol, chavicol, acetyl salicylate and humulenes. All the active agents which may be extracted are described in Table 1.

Chaieb, Hajlaoui, Zmantar et al. isolated clove essential oil by hydro-distillation using gas chromatography- mass spectrometry (GC-MS) analysis. The chemical analysis resulted in the identification of 36 components, with a high concentration of eugenol (88.58%), eugenol acetate (5.62%), β-caryophyllene (1.39%), 2-heptanone (0.93%), ethyl hexanoate (0.66%), humulene (0.27%), α-humulene (0.19%), calacorene (0.11%) and calamene (0.10%). Eugenol (4-allyl-1-hydroxy-2-methoxybenzene), a phe nolic non-nutrient compound, is one of the major components with a molecular weight of 164.20, β-caryophyllene, the other major constituent of clove oil has a molecular weight of 204.35. Similar results were also observed by Lee and Shibamato. The reported proportions of each constituent vary widely. Prashar, Locke and Evans et al. found the content of eugenol to be 78%, with 13% β-caryophyllene, whereas Pawar and Thaker found that the content of eugenol was 47.64%, with the concentration of benzyl alcohol at 34.10%. Alma, Ertas, Nitz et al.

<table>
<thead>
<tr>
<th>Sno</th>
<th>Compound</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2-Heptanone</td>
<td>0.9323</td>
</tr>
<tr>
<td>2.</td>
<td>Ethyl hexanoate</td>
<td>0.6609</td>
</tr>
<tr>
<td>3.</td>
<td>β-Caryophyllene</td>
<td>1.3883</td>
</tr>
<tr>
<td>4.</td>
<td>α-Humulene</td>
<td>0.1998</td>
</tr>
<tr>
<td>5.</td>
<td>Calamene</td>
<td>0.1053</td>
</tr>
<tr>
<td>6.</td>
<td>Calacorene</td>
<td>0.1143</td>
</tr>
<tr>
<td>7.</td>
<td>Eugenol</td>
<td>88.5853</td>
</tr>
<tr>
<td>8.</td>
<td>Eugenyl acetate</td>
<td>5.6208</td>
</tr>
<tr>
<td>9.</td>
<td>Humulencol</td>
<td>0.7257</td>
</tr>
<tr>
<td>10.</td>
<td>α-pinenne</td>
<td>0.04</td>
</tr>
<tr>
<td>11.</td>
<td>p-cymene</td>
<td>0.01</td>
</tr>
<tr>
<td>12.</td>
<td>L-monene</td>
<td>0.01</td>
</tr>
<tr>
<td>13.</td>
<td>2-Heptyl cetae</td>
<td>0.04</td>
</tr>
<tr>
<td>14.</td>
<td>(E)-β-Occimene</td>
<td>0.33</td>
</tr>
<tr>
<td>15.</td>
<td>2-Nonaone</td>
<td>0.02</td>
</tr>
<tr>
<td>16.</td>
<td>Lanalool</td>
<td>0.01</td>
</tr>
<tr>
<td>17.</td>
<td>Methyl salicylate</td>
<td>0.07</td>
</tr>
<tr>
<td>18.</td>
<td>p-Alllyl phenol</td>
<td>0.19</td>
</tr>
<tr>
<td>19.</td>
<td>A-Copaene</td>
<td>0.10</td>
</tr>
<tr>
<td>20.</td>
<td>Δ-Cadinene</td>
<td>0.04</td>
</tr>
<tr>
<td>21.</td>
<td>Caryophyllene oxide</td>
<td>0.02</td>
</tr>
</tbody>
</table>
found the composition to include eugenol (87%), eugenol acetate (8.01%) and β-caryophyllene (3.56%).

**PHARMACOLOGICAL EFFECTS OF CLOVE**

**Antibacterial activity**

Natural remedies have been used for a long time for the treatment of various bacterial infections. In the recent practice of medicine, the misuse of antibiotics has led to the development of bacterial resistance. Therefore there is a need for identifying novel antibacterial agents against which there is minimal or no bacterial resistance. Studies on clove oil or its extract may contribute to the development of novel antimicrobial agents to offset the effects of resistance to antibiotics. Essential oils have anti-quorum sensing activity which might be important in reducing the virulence and pathogenicity of drug-resistant bacteria.34,25 (Quorum sensing is a means of bacterial intercellular communication. Anti-quorum sensing interrupts that process). A combination therapy of clove with antibiotics could be another method of overcoming bacterial resistance.

Several studies have shown the effectiveness of clove against numerous strains of bacteria.26,35 Clove oil and eucalyptus oil exhibited antibacterial properties against the most common oral pathogen *S. Mutans*.27,32 Cai and Wu2 showed preferential growth-inhibition activity of a crude extract of clove against the gram-negative pathogens: *Porphyromonas gingivalis*, *Streptococcus mutans*, *Actinomyces viscosus* and *Prevotella intermedia*. Several other studies have confirmed the in vitro antibacterial activity of clove against gram negative bacteria like *Escherichia coli*, *Klebsiella pneumonia*, *Pseudomonas aeruginosa*, *Proteus vulgaris*, *Campylobacter jejuni*, and *Salmonella enteritidis*, and gram-positive bacteria like *Bacillus subtilis* and *Staphylococcus aureus*.30-36 Duraisapandiyan, Ayyanar and Ignacimuthu38,36 observed antibacterial activity against *Bacillus subtilis*, *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Escherichia coli*, *Erwinia sp*, and *Proteus vulgaris*. Clove oil exhibited antibacterial activity against five strains of *S. epidermidis* (reference strains CIP106510, E13, S27, S23 and S38) which is mainly attributed to the presence of eugenol,12 extracts of which have shown antibacterial activity against five strains of *S. Mutans* and *S. epidermidis*.30-35 Duraipandiyan, Ayyanar and Ignacimuthu38,36 observed antibacterial activity against *S. Mutans* strains.43,44 The antibacterial property of clove is due to the presence of clove oil molecule together with a conventional antibiotic.45-47 Time - kill studies have been used to evaluate the effect of interaction between eugenol together with ampicillin and with gentamicin. The hydrophilic antibiotics such as vancomycin and β-lactam antibiotics have a marginal activity on gram negative bacteria but exhibit enhanced antibacterial activity when pre-treated with eugenol.46-48 This synergistic effect could be explained by the fact that eugenol is able to damage the membrane of bacteria allowing increased penetration of vancomycin and β-lactam antibiotics and therefore effecting a greater antimicrobial effect.48 In a recent study Moon, Kim and Cha46 assessed the inhibitory effects of a combination of eugenol and antibiotics on cariogenic and periodontal-pathogenic bacteria. Although eugenol is effective against both gram-positive and gram-negative microorganisms, contrasting results were found in other studies.46,49 Clove was found to be less effective when compared with cinnamon oil.49

No clinical studies were identified which had evaluated the effect of eugenol or any of clove extracts on periodontal-pathogenic microorganism.

**Anti- Inflammatory activity**

Bacteria are responsible for the initiation of periodontal disease, but it is the host immune-inflammatory response which is responsible for the progression of the disease and destruction of the periodontal attachment. One of the pathways is through the synthesis and release of prostaglandin and other arachidonic acid metabolites locally within the periodontal tissue. Tissue damage leads to the production of free arachidonic acid, which is further metabolized via either the cyclooxygenase (COX) pathway to the prostaglandin (PGE2), prostacyclin and thromboxane or the lipoxygenase (LOX) pathway to the leukotrienes. Therefore it is recognised that potential COX and leukotrienes inhibitors be considered as anti-inflammatory agents.

Few authors have investigated eugenol and acetyl eugenol for potential anti-inflammatory action on COX-2 and LOX enzymes.50,51 Eugenol appeared to directly inhibit COX-2 enzymeactivity, possibly through completeinhibition ofPGE2, suppression of the nuclear factor kappa B (NF-kB) pathway and inhibition of interleukin (IL) - 6 production.51 Bachlega, de Sousa, Bastos et al.51 demonstrated immune-modulatory and anti-inflammatory effects of clove, as it inhibited production of IL-1β, IL-6 and IL-10. Likewise, Thompson and Eling52 demonstrated that eugenol inhibited prostaglandin H synthase activity. Similarly Raghavendra, Diwakr, Lokesh et al.56 observed in human polymorphonuclear leucocytes that eugenol effectively inhibited the LOX enzyme in a non-competitive nature. Naidu54 demonstrated concentration-dependent inhibition of LOX-catalysed lipid peroxidation (LPO) by eugenol. Though no clinical studies have been done, Koh, Murakami, Tanaka et al.57 found that eugenol exhibits potent anti-inflammatory effects on cultured human gingival fibroblasts.

**Antioxidant property**

The reactive oxygen species (ROS) produced by our body are responsible for tissue damage and cell death and can inhibit normal function of cellular lipids, proteins, DNA and RNA. This can lead to many chronic diseases such as heart disease, cancer and even periodontitis.58 Clove has been identified as a potent anti-oxidant. Antioxidant activity of clove might be due to the higher concentration of phenol-ic compounds such as eugenol (71.56%), eugenol acetate...
The anti-oxidant capacity of clove was present when measured by the metal chelating activity, by bleomycin dependant DNA oxidation, by diphenyl-p-picryl hydrazyl (DPPH) radical scavenging activity and by the ferric reducing antioxidant power (FRAP).\textsuperscript{59,60} *Syzygium aromaticum* showed the highest antioxidant activity among 19 different extracts from Thai medicinal plants.\textsuperscript{53} Cloves showed the highest DPPH radical scavenging activity (90%), highest FRAP values, high metal chelation ability and DNA oxidation among different spieces.\textsuperscript{59,60} Clove also showed increased ability to inhibit metal-induced LPO.\textsuperscript{59,60} Some of the earlier in vitro studies have demonstrated that flavonoids can scavage $\alpha$-OH and per-oxyl radicals, and inhibit LPO in different systems.\textsuperscript{64-66} High DPPH scavenging activity as well as $\alpha$-OH radical scavenging activity and metal chelating activity may be responsible for the marked antioxidant action of cloves. Thus the antioxidant properties of spieces may be attributed to various mechanisms, which include prevention of chain initiation, chelation of transition metal ion catalysts, decomposition of peroxides, prevention of continued hydrogen abstraction, reductive capacity and radical scavenging activity.\textsuperscript{59}

The effect of eugenol is concentration dependant. At low concentrations it has anti-oxidant and anti-inflammatory effects, whereas at high concentrations it acts as a pro-oxidant, leading to tissue damage resulting from the enhanced generation of free radicals.\textsuperscript{52,60} Clove exhibited a higher bleomycin-dependent DNA oxidation activity indicating a pro-oxidant effect.\textsuperscript{60} Clove oil thus shows a powerful antioxidant activity, and can be used as an easily accessible source of natural antioxidants in pharmaceutical applications. No direct studies on periodontal cells or markers have been done to elucidate the effect of clove extracts as an anti-oxidant.

### Antifungal activity
Clove possesses fungicidal characteristics in vitro and in vivo due to its phenolic components, carvacrol and eugenol.\textsuperscript{67,68} The potential drawback in the treatment of fungal diseases is the possibility of the development of antimicrobial resistance. Combination therapy with clove could form an alternative treatment method especially in treating fluconazole-resistant or multi-drug resistant fungal diseases. Studies have shown synergistic interaction with the use of eugenol and/or methyl-eugenol or either in combination with fluconazole or amphotericin B.\textsuperscript{59}

### Antifungal activity
Antifungal activity has been seen against *Candida albicans* and *Trichophyton mentagrophytes*.\textsuperscript{50,71} *Onychomycosis,*\textsuperscript{72} *Saccharomyces cerevisiae,*\textsuperscript{73} *E. Caryophyllata,*\textsuperscript{74} and *Aspergillus niger.*\textsuperscript{75} The antifungal activity is due to considerable reduction in the quantity of ergosterol, a specific fungal cell membrane component.\textsuperscript{76} Eugenol displayed in vitro activity against *C. albicans* cells within biofilms.\textsuperscript{77} Garg and Singh\textsuperscript{78} conducted an experiment using eugenol-loaded lipid nanoparticles in immunosuppressed rats and showed significant improvements in the eugenol-treated site. Similarly eugenol exhibited the minimum inhibitory concentration (MIC) ranging from 0.06 to 0.25% (v/v) and minimum concentration of drug that inhibited 50% of the isolates (defined as MIC50) ranging from 0.06 to 0.12% (v/v) when tested against 38 strains of Candida species from denture wearers and 10 collection strains.\textsuperscript{79}

### Antiviral activity
Viruses are highly sensitive to the components of essential oils. The antiviral activity of eugenol has been tested against the herpes simplex-1 (HSV-1) and HSV-2 viruses.\textsuperscript{80,81} Husseim, Miyashiro, Nakamura et.al\textsuperscript{82} found that *Syzygium aromaticum* extract was highly active at inhibiting replication of the hepatitis C virus. Synergetic interaction between acyclovir and eugenol combination has been seen.

### Analgesic activity
For many ages eugenol has been used as a natural remedy for relieving tooth pain. Similarly this technique in modern dental practice has been adopted by many clinicians, in which eugenol can act as an analgesic agent. Eugenol exhibited an analgesic effect in different experimental pain models in mice.\textsuperscript{83,84} Kurian and co-workers\textsuperscript{84} studied the anti-nociceptive ability of eugenol (100mg/kg) in several mouse models and found that the effect was more pronounced in the inflammatory phase than the neurogenic phase. Eugenol can, however, alleviate neuropathic pain.\textsuperscript{84} Guenette, Beaudry, Marier et al.\textsuperscript{85} in their study in male Sprague-Dawley rats, showed that eugenol, at a dose of 40mg/kg, was capable of prolonging reaction time to thermal stimuli. All these results suggested the possible use of eugenol as an analgesic agent.

### Anaesthetic activity
Eugenol is cheap and is an easily available topical anaesthetic. It is relatively user-friendly and can be used effectively in lower concentrations than other local anaesthetics.\textsuperscript{86,87} It is rapidly metabolized and excreted, thus requiring no withdrawal period.\textsuperscript{87} Eugenol shows good anaesthetic effects on inflamed pulpal tissues.\textsuperscript{88}
OTHER ACTIVITY OF SYZYGIUM AROMATICUM

Anti-tumour activity
Clove essential oil has been reported to show anti-carcinogenic and anti-mutagenic potential. To overcome the toxic effects of synthetic drugs, clove essential oil can be used to inhibit, delay, block, or reverse the initiation of and promotional events associated with carcinogenesis. Sesquiterpenes found in *Syzygium aromaticum* were investigated as potential anticarcinogenic agents. Volatile oils display cytotoxic action towards the human tumour cell lines PC-3 and Hep G2. A derivative of eugenol, dihydro-eugenol, has been shown to induce apoptosis of human cancer cells. Studies have demonstrated that eugenol provides protection from chemically induced skin cancer.

Cardiovascular activity
The consumption of polyphenol-rich foods like clove can lower the risks for cardiovascular disease, arterial sclerosis and other disease related to oxidative stress. Eugenol produces dose-dependent, reversible vasodilator responses, negative inotropic effects in heart muscle, hypotensive effects and smooth muscle relaxant effect.

POTENTIAL OF CLOVE (SYZYGIUM AROMATICUM) FOR TREATMENT OF PERIODONTAL DISEASE

Periodontal disease initiation and progression occurs as a consequence of the host response to microorganisms present in dental biofilm. The pathogens stimulate the host response resulting in the release of harmful by-products such as cytokines and prostaglandins by leukocytes, fibroblasts or other host tissue-derived cells and enzymes. These break down extracellular matrix components, such as collagen, as well as host cell membranes, consequently leading to periodontal attachment loss and bone resorption.

Host modulation therapeutic strategies are aimed at inhibition of the progression of inflammatory bone loss associated with periodontitis. Although a range of biological and pharmacological activities of clove have been reported, there has been a lack of research into its therapeutic potential for destructive periodontal disease. Table 2 describes the therapeutic use of clove for dental application.

Clove exhibited antibacterial activity against gram-negative anaerobic periodontal pathogens, including *Porphyromonas gingivalis* and *Prevotella intermedia*. Clove may reduce periodontal inflammation by modulation of the signalling pathway (NF-κB) and suppression of IL-6, COX-2 and TNF-α. Besides its anti-inflammatory properties, clove also has antioxidant property. It has an important property for reducing the oxidative stress which is often seen in periodontal disease. It promotes DPPH scavenging activity, hydroxyl radical scavenging and inhibits lipid peroxidation. It exhibits antifungal activity against *Candida albicans* and antiviral activity against Herpes Simplex virus (HSV) 1 and 2. Analgesic and anaesthetic properties of clove could be a natural way of performing painless dental and oral procedures. Additionally, Karmarkar, Choudhury, Das et al. observed that dried clove buds rich in eugenol and eugenol derivative were effective in preventing bone loss and this property would be beneficial for treating periodontal disease.

All these studies demonstrated that therapy with clove and its active components like eugenol can be beneficial for the treatment of periodontal disease as a natural anti-plaque or anti-gingivitis agent. Research has been particularly lacking in the areas of periodontal disease control. Clove can be effectively incorporated in therapeutic agents formulated against periodontal diseases in the form of mouthwashes, tooth pastes, topical agents and local drug delivery devices.

CYTOTOXICITY OF CLOVE

Clove oil and its components are generally recognized as ‘safe’, but the in vitro study by Prashar et al. demonstrated cytotoxic properties of both the oil and eugenol towards human fibroblasts and endothelial cells. The cytotoxicity may be a function of more than one component. Clove oil was found to be highly cytotoxic at concentrations as low as 0.03% (v/v) with up to 78% of this effect attributable to eugenol and phenolic terpene. The second component β-caryophyllene did not contribute towards cytotoxicity. Localised irritation of the skin, ulcer formation, allergic contact dermatitis, tissue necrosis, reduced healing and in rare cases even anaphylactic-like shock are some the observed reactions when using dental products containing eugenol. Hartnoll, Moore and Douek reported severe side effects after clove oil ingestion such as hepatotoxicity, generalized seizures and disseminated intravascular coagulopathy. Further research is still required to clearly define the cytotoxic effects of clove.

CONCLUSION

Clove has many properties which have been identified in both basic and specific disease-targeted research that could be of benefit in the treatment of periodontal disease. Yet the review shows glaring gaps in research which is specific to inflammatory periodontal disease. Eugenol, an important constituent of clove, has important anti-microbial and anti-inflammatory properties which could be harnessed and designed for the control and cure of periodontal disease. The fast developing fields of pharmaceutical and nano-technology are bound to impact on the designing of eugenol/clove extract formulations. There are opportunities wherein specific cell or tissue-targeting technology could effectively deliver the natural remedies in appropriate quantities and form. This will also negate the few cytotoxic properties of these compounds. Concerted effort is needed, as revealed by this review, to initiate investigations which could bring the findings hidden on the research benches to effective clinical use. Interdisciplinary research especially between pharmacy and clinical periodontics is seriously advocated. This paper suggests that there will be merit in the return to natural medicine for the treatment of periodontal diseases.

References
5. Preshaw PM. Host response modulation in periodontics. Perio-
periodontal disease—a patent review. Recent Pat Drug Deliv
7. Newman DJ, Cogg D. Natural products as sources of new
estratic and anti-inflammatory effects on saliva measures relevant
9. Namiranian H, Serino G. The effect of a toothpaste contain-
ing aloe vera on established gingivitis. Swed Dent J 2012;
36:179-85.
10. Surya HS, Neeraj, Kurumathur AV. Traditional therapies in the
management of periodontal disease in India and China. Perio-
11. Zheng GQ, Kenney PM, Lam LKT. Sesquiterpenes from clove (Eugenia
12. Karmatou GP, Vermaak I, Viljoen AM. Eugenol from the remote
Maluku Islands to the international market place: a review of a
13. Cai L, Wu CD. Compounds from Syzygium aromaticum pos-
sessing growth inhibitory activity against oral pathogens. J
Nat Prod 1996;59:987-90
14. Chaieb K, Hilaoui H, Zmantar T, Kahla-Nakbi AB, Rouabha M,
Mahdouani K, Bakhrour A. The chemical composition and
biological activity of clove essential oil, Eugenia caryophyllata
(Syzzygium aromaticum L. Myrtaceae): a short review. Phyto-
versatile pharmacological actions. Nat Prod Commun 2010;
16. Chomchawon N. Spice production in Asia—An overview. Pre-
sented at IBC Asian Spice Markets Conference, Singapore,
27–28 May 1996.
17. Hartnell G, Moore D, Douek D. Near fatal ingestion of oil of
18. Karmatou GP, Vermaak I, Viljoen AM. Eugenol from the remote
Maluku Islands to the international market place: a review of a
19. Lee KYM, Patterson A, Piggot JR, Richardson GD. Origins of
favourite in whiskies and a revised flavour wheel: A review. J
20. Lee KG, Shibamoto T. Antioxidant property of aroma extract
isolated from clove buds (Syzzygium aromaticum (L.) Merr. Et
21. Alina-hta, Ertas M, Nit, S, Kollmannsberger H. Chemical com-
position and content of essential oil from the bud of cultivated Turkish
22. Praschar A, Locke IC, Evans CS. Cytotoxicity of clove (Syzy-
gium aromaticum) isolated from clove buds on cervical can-
23. Pawar VC, Thaker VS. In vitro efficacy of 75 essential oils
24. Khan MS, Zain M, Hasan S, Husain MF, Ahmad I. Inhibition of
quorum-sensing regulated bacterial functions by plant essen-
tial oils with special reference to clove oil. Lett Appl Micro-
25. Dorman HJ, Deans SG. Antimicrobial agents from plants:
anitibacterial activity of plant volatile oils. J Appl Microbiol
2000; 88:308-16.
antibacterial activity of some plant volatile oils. J Appl Microbi-
ol 2000; 88:308-16.
27. Chaudhari LK, Jawale BA, Sharma S, Sharma H, Kumar CD,
Kulkami PA. Antimicrobial activity of commercially available
essential oils against Staphylococcus mutans. J Contemp Dent
28. Rahim ZH, Khan HB. Comparative studies on the effect of
crude aqueous (CA) and solvent (CM) extracts of clove on the
caricogenic properties of Streptococcus mutans. J Oral Sci
2006; 48:117-23.
29. Uju DE, Obioma NP. Anticariogenic potentials of clove, tobac-
30. Burt SA, Reinders RD. Antibacterial activity of selected plant
essential oils against Escherichia coli O157:H7. Lett Appl
31. Feres M, Figureiro LC, Barreto IM, Coelho MN, Araujo MW,
Cortell SC. In vitro antimicrobial activity of plant extracts and
propolis in saliva samples of healthy and periodontally-involved
32. Larhzioni M, Oumoulid L, Lazrek HB, Wataleb S, Bousaid M,
Bekhouche K, et al. Antibacterial activity of some Moroccan
33. Friedman M, Henika PR, Mandrell RE. Bactericidal activities
of plant essential oils and some of their isolated constituents against
Campylobacter jejuni, Escherichia coli, Listeria monocytogenes,
34. Mogina MD, Dalmacaro JF, Fonseca ME, Jr. J Ethnopharma-
35. Duralapandyam V, Ayyanar M, Ignacimuthu S. Antibacterial activity
of some ethno-medical plants used by Palayari tribe from Tamil
Nadu, India. BMC Complement Altern Med 2006 17; 635:42.
36. Devi KP, Nieha SA, Sakhthivel SK, Eugenol (an essential oil of clove) acts as an antibacterial agent against Sal-
monella typhi by disrupting the cellular membrane. J Ethnoph-
armacol 2010; 130:107-15.
37. Fabio A, Cermelli C, Fabio G, Niccoliti P, Quaglio P. Screening
of the antibacterial effects of a variety of essential oils on mi-
roorganisms responsible for respiratory infections. Phytother
38. Saini A, Sharma S, Chhipher S. Induction of resistance to
respiratory tract infection with Klebsiella pneumoniae in mice
fed on a diet supplemented with tulsi (Cuminum sanctum) and
clove (Syzygium aromaticum) oils. J Microbiol Immunol Infect
of clove (Syzygium aromaticum) oil in inhibiting Listeria mono-
40. Ogumwana IE, Okwale NO, Eckundayo O, Walker TM, Schmidt
JM, Setzer WN. Studies on the essential oils composition,
antibacterial and cytotoxicity of Eugenia uniflora L. Int J
41. Neely AN, Maley MP. Survival of enterococci and staphylococci
42. Warnke PH, Becker ST, Poddusch R, Sivananthan S, Springer
IN, Russo PA, Wiltfang J, Fickenscher H, Sherry E. The battle
against multi-resistant strains: Renaissance of antimicrobial
essential oils as a promising, forceful and light hospital-acquired
43. Enzo AP, Susan JS. Antibacterial activity of Australian plant
extracts against methicillin-resistant Staphylococcus aureus
(MRSA) and vancomycin-resistant enterococci (VRE). J Basic
44. Moon SE, Kim HY, Cha JD. Synergistic effect between clove
oil and its major compounds and antibiotics against oral bac-
45. Hemaiswarya S, Doble M. Synergistic interaction of eugenol
with antibiotics against gram negative bacteria. Phytomed-
46. Mayo L, Arrigo A, Zrih A, Aubert G. Comparison of bac-
teniotic and bactericidal activity of 13 essential oils against
strains with varying sensitivity to antibiotics. Lett Appl Micro-
47. Pei RS, Zhou F, Ji BP, Xu J. Evaluation of combined antibacte-
rial effects of eugenol, cinnamaldehyde, thymol, and carvacrol
against E. coli with an improved method. J Food Sci 2009;
74:M370-383.
48. Gupta C, Kumar A, Garg AP, Catanzaro R, Marotta F. Com-
parative study of cinnamon oil and clove oil on some oral
49. Avila Fatira M, Oliveira PS, Dutra FS, Fernandes TJ, de
Pereira CM, de Oliveira SQ, et al. Eugenol derivatives as po-
tential anti-oxidants: is phenolic hydroxyl necessary to obtain

52. Lee YY, Hung SL, Pai SF, Lee YH, Yang SF. Eugenol suppressed the expression of lipopolysaccharide-induced immunomodu-

53. Thompson D, Eling T. Mechanism of inhibition of prosta

54. Raghavanerra H, Diwakar BT, Lokesh BR, Naidu KA. Eugenol–the active principle from cloves inhibits 5-lipoxygenase activ-


58. A.S.Yadav and D. Bhatnagar, Modulatory effect of spice ex-

59. Daniel AN, Sartoretto SM, Schmidt G, Caparroz-Assef SM, Bersani-Amado CA, Cuman RKN. Anti-inflammatory and an-


Building a new layer of protection.

Sensodyne® Repair & Protect harnesses advanced NovaMin™ technology to help build a robust hydroxyapatite-like layer over exposed dentine and within dentine tubules.1–5 With Sensodyne® Repair & Protect, you can do more than help relieve the discomfort of dentine hypersensitivity – you can help repair and protect your patients’ exposed dentine.
Building on technology

Originally developed for bone regeneration, NovaMin delivers calcium and phosphate into your patient’s enamel and dentine and provides favourable conditions for hydroxyapatite-like layer formation.

Building a reparative layer

From as quickly as the first use, in vitro studies have shown a hydroxyapatite-like layer forming over exposed dentine and within the dentine tubules that is 50% harder than dentine.

Building an integrated and resilient layer

The hydroxyapatite-like layer formed binds firmly to the collagen in the patient’s dentine and helps protect your patients from the chemical and physical oral challenges they encounter in their everyday lives.

In vitro studies have shown that the robust layer builds up over 5 days and, with twice-daily brushing, provides patients with continual protection from dentine hypersensitivity.

References:


No. 1 Dentist recommended brand for sensitive teeth

Think beyond relief - recommend Sensodyne® Repair & Protect
OBJECTIVE
To record the broad demographics of patients attending a private periodontal/oral medicine practice. The purpose of this study was to establish the age and gender distribution of these patients and to compare these findings with a similar study carried out in 1977. In addition to the age and gender, the reasons and/or the complaints of the patients were recorded. This is a retrospective review of patient records.

INTRODUCTION
In our previous study it was found that nearly half (47%) of the patients attending the practice sought consultation only. Included amongst these were patients attending for consultation for an oral medicine diagnosis, those who were referred back to the general practitioner for treatment, those who declined treatment, as well as those who did not keep a further appointment.1

Papapanou in a recent review article asks the questions: “what are the levels of disease in the populations and what are the determinants of its extent and severity?”2

It is well known that the periodontal diseases are widespread throughout the world populations3 and that the afflictions are linked to many systemic conditions.4 These are some of the motives why we looked at patient attendance at a periodontal practice and the reasons for their visits.

MATERIALS AND METHODS
One thousand two hundred and sixty two patient record cards were examined in sequential order and the following information noted:

1. Age and gender of the patient.
2. The main complaint or reason for the consultation.
3. Whether the patient had either a periodontal or oral medicine problem.
4. Source of the referral, for example a Dental practitioner, Medical Aid, Internet or personal referral.
5. Whether consultation alone was sought or whether treatment was undertaken.

A periodontal problem was defined as either gingivitis or periodontitis. No further subdivisions were recorded. Oral medicine problems included lesions of the oral cavity such as white lesions, ulcers, conditions of the tongue, the lips and non-keratinized oral mucosa. Temporo-mandibular joint dysfunction was not included in the study.

A consultation was defined as one or two visits, the second visit being a follow-up consultation. Treatment was considered as requiring a minimum of three visits.

Statistical analysis was with Chi square test using Instat (version 3.1, GraphPad Software Inc., San Diego, CA, USA) at six degrees of freedom. Statistical significance was set at p<0.05.

RESULTS
Of the 1262 patients seen, 520 were male and 742 female, a male to female ratio of 1:1.4. Their ages ranged from 10 to 80+ and are listed in decades in Table 1. The mode and median in the current study was the 41-50 decade compared with 31-40 in the 1977 sample. The difference in age decades between the samples is statistically highly significant (p<0.0001, Chi square = 235.76). The same mode and median pattern is present within males and females in each of the samples. In the current sample there is no statistically significant difference in age decades. When sexes are compared between the samples, males in the 1997 sample are significantly younger than males in the current sample (p<0.0001, Chi square = 72.43). Females are also significantly younger in the 1977 sample (p<0.0001, Chi square = 174.08).

One thousand two hundred patients presented with a periodontal problem, while 62 were specifically oral medicine patients, of whom there were 39 females and 23 males.

Considering the patient’s complaint and/or the reason for the initial consultation, the following were the main concerns of the presenting patients, and the frequencies in which each occurred:

- Referred for periodontal treatment, or the patient stating “I require periodontal care”, but with no specific complaint: 357
- Pain and or discomfort: 266
- Gum recession: 116
- Tooth mobility, loose teeth: 113
- Other, which included, for example, splaying of teeth, bad breath and bad taste: 103
- Bleeding gums: 95
- Abscesses: 89
- Specific Oral Medicine: 62
- Surgical: 61

Three hundred and seventy seven of the periodontal patients sought consultation only. Of the sixty two oral medicine patients, 29 (47%) sought consultation only. Two hundred and eighty five patients had not been referred.
by dentists. They comprised direct patient referrals, as a result of direction by Medical Aids, after personal internet searches and by medical staff at the local hospital.

Six hundred and thirty seven (slightly more than half) of the patients were in the age range 41-60 years. Table 2 reflects a study of their main complaint and / or their reason for the initial consultation, recognizing that this constituted the majority of the patients attending the practice.

DISCUSSION

In this study, the severity of disease and finite treatment have not been investigated. The reasons for the patient attendance may be instructive. Referral by a dental colleague appears to be the most frequent reason, combined with the patient stating “I require periodontal care”. This is in contrast with the finding of Brunsvold et al (1999) who found the chief reason to be “I was told I have gum disease” That study reported that the third most common complaint was “bleeding gums" In the current investigation the complaints ranged from pain and or discomfort and then tooth mobility and gum recession, Of almost equal frequency were bad taste, bad breath, spaying of teeth, and then bleeding gums.

The change in the age distribution of the samples with patients now attending the practice at an older age may simply be an incidental finding, although one is tempted to claim an enhanced dental awareness as a major influence in preventing the onset of oral disease until later in life. It is clear however that the need for periodontal care is as necessary as ever and in this regard, the following questions, with regard to “time and periodontal needs” in South Africa, may be posed:

- “How much time is devoted to periodontal care in the undergraduate dental and oral hygiene curricula, and is that adequate to cover the needs of a general dental practitioner?”

- “What percentage of time in a general dental practice is devoted specifically to periodontal / oral medicine care?”

- “What percentage of the South African population require periodontal care?”

- “Has there been a recent study on the dental / periodontal needs in a South African population?”

In this observational study, one was not able to determine the intensity of the practice. Could more patients have been seen and cared for? What one can determine from the study is that the age range of patients attending the practice were older, particularly from forty to seventy years.

CONCLUSIONS

In the 1977 study the highest number of patients was in the 31-40 age group, compared with the present study where it is the 41-50 age group. This apparent shift may be due to enhanced preventive measures being practised by younger patients, or could be the result of more general practitioners managing the early stages of periodontal disease. By far the greatest number of patients attending the practice had been referred for periodontal treatment, confirming the prevalence of the condition.

Acknowledgements

We wish to thank Professor P Cleaton-Jones for his advice and assistance, notably with statistical presentation, and Professor W G Evans for his guidance.

Table 1: Details of Age and Gender of 1262 patients in the current sample compared with those of the 1250 patients in the 1977 sample.

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Male (77)</th>
<th>Female</th>
<th>Female (77)</th>
<th>Total</th>
<th>Total (77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>11-20</td>
<td>12</td>
<td>31</td>
<td>14</td>
<td>73</td>
<td>26</td>
<td>104</td>
</tr>
<tr>
<td>21-30</td>
<td>59</td>
<td>111</td>
<td>82</td>
<td>195</td>
<td>141</td>
<td>306</td>
</tr>
<tr>
<td>31-40</td>
<td>115</td>
<td>148</td>
<td>140</td>
<td>175</td>
<td>255</td>
<td>323</td>
</tr>
<tr>
<td>41-50</td>
<td>138</td>
<td>141</td>
<td>215</td>
<td>152</td>
<td>353</td>
<td>293</td>
</tr>
<tr>
<td>51-60</td>
<td>105</td>
<td>56</td>
<td>179</td>
<td>112</td>
<td>284</td>
<td>168</td>
</tr>
<tr>
<td>61-70</td>
<td>71</td>
<td>24</td>
<td>81</td>
<td>17</td>
<td>152</td>
<td>41</td>
</tr>
<tr>
<td>71-80</td>
<td>17</td>
<td>4</td>
<td>22</td>
<td>3</td>
<td>39</td>
<td>7</td>
</tr>
<tr>
<td>81+</td>
<td>7</td>
<td>2</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>516</td>
<td>752</td>
<td>734</td>
<td>1262</td>
<td>1250</td>
</tr>
</tbody>
</table>

Table 2: Patient’s main complaint or reason for the initial consultation. Ages 41-50 and 51-60 years.

<table>
<thead>
<tr>
<th></th>
<th>41-50 years</th>
<th>51-60 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abscess</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>F</td>
<td>28</td>
<td>12</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>20</td>
<td>61</td>
</tr>
<tr>
<td>Pain +</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>F</td>
<td>24</td>
<td>22</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>37</td>
<td>29</td>
<td>66</td>
</tr>
<tr>
<td>Bleeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>12</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>F</td>
<td>16</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>21</td>
<td>49</td>
</tr>
<tr>
<td>Recession</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>F</td>
<td>15</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>Ref. for Perio. Rx</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>42</td>
<td>26</td>
<td>68</td>
</tr>
<tr>
<td>F</td>
<td>54</td>
<td>45</td>
<td>99</td>
</tr>
<tr>
<td>Total</td>
<td>96</td>
<td>71</td>
<td>167</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>19</td>
<td>30</td>
<td>49</td>
</tr>
<tr>
<td>F</td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>70</td>
<td>129</td>
</tr>
<tr>
<td>Surgical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>F</td>
<td>10</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>12</td>
<td>11</td>
<td>23</td>
</tr>
<tr>
<td>F</td>
<td>20</td>
<td>21</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Oral Med.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>F</td>
<td>8</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>12</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>637</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CASE REPORT

A 53-year old female was referred by her local general medical practitioner to an oral medicine specialist for the management of a persistent ulcer on the left side of her tongue. The lesion had been present for at least three months and was not responding to treatment by topical antiseptic agents. The earlier removal of a molar in close proximity to the lesion, in an attempt to exclude the possibility of traumatic ulceration, had also yielded no beneficial effects. Upon examination, the patient appeared clinically healthy but presented with a history of emphysema due to chronic cigarette smoking. The emphysema was currently being managed by oral inhalation steroids. Even though smoking cessation had previously been advised, she failed to comply and was currently still smoking more than 10 cigarettes per day.

Her intraoral examination revealed signs of a healing extraction socket in the lower left molar area and brown staining of the dorsal surface of the tongue. A 1.5 x 1.5cm ulcer with rolled margins and signs of induration was noted on the left lateral surface of the tongue opposite the left lower first molar (Figure 1). Interestingly, no detectable lymphadenopathy was noted. Based on the history and clinical findings, a differential diagnosis of neoplasia, tuberculosis or chronic trauma associated ulceration was made.

An incisional biopsy that included the margins of the lesion was carried out under local anaesthesia to confirm the clinical diagnosis. At the same time, the patient was advised to reduce smoking to decrease her cancer risk as well as to improve the healing of the biopsy site. The histopathologic examination of the biopsy revealed ulcerated mucosa with a florid chronic granulomatous infiltrate in the submucosa. Whilst there were no signs of caseating necrosis, the presence of a few multinucleated (typical tuberculosis-associated) Langhans-type giant cells was, however, noted and the granulomatous inflammation showed infiltration by lymphocytes and numerous eosinophils. Of pertinent interest was the fact that the granulomas extended deeply into the submucosa and were wedged between the skeletal muscle fibres at the base of the specimen (Figure 2). The presence of eosinophils could be attributed to chronic skeletal muscle damage. No signs of epithelial dysplasia or neoplasia were noted. Ziehl-Neelsen staining was negative for mycobacterial species (Figure 3) and Periodic acid-Schiff staining did not expose signs of fungal infection. Immunoperoxidase studies for cytokeratins were negative, thus ruling out a malignant squamous infiltrate which could have been masked by the dense granulomatous inflammation. The histological diagnosis of chronic granulomatous inflammation, that could not be further specified, was made.

Due to the inconclusive nature of the histopathological findings, additional investigations were requested to exclude systemic disease and specifically tuberculosis. This revealed the following significant findings: An ESR of 58; normal full blood and differential white blood counts; negative test for HIV; negative results for syphilis; plain chest radiographs indicating a miliary pattern of lung calcifications (also noted on radiographs taken two years earlier); and high resolution computer tomography (CT) showing lung calcifications that were considered non-specific by the radiologists but were deemed to indicate a possible infectious granulomatous disease. The differential diagnosis was consequently altered to include tuberculosis, varicella pneumonia and sarcoidosis.

ACRONYMS

DNA: Deoxyribonucleic acid
HIV: Human immunodeficiency virus
INH: Isoniazid
MDR-TB: Multidrug-resistant tuberculosis
NAAT: Nucleic acid amplification test
PCR: Polymerase chain reaction
RIF: Rifampicin
RMR-TB: Rimfampicin-resistant tuberculosis
RNA: Ribonucleic acid
TB: Tuberculosis
Rifampicin-resistant tuberculosis (RMR-TB) is a rapidly emerging form of TB, characterised by resistance to the anti-TB drug, rifampicin (RIF). RIF is an important first-line drug in the treatment of TB and acts by arresting the DNA-directed RNA synthesis of *M. tuberculosis*. Once regarded as rare, RMR-TB appears to be on the rise, especially in areas like the Western Cape, South Africa. This is significant, since multidrug-resistant TB (MDR-TB) is often preceded by the acquisition of resistance to either isoniazid (INH) or RIF. Individuals co-infected with TB and HIV (human immunodeficiency virus), HIV infected individuals on antiretroviral therapy and those with a previous history of TB treatment appear to be at increased risk for acquiring RMR-TB infection. Alcohol abuse is probably another risk factor associated with the disease. Patients in countries with a high usage of rifampic-in-type drugs for the management of bacterial infections, also appear to be at increased risk. As with other forms of tuberculosis, RMR-TB is thought to be transmitted via close contact and at least three different studies, from disparate regions, confirm this tendency. In the case presented above, the only identifiable TB contact was a close relative who had been treated successfully for TB 15 years previously.

The mechanism of RIF resistance has recently been studied. Pang *et al* (2013) showed that specific genetic mutations located in the 81-bp region (RIF resistance-determining region) as well as the increased transcription of several RIF-related efflux pumps, may be responsible for a large percentage of the RIF-resistant TB strains currently seen. Efflux pumps are primitive transport proteins located in the cytoplasmic membrane of most cells, including bacteria. These pumps are involved in the extrusion of intracellular substances into the external environment and are often associated with the efflux of multiple substrates, including antibiotics. Although their physiological function is not completely understood, the over-expression of efflux pumps is thought to be a major reason for antibiotic resistance. This resistance may not
be antibiotic specific but may also incur resistance to other substances, such as dyes, detergents, and disinfectants (including triclosan). Although one might presume that over-expression of these pumps may occur as a result of exposure to antibiotic stresses, this may not be the case. It is presupposed that over-expression may occur due to mutations of local suppressor genes resulting in the development of bacterial species with a high efficacy of resistance to a number of substances. This may also explain the high intrinsic antibiotic resistance of certain bacterial species. The clinical significance of these antibiotic resistant species therefore warrants the use of a broad spectrum of drugs to effect a significant clinical change.

DIAGNOSIS AND TREATMENT

The diagnosis of drug-resistant TB is based on clinical and laboratory examination. Once TB is suspected, based on clinical, histological and/or microbiological grounds, two types of tests are used to evaluate drug susceptibility. These include WHO-endorsed solid or liquid culture-based tests, such as solid agar or Bactec MGIT 960 (Becton-Dickson, Sparks, MD, USA), and molecular based tests that include nucleic acid amplification (NAAT). Culture based tests assess the inhibition of M. tuberculosis growth in the presence of antibiotics and even though they are regarded as the diagnostic gold standard, culture based tests suffer from a number of disadvantages. These include the time required (minimum 21 days), the specialised equipment needed and the lack of infrastructure in most resource-poor settings. In the above case, culture based tests were not possible due to the limited size of the tissue biopsy.

Unlike culture-based tests, NAATs allow much faster processing times, with results often available within two hours. The most commonly used NAAT is Xpert® MTB/RIF (Cepheid, Sunnyvale, CA, USA). This is a polymerase chain reaction test that simultaneously diagnoses TB and Rifampicin resistance, and is now endorsed by the WHO as a first investigation for patients suspected of having drug resistant tuberculosis. Although rapid, the disadvantage of Xpert® investigation for patients suspected of having drug resistant RIF (Cepheid, Sunnyvale, CA, USA). This is a polymerase backbone of later generation fluoroquinolone as well as an injectable aminoglycoside, together with any first line drug to which the bacterium is susceptible. In addition to this, an oral bacteriocidal second-line TB drug should also be used. Treatment is initiated by an intensive phase of injectable medication that might last up to 18 months with the total duration of treatment usually extending up to 24 months. Because of the prolonged treatment regimen, patients have to be monitored frequently for compliance, adverse drug reactions and drug interactions. The treatment outcome for RMR-TB varies according to geographical location, regimen choice and duration of treatment. Curative rates of up to 67% have been recorded but may be influenced by the factors mentioned above.

CONCLUSION

The case presented above has clinical significance for the oral health care practitioner. Oral lesions may be the first sign of systemic disease and, as in this case, a non-healing ulcer was the only presenting sign of RMR-TB. Thus, although oral ulceration is common, and TB associated oral ulceration is a well-documented phenomenon, the rise of resistant TB strains warrants careful consideration when managing these patients. The varied curative rate as well as the potential for disease spread must be taken into account. Practitioners must be aware that in order to effectively manage these complex conditions, interaction with the appropriate specialists, as well as with other healthcare workers, may be required. An acute awareness of systemic disease is a prerequisite for diagnosing oral disease, especially in cases with potentially fatal disorders.

Declaration: No conflict of interest declared

References

This six-year-old female patient (Figure A) presented with episodes of oral bleeding, fever and ulcerations affecting the submandibular region. Cropped pantomographs of the same patient were taken six weeks earlier (Figure B) with a follow-up pantomograph six weeks later (Figure C). What are the most important radiological differences between the cropped pantomographs?

**INTERPRETATION**

The important differences between the cropped pantomographs are the displacement of the 2nd developing permanent molar (blue arrows) and loss of bone surrounding the mandibular primary 2nd molar (red arrow). A diagnosis of acute leukemia was made. Acute leukemia occurs mostly during the first decade of life, usually with gradual onset followed by a rapid course of a few weeks to a few months. In general, it is difficult to distinguish between the various types of acute leukemia's as the cells are in an immature state. Oral manifestations are often found in the form of gingival abnormalities, petechiae and ecchymosis, ulcers and bleeding of decreasing frequency. Very frequent is lymphadenopathy of the submandibular region. Radiological changes are said to occur in 60% of children and 10% of adults. In adults changes are preferentially seen in the axial skeleton; in children the appendicular skeleton is most commonly involved. Overall 50% of patients show radiological changes and 63% exhibit abnormalities on panoramic radiographs. The cardinal radiological signs of acute leukemia affecting the jaws are: premature loss of teeth, generalized absence of the lamina dura (yellow arrow) (Figure D), resorption of bone around the roots of both mandibular and maxillary first molar teeth, (green arrows) (Figure E), periapical radiolucency simulating typical inflammatory periapical changes, single, non cyst-like radiolucency of the alveolar bone and generalized rarefaction of the jawbones, which may take the form of a reduction in the number of radiographically demonstrable trabeculae in the mandible or maxilla (Figure E). Ancillary radiological signs of acute leukemia are: absence of the follicular walls of unerupted teeth, multiple well-defined radiolucencies, teeth including those in crypts displaced. Differential diagnosis include: hyperparathyroidism, neuroblastoma metastatic to bone and renal osteodystrophy.

**Reference**

In South Africa, the prevalence of eating disorders remains largely unknown. However, with the unique, complex, social and political transformation of the country and increasing urbanization, it is anticipated that there will be an increased local risk of eating disorders. Psychological, social, biological, cultural and familial factors play a role in the development of these ailments. Adolescence is a time of significant self-awareness, identity development and critical self-evaluation and has perhaps been most impacted by socio-cultural changes in contemporary South African society. It is usually during this developmental phase that, among females predominantly, body dissatisfaction and aesthetic concerns are raised and efforts to address these worries often result in dieting. Western culture and the seductive emphasis on consumerism appear to have a powerful impact on the development of eating disorders. Consequent assimilation of the associated Western value system, where physical appearance and self-worth are seemingly synonymous, seems inevitable. The media plays a pivotal role in promoting and reinforcing the development of eating disorders as youngsters are faced with a barrage of media propaganda suggesting what is the ideal body.

Eating disorders are essentially psychological conditions, often associated with devastating medical consequences and share the core features of self-evaluation by weight perception and a desire to be thin. They are classified as Anorexia Nervosa, Bulimia Nervosa and Eating Disorders Not Otherwise Specified. The diagnostic criteria of Anorexia Nervosa includes (i) body weight is maintained at less than 85 percent expected for age; (ii) a distorted body image; and (iii) an endocrine disorder typified by amenorrhoea.

The self-induced weight loss criteria achieved by food avoidance, vomiting and purging, Bulimia Nervosa is typified by binge-eating large amounts of food and a subjective sense of loss of control. It is characterized by (i) a persistent preoccupation with eating; (ii) compensating for over-eating with behaviour to decrease calorie intake or expend calories, typically by self-induced vomiting, exercise and laxative abuse; and (iii) a morbid dread of becoming fat.

Eating disorders are often severe conditions with elevated standardized mortality ratios and marked impairment. Anorexia Nervosa and Bulimia Nervosa both have a typical onset in late adolescence and early adulthood, mainly in young women, but are increasingly seen in young males.

Eating disorders have a significant impact on oral health. The subtle changes in the mouth, which should be recognized by the general dental practitioner, may be early indicators of a serious underlying psychiatric condition. Recognition of these signs should result in earlier diagnosis, referral and instigation of management of both the underlying condition and the secondary oral conditions in their early stages. Early recognition will result in more favourable treatment outcomes as failure to recognize the signs may lead to serious systemic problems, together with progressive and irreversible damage to the dental hard tissues. Dental erosion is the most common and dramatic oral manifestation of the chronic regurgitation typical of eating disorders.

Other oral manifestations include dental hypersensitivity, enamel erosion of lingual maxillary anterior teeth, moth-eaten appearance of incisal edges of maxillary anterior teeth, raised restorations above eroded tooth structure, xerostomia, enlarged parotid glands, sore throat, mucositis, burning sensation of the tongue, bleeding gingiva and decreased salivary flow/enlarged salivary glands. In addition to the damage to dental hard tissues, the oral mucosa is also affected. Nutritional deficiencies impair repair and the regenerative potential of the oral mucosa. Trauma to the mucosa, particularly to pharynx and soft palate is a universally recognized sequelae of eating disorders and is often caused by the insertion of foreign objects into the oral cavity to induce vomiting.

Angular cheilitis has been reported and non-specific nutritional deficiencies and trauma have been implicated as aetiological factors. Angular cheilitis is a manifestation of chronic infection either solely by the fungus Candida.
albicans or sometimes by concomitant candidal and staphylococcal flora and is associated with both nutritional deficiencies and salivary dysfunction. Many of the manifestations of chronic oral candidiasis present as atrophic, erythematous lesions of the oral mucosa and may be misdiagnosed as being of traumatic aetiology. All forms of oral candidiasis are associated with nutritional deficiencies – patients with eating disorders are nutritionally challenged individuals and would be expected to exhibit candidal lesions of the oral mucosa.6 Oral candidiasis is an early clinical marker of systemic conditions such as HIV/AIDS, diabetes and sideropenia. However in nutritionally deficient individuals, such as those with eating disorders, oral candidiasis may raise a red flag of suspicion, especially as chronic oral candidiasis should not be present in healthy adolescents. Other oral mucosal manifestations include oral ulceration and glossitis11 that are known to be related to hypovitaminosis B-12 as well as folate and iron deficiency states. Such deficiency states should alert the dentists to a potentially serious underlying problem.11

ETHICAL CONSIDERATIONS

Eating disorders arise from a variety of physical, emotional and social issues all of which need to be addressed to help prevent and treat these disorders. Early detection of eating disorders is important not only for the psychological and somatic outcomes but also for the oral and dental consequences. Dentists are often the first health care professional that previously undiagnosed individuals with eating disorders may present. In this regard the dental profession needs to be knowledgeable and informed and assist with the secondary prevention of the disease.12 Despite the serious consequences of eating disorders on physical and psychological health and well-being, they are often difficult to diagnose and more than half of all cases go undetected.13 Many dental professionals and other health care workers prefer not to pursue their suspicions and do not engage with the patient for fear of losing the patient or misdiagnosing the condition. If a patient presents with some classic oral signs of an eating disorder, a dental professional should, at the very least, discuss the concerns with the patient. A medical referral may be necessary, even though when detected, patients are often averse to accepting treatment.

The ultimate act of beneficence will be in making the patient aware of their problem and to encourage and assist them to seek appropriate care and treatment. Treatment is to address the underlying psychological and interpersonal factors and to restore weight loss in a caring, humane manner. Treatment, with a stepped-care approach to determine the patient’s needs, is most effective when it consists of a multidisciplinary team including psychotherapy, behavioural healthcare, nutritional advice and medical and dental monitoring. The dental profession is well suited to be part of a multidisciplinary team effort to provide care to affected patients.

References
Despite considerable advances in composite resin technology over the last 10 years, shrinkage behaviour and the resultant stresses inherent to directly placed composite restorations continue to challenge clinicians. The most frequently reported reasons for replacement of composite restorations are secondary caries and fractures. To reduce the risk of secondary caries, the development of new materials has mainly focused on the improvement of the marginal adaptation in order to avoid gap formation between the tooth and the restoration. To reduce the problem of polymerization shrinkage and gap formation, a low-shrinkage composite material (Filtek™ Silorane, 3M-ESPE) has been introduced. This material is based on silorane monomers with traditional filler particles. Silorane monomers polymerize by a contraction-neutral ring-opening process which reduces volume shrinkage to 1% compared with 1.7 to 3.5% in methacrylate-based materials. Schmidt and colleagues (2015) reported on a randomized clinical trial that sought to investigate the clinical performance of Filtek™ Silorane by comparing it with a methacrylate-based, composite material (Ceram X™, Dentsply DeTrey). The null hypothesis was that there would be no statistically significant differences in clinical performance between the two restorative systems after five years.

**MATERIALS AND METHODS**

The study was double-blinded RCT where neither the patients nor the evaluator was aware of the treatment. 72 adult patients from Denmark requiring class II restorations of premolars and/or molars provided 158 restorations at baseline. After 5 years, 107 (52 Filtek™ Silorane, 55 Ceram X™) restorations in 48 patients were evaluated. The average age of the patients was 50.5 years (SD 12.3 years, min. 22.9 years, max. 72.8 years). Only vital teeth without preoperative symptoms were included in the study.

After patients had given their informed consent, their teeth were randomized into two treatment groups (Filtek™ Silorane and Ceram X™) using computer-generated random numbers. The randomization used patients as blocks (based on the number of teeth to be restored) and was balanced within patient, or nearly balanced, if an odd number of teeth was included.

All the restorations were placed by the same dentist using a standardized procedure that include the use of local anesthetic, rubber dam, contoured titanium matrices, wooden wedges and lining with calcium hydroxide paste in the case of deep cavities.

Different adhesive systems designed for each of the materials were used. The adhesive system for Filtek™ Silorane (Silorane System Adhesive, 3M-ESPE) was a two-step self-etch primer and bond, whereas the adhesive system for CeramX (XenoIII, Dentsply DeTrey, Denmark) was a single-step self-etch primer and bond. Adhesive procedures were made according to the recommendations of the manufactures.

The composite material was applied in oblique incremental layers not exceeding 2mm. When necessary, an instrument for approximal contouring was used, and each layer was light-cured for 40 seconds. Restorations were adjusted to occlusion and articulation, finished with diamond burs and final polishing was done using rubber points whilst approximately the restorations were polished with Soflex strips.

The primary outcome was marginal adaptation, and the secondary outcomes were: marginal discoloration, approximal contact, anatomic form, fracture, secondary caries, and hypersensitivity. Marginal adaptation had four different scores: 0 excellent, 1 gap detectable with a 150 μm explorer, 2 gap detectable with a 250μm explorer, and 3 gap detectable with a ball-ended 0.5mm explorer. Approximal contact was assessed according to the size of the approximal space: 0: dental floss could pass, 1: a 50 μm blade could pass, 2: a 100μm blade could pass. Secondary caries was scored as 0: no caries, 1: inactive caries, 2: active caries without cavity, and 3: active caries...
with cavity. Fracture and discoloration were diagnosed by visual inspection and scored on a binary scale (yes/no). For pulp vitality test, the electrical pulp tester was used. Finally, the examiner assessed treatment need (need for repair or replacement of the restoration).

Restorations were scored after 5 years by one experienced dentist/evaluator (ID).

RESULTS

Patients were recalled for a 5-year follow-up from September 2012 to February 2013 with an average observation time of 1,780 days (SD 45 days). A total of 32 % of the restorations were lost to 5-year follow-up. Patients examined after 5 years had, on average, 2.2 restorations (min. 1, max. 9) included in the study (see Table 1).

At 5-year follow-up, no statistically significant differences between the two materials were found in marginal adaptation either occlusally (p = 0.96) or approximally (p = 0.62).

In general, higher scores for marginal gaps were found for occlusal surfaces than for approximal surfaces.

No statistically significant differences were found between the two materials in terms of approximal contact (p = 0.22), anatomic form (p = 0.23), fractures (p = 0.76), or discoloration (p = 0.89).

Secondary caries was found in two teeth (Filtek™ Silorane). Both of the lesions were active, but only one had a cavity. Inactive caries was found in two teeth (Filtek™ Silorane). A total of 99 teeth (49 Filtek™ Silorane, 50 Ceram X™) were tested for vitality. They were all vital. One tooth showed hypersensitivity (Ceram X™).

At 5-year follow-up, out of 107 restorations, six were repaired (four Filtek™ Silorane, two Ceram X™), and five were replaced (3 Filtek™ Silorane, 2 Ceram X™). All replacements were necessitated by cusp fractures (all in premolars). Five repairs/replacements were placed in molars, six in premolars. Six of the repairs/replacements were placed in the upper jaw, five in the lower jaw. The average size of the restorations in the repair/replacement group was 2.5 surfaces, whereas an average of 2.6 surfaces was found in the whole group. The average age of the patients in the repair/replacement group was 49.3 years, compared with 50.5 years in the whole group.

CONCLUSIONS

The null hypothesis, that there would be no statistically significant differences in clinical performance for the two materials was accepted. Restorations of both materials were clinically acceptable after 5 years.

IMPLICATIONS FOR PRACTICE

This study did not find any advantage of the silorane-based composite over the methacrylate-based composite, which indicates that the low shrinkage of Filtek™ Silorane may not be a determinant factor for clinical success in class II cavities after 5 years.

Reference


2. Calcium-enriched mixture cement (CEM) versus root canal therapy (RCT) for the treatment of irreversible pulpitis in permanent molars: A randomized clinical trial.

S Asgary, MJ Eghbal, M Fazlyab, AA Baghban, J Ghoddusi

Experts are of the opinion that for an informed, meticulously selected patient who wishes to avoid root canal therapy (RCT), vital pulp therapy (VPT) should be attempted as the correct/ethical treatment choice especially in contemporary modern endodontics where pulp regeneration in necrotic teeth has become the top goal. Ideally, vital pulp therapy of adult permanent teeth includes direct/indirect pulp capping and partial/coronal pulpotomy using pulp-covering (bio) materials, which subsequently preserve the coronal pulp in situ, partially or totally removed to the level of canal orifice(s), and stimulate the formation of dentinal bridge as a natural barrier. VPT can have a high success rate provided that:

(i) the remaining pulp is either non-inflamed or capable of healing;
(ii) hemorrhage is properly controlled;
(iii) a biocompatible, bioregenerative capping material is applied; and
(iv) a bacterial-tight seal is present.

Calcium-enriched mixture (CEM) cement has been introduced as a hydrophilic tooth-colored biomaterial with favorable sealing ability.

Asgary and colleagues (2015) from Iran reported on the 5-year treatment outcomes of VPT/CEM or RCT for adult

<table>
<thead>
<tr>
<th>ACRONYMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM: calcium-enriched mixture</td>
</tr>
<tr>
<td>RCT: root canal therapy</td>
</tr>
<tr>
<td>VPT: vital pulp therapy</td>
</tr>
</tbody>
</table>

Table 1: Status of sample after 5 years.

<table>
<thead>
<tr>
<th></th>
<th>Filtek™ Silorane</th>
<th>Ceram X™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of restorations</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>Restorations in females</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Restorations in males</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Premolars</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Molars</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>Mean number of surfaces per restoration</td>
<td>2.4</td>
<td>2.7</td>
</tr>
</tbody>
</table>
permanent molars with irreversible pulpitis. In addition, the influence of patient's age/gender on long-term outcomes of VPT as well as effects of the presence of a preoperative periapical lesion on the treatment outcome was assessed.

MATERIALS AND METHODS

This Iranian study involved patients aged between 9 and 65 years who had a vital molar tooth (detected by clinical signs/symptoms) with a history of pain indicative of irreversible pulpitis i.e. a spontaneous pain or a pain exacerbated with hot and cold stimuli that lasted for a few seconds to several hours. The pain could be interpreted as lingering and could be reproduced using cold/heat testing. Subjects with moderate or severe marginal periodontitis, a tooth non-restorable with amalgam or a tooth with internal/external resorption, and root canal calcification in periapical radiographs and medically compromised patients with systemic complications that would alter the treatment procedure were excluded. All the demographic data, patient codes, and the treated teeth for each subject were recorded before treatment.

Five years after treatment, clinical and radiographic evaluations were done in a standardized manner. In addition, the patient database was also checked for treatment cases with failure, or non attendance in evaluations (i.e. failed cases at 1-year follow-up who did not take part at 2- and 5-year recall). The 5-year results of each treatment group, with/without such failures, were assessed using the chi-square test. The chi-square test was also used for assessing the effect(s) of gender on treatment outcomes in each of the study arms.

The influence of patients’ age (three age groups of <20, 20–29, and ≥30 years) as well as the effect of preoperative periapical involvement (i.e., presence/absence of apical lucency) on success/failure were assessed using the multiple binary logistic regression model. The marginal homogeneity test was used to compare the distribution of treatment responses in each of the study arms at 1- and 5-year follow-ups.

RESULTS

After 5 years, a total number of 271 patients (66.6 %; 137 in VPT/CEM group and 134 in RCT group) were available for assessment of treatment outcomes. Using the independent sample t test, no significant difference in the follow-up duration was shown between the groups (P = 0.27).

When the data of available patients were assessed, the chi-square test revealed no significant difference in the treatment outcomes of both groups with the success rates of 78.1 and 75.3 % for the VPT/CEM and RCT groups, respectively (P = 0.61).

When the missing data related to the previous failures (n = 13 in VPT/CEM group and n = 20 in RCT group) were evaluated, the difference between the study arms was not significant (P = 0.29) with success rate being 71.3 % for VPT/CEM group and 65.8 % for RCT group.

In terms of the correlation between patients’ age and treatment outcomes in each of the two study arms, the multiple binary logistic regression model revealed that the outcome and patients’ age were not significantly related in each of the defined age groups (P = 0.72 and P = 0.61 for VPT/CEM and RCT arms, respectively;)

When assessing the impact of gender on outcomes of treatment in each of the study arms, the statistical analysis did not reveal a significant difference (P = 0.24 in VPT/CEM and P = 0.73 in RCT).

In addition, the marginal homogeneity test did not reveal a significant difference between the 1- and 5-year results in the group treated by VPT/CEM (P = 0.09), while the difference for the RCT group was significant (P < 0.001).

For the interaction of treatment type and preoperative periapical involvement of the teeth on treatment success and failure, the multiple binary logistic regression model revealed no significant differences (P = 0.71).

CONCLUSION

The authors concluded that treatment outcomes of VPT/CEM in mature permanent molars with established irreversible pulpitis is comparable with that achieved in RCT.

IMPLICATIONS FOR PRACTICE

The trial has provided good evidence that the VPT/CEM procedure which is simple, cost-effective, predictable, and bioregenerative is viable as a realistic alternative for tooth extraction or root canal therapy in general clinical practice worldwide.

Reference


3. Rubber interdental bristle versus the standard metal-core interdental brush for interdental cleaning- a randomized clinical trial (RCT).

The importance of plaque removal for the prevention of dental disease is well established. However, habits such as interproximal plaque removal via flossing or alternative methods such as using wooden sticks, rubber-tip applicators, or interdental brushes have yet to become

ACRONYMS

EIBI: Eastman Interdental Bleeding Index
IDB: Standard interdental metal core brush
Pl: Plaque Index
Rib: Rubber interdental brush
established as a daily routine for the majority of people who brush their teeth using toothbrushes.

Interdental cleaning plays a crucial role in good oral hygiene because these surfaces are very difficult to reach and are especially prone to periodontal destruction.1 It has been found that interdental brushes are more effective than dental floss or wooden sticks in removing dental plaque. Interdental brushes have been available since the 1960s and commonly consist of a stainless steel wire which is connected to fine nylon filaments of different diameters. These nylon filaments are normally arranged in either a round or a triangular design, the latter of which was shown to be more effective in cleaning and to require the use of less pressure for insertion.1 However, when brushes are not carefully used the chance of direct contact between the metal core of the brush and the tooth itself may trigger dentin hypersensitivity and iatrogenic tooth damage.2 Abouassi and colleagues (2015) reported on a trial that sought to compare a newly developed rubber interdental bristle against the standard metal-core interdental brush for its plaque removal efficacy and reduction of gingivitis in patients. Patients were also questioned afterwards as to their acceptance and satisfaction in using the brushes.

MATERIALS AND METHODS

51 patients between 18 and 72 years and who had more than 18 interdental sites in their mouths were included in this trial. Those that had been exposed to antibiotic therapy in the previous three months were excluded.

The tested material consisted of a newly developed rubber interdental bristle (Fuchs©, Interbros GmbH, Schönau, Germany; RIB) and a standard metal core interdental brush (TePe©, Malmö, Sweden; IDB).

Gingival condition was assessed using the Eastman Interdental Bleeding Index (EIBI). For this, a triangular wood-en interdental device was moved in the facial interdental space depressing the papilla 1–2mm and removed. This procedure was repeated four times. After 15 seconds, the presence or absence of bleeding was assessed.

Plaque levels were assessed using the Plaque Index (PI) with the Turesky modification of the Quigley and Hein Index. Stained plaque was scored from 0 to 5 at each facial and lingual non-restored surface of all the teeth except third molars (0 = no plaque, 1 = separate flecks of plaque, 2 = a thin continuous band of plaque up to 1mm, 3 = a band of plaque wider than 1mm but covering less than one third of the crown, 4 = plaque covering at least one third of the crown but less than two thirds, and 5 = plaque covering two thirds of the crown or more).

The questionnaire to assess patient acceptance consisted of 16 items regarding their subjective evaluation in using the product. The items included a 10-point Likert scale for evaluation of the acute pain intensity when using the product; free text for describing location of pain; 5-point Likert scales (1 = very satisfied, 2 = satisfied, 3 = neutral, 4 = unsatisfied, 5 = most unsatisfied) for items like subjective cleaning capacity; ease of use; manageability; stability; slip resistance; accessibility of interdental spaces; flavour; and overall assessment with free text for personal comments. Besides the questions generated by Christou et al.2 the questionnaire was developed by the authors of this study including three researchers in the field of oral hygiene (PRK, CD, and EH). The questionnaire was shown to other patients prior the study to check understanding of the questions.

This study was performed in a crossover design. Each participant was asked to attend three times for the respective test interdental brush. The subjects were randomly assigned to a treatment sequence for the two tested products using a computer-generated randomization schedule. The subjects were randomly assigned to either treatment pair group “AB” or “BA”. Patients were randomized to receive either RIB (Rubber interdental brush) or IDB (standard interdental metal core brush).

During the first appointment, plaque evaluation was followed by professional dental cleaning and by oral hygiene instructions.

Tested rubber interdental bristles were designed for single use, so the patients were informed to use a new RIB every time. The IDB were multiple use products. Each time, the IDB had to be rinsed with tap water and stored dry at room temperature. Patients were asked to discard the IDB when the filaments were no longer straight or when the metal core became damaged.

At the start of the trial, subjects were given the same type of toothpaste and toothbrushes. EIBI scores were taken from the interdental papillae adjacent to interproximal test sites after 1 week. The second measurement of plaque was taken after 4 weeks. After this session, participants were asked to fill out a questionnaire regarding their opinion about the interdental brush. After 4 weeks wash out time, participants started the second course using the other product in the same manner.

RESULTS

Of the total of 39 patients who completed the study (there were 12 dropouts), 23 were female and 16 male with an average age of 44 years, ranging from 21 to 72 years.

Regarding EIBI, a total of 7,151 interdental sites were analyzed with a mean of 22.92 interdental sites per patient and measurement.

EIBI as a parameter for gingival inflammation/bleeding was significantly reduced after 4 weeks in both the RIB and IDH groups. No statistically significant difference with regard to bleeding index was registered between RIB and IDB. Both products showed a similar effect on bleeding index.

Regarding the plaque index, a total of 16,133 sites were analyzed with a mean of 51.71 analyzed sites per patient and measurement. IDB showed no significant changes in PI after 4 weeks.

RIB showed a low but significant increase of PI after 4 weeks. No statistically significant differences concerning the plaque index were observed between the two tested interdental brushes. RIB and IDB each showed a statistically significant decrease of PI after a single use, respectively with IDB being more effective in plaque reduction in comparison to RIB after a single use (p = 0.0075).

Within low values of pain, IDB provoked significantly more pain during brushing compared with RIB as assessed with
a 10-point Likert scale. RIB was found to be significantly softer than IDB and more comfortable in use. Regarding the overall assessment, RIB was rated significantly superior in comparison to IDB on a 5-point Likert scale.

CONCLUSION
The authors concluded that both interdental cleaning products tested were suitable for daily interdental cleaning. Rubber bristles showed more plaque accumulation compared to the interdental brushes, but with no statistical significance between the two devices. Both products showed a reduction in gingival inflammation after 4 weeks. Patients described rubber brushes as being more comfortable in application and handling.

IMPLICATIONS FOR PRACTICE
Rubber interdental brushes displayed the same cleaning efficacy as the standard metal core interdental brushes. These brushes were found to be more comfortable for patient use but can only be used once before discarding as opposed to the standard metal core brushes which can be used multiple times.

References
Over half of patients may suffer from dentin hypersensitivity and not mention it. They need...

Instant Relief and Long-lasting Protection

**In Office**
- Apply Colgate® Sensitive Pro-Relief™ Desensitizing Paste to patients who are at high risk of hypersensitivity before or after dental procedures

**At Home**
- Recommend Colgate® Sensitive Pro-Relief™ Toothpaste for proven efficacy backed by evidence-based technology
- Great taste to help ensure compliance

*Treatment Program*

The ONLY clinically proven Treatment Program that provides instant* and long-lasting relief for uninterrupted protection

*Instant relief when used according to Instructions For Use.

Scientific Work Cited:

©2011 Colgate-Palmolive Company, New York, NY 10022, USA

www.colgateprofessional.com
GENERAL

The prevalence of musculoskeletal disorders among dentists in KwaZulu-Natal (p 98)

1. Musculoskeletal disorders are an occupational problem which stems from poor postures, extended work hours and working without an assistant.
   a. True
   b. False

2. Only about 10% of respondents in this South African study self reported not having suffered musculoskeletal disorders.
   a. True
   b. False

Microbial contaminants on dental bib chains with attached clips. (p 104)

3. Reusable dental bib chains are considered to carry a low risk for transmission of infection.
   a. True
   b. False

4. A low number of bib chains carried microbial contaminants after dental treatment.
   a. True
   b. False

5. Which one of these microorganisms was not eradicated by disinfection?
   a. Staphylococcus aureus
   b. Streptococcus mutans
   c. Escherichia coli
   d. Pseudomonas aeruginosa
   e. Lactobacillus

6. The disinfectant used in the study was
   a. Chlorhexidine
   b. Brushtox
   c. Chlorine dioxide
   d. Listerine

Potential of clove of Syzygium aromaticum in development of a therapeutic agent for periodontal disease. A review. (p 108)

7. Clove has been used to treat medical conditions like dyspepsia, acute or chronic gastritis and diarrhoea.
   a. True
   b. False

8. Clove oil and eucalyptus oil exhibited antibacterial property against the most common periodontal pathogen Aggregatibacter actinomycetemcomitans.
   a. True
   b. False

9. The major component of clove is:
   a. β-caryophyllene
   b. eugenol acetate
   c. eugenol
   d. benzyl alcohol
   e. chavicol

10. Clove has anti-inflammatory property by inhibition of:
    a. cyclooxygenase (COX) pathway
    b. lipooxygenase (LOX) pathway
    c. nuclear factor kappa B (NF-κB) pathway
    d. inhibition of PGE2
    e. All of the above

Who visits a periodontist and why (p 118)

11. This study raises some relevant questions about the education of dental students in oral medicine and periodontology.
    a. True
    b. False

Maxillo-Facial Radiology Case 129 (p 123)

12. The onset of thalassemia is during puberty.
    a. True
    b. False

13. Enlargement of the maxilla is the most noticeable feature of the oral structures.
    a. True
    b. False

Oral Medicine Case 68: Oral ulceration caused by rifampicin-resistant tuberculosis (p 120)

14. Most cases of Rifampicin-resistant tuberculosis are also resistant to Isoniazid.
    a. True
    b. False

15. M. tuberculosis is routinely cultured over a period of 3-4 days.
    a. True
    b. False

16. Oral tuberculosis associated lesions are best managed with topical agents.
    a. True
    b. False

Clinical Windows (p 126)

17. In the Schmidt et al trial, the unit of interest was:
    a. the patient
    b. the tooth
    c. both a & b
    d. None of the above
18. In the Schmidt et al trial, Filtek™ Silorane offered no additional benefit over Ceram X™ for all of the outcomes assessed.
   a. True
   b. False

19. In the Asgary et al trial, there were no significant differences in the treatment outcomes of both groups as indicated by the p value (P = 0.00001)
   a. True
   b. False

20. In the Abouassi et al trial, the metal core interdental brush (IDB) scored significantly lower than the rubber interdental brush for pain, comfort and softness.
   a. True
   b. False

23. Oral manifestation of eating disorders includes:
   a. Candidiasis
   b. Enlarged parotid glands
   c. Dental Erosion
   d. Mucositis
   e. All of the above

24. The role of dental practitioners in early identification, referral and case management of eating disorders is crucial.
   a. True
   b. False

25. Early detection of eating disorders is important not only for the psychological and somatic outcomes but also for the oral and dental consequences.
   a. True
   b. False

ETHICAL

Ethical considerations when treating patients with eating disorders (p 124)

21. Bulimia Nervosa is typified by:
   a. binge eating large amounts of food
   b. a subjective sense of loss of control
   c. a persistent preoccupation with eating
   d. a morbid dread of becoming fat
   e. all of the above

22. Eating disorders are always seen female patients, but never in males.
   a. True
   b. False

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.

Online CPD in 6 Easy Steps

1. Go to the SADA website www.sada.co.za.
2. Log into the ‘member only’ section with your unique SADA username and password.
3. Select the CPD navigation tab.
4. Select the questionnaire that you wish to complete.
5. Enter your multiple choice answers. Please note that you have two attempts to obtain at least 70%.
6. View and print your CPD certificate.
**Cornelius Niemann**
Andolex Product Manager
Tel: 011 021 4155
E-mail: c.niemann@inovapharma.co.za

**Adriaan Buys**
Tel: 011 898 2429
E-mail: adriaan_buys@colpal.com
Website: www.colgateprofessional.co.za

**Karel Viviers**
Tel: 011 745 6000
E-mail: karel.k.viviers@gsk.com

**Georgina Harpur**
Tel: 011 253 4274
E-mail: G

**For better dentistry**

**Terry Greyling** (CT) 082 457 3200
**Joseph Shai** (JHB/PTA) 082 459 5480
**Craig Johnstone** (KZN) 083 661 4000
**Leigh Spamer** (JHB) 072 631 9696
**Neil de Villiers** (JHB) 071 463 2062
**Yolanda Botha** (PTA) 082 553 5324

**Alida Thomson**
Tel: 0800 22 86 87
Cell: 084 402 7746
Fax: 021 531 1792
E-mail: alida@ekonodent.co.za

**C-TECH Bone Level**
**MORSE TAPERED**
**IMPLANT**

- **AFFORDABLE**
- **INTERNAL TAPER**
- **PLATFORM**
- **SWITCHED**
- **EASY TO USE**

**GH Dental**
Suppliers of internal hex, internal hex with taper and mini implants

Tel: 011 954 2571
Fax: 086 604 9878
E-mail: info@ghdental.co.za

**BOOK YOUR COURSE NOW**

**P-I Brånemark Institute of Excellence**
The Brånemark Institute is an international centre of excellence in craniofacial reconstruction.

**CLINICAL COURSES 2015**
**INTRO TO COMPREHENSIVE IMPLANT DENTISTRY** 29-31 MAY 2015
COST: R5 000

Endodontic services now available at the Brånemark Institute
DR C G SIDLEY
Tel: 011 784 3204, Fax: 086 604 9878.

**BOOK YOUR COURSE NOW**

FOR MORE INFORMATION / REGISTER
www.branemarkinstitute.co.za

**Quality dental products at the best prices**

Tel: 0800 111 796
E-mail: admin@dentalwarehouse.co.za
Website: www.dentalwarehouse.co.za

**Your money, our business**
Distributor of innovative and high quality dental products

Robyn Lewis
Tel: 021 710 4308
Website: www.listerine.co.za

The only recommended cleaner for your Valplast®

Novo Dental are your exclusive stockists of Val-Clean Concentrated Denture Cleaner.

Tel: 011 2100 400
Fax: 011 433 3581
Email: sales@novadental.co.za

The only recommended cleaner for your Valplast®

Savitha Govender
Tel: 011 745 6568
E-mail: Savitha.s.govender@gsk.com

Sugarfree chewing gum with

Endorsed by the South African Dental Association

Cleans teeth in a way you can really feel

BOOK YOUR SPACE NOW
R495 (excl. VAT) pm or R4950pa
3 Payment options:
• Once-off Annual
• Monthly Invoiced
• 2 payments per annum

Ruan Meiboom
Tel: 010 020 1013
E-mail: ruan@edoc.co.za

UNILEVER ORAL CARE – one of the world’s leading oral care companies
• Present in 100 countries
• Over 40 years’ experience
• Number 1 oral care company in 26 countries
  including Italy and France
• Number 2 oral care company in 24 more countries
• Recognised by the FDI World Dental Federation

For more information please contact:
Cassy Lee, Brand Manager - Oral Care
cassy.lee@unilever.com
+27 31 570 3398

BOOK YOUR SPACE NOW
R495 (excl. VAT) pm or R4950pa
3 Payment options:
• Once-off Annual
• Monthly Invoiced
• 2 payments per annum

Ruan Meiboom
Tel: 010 020 1013
E-mail: ruan@edoc.co.za

UNILEVER ORAL CARE – one of the world’s leading oral care companies
• Present in 100 countries
• Over 40 years’ experience
• Number 1 oral care company in 26 countries
  including Italy and France
• Number 2 oral care company in 24 more countries
• Recognised by the FDI World Dental Federation

For more information please contact:
Cassy Lee, Brand Manager - Oral Care
cassy.lee@unilever.com
+27 31 570 3398
Classifieds

Experienced dental assistant in KZN seeks employment. Contact 083 477 1131 or e-mail vickendra@gmail.com

Established State of the Art (Cerec, digital x-rays, implants etc.) dental practice in Grootfontein, Namibia requires full time dentist or alternatively practice. Cell: +264 81 322 6504, hannesdehaast@gmail.com

Dentist / dental surgeon required for a busy practice. Well established modern family practice situated in Lusaka the capital city of Zambia. Should have 5 years practical experience (minimum) and be able to treat and manage all aspects of dental procedures. Minimum 2 year contract. Must be fluent in English. Please send CV to Stacy MasekoPhiri via email at m.sowden@microlink.zm

‘DIR’ Practice Sales/Recruitment/ Uniforms Contact Belita 082 459 9198 www.dirdental.co.za

placements and enquiries

Fully paid-up SADA members:
R20 per word for first 20 words, thereafter a rate of R15 per word will be charged for the balance of the wording, to a maximum wording of 100 words in total.

Non-SADA members:
R30 per word to a maximum wording of 100 words.

All advertisements which exceed a word count of 100 words will be forwarded to our publishers E-Doc for further processing as a potential quarter page advertisement. E-Doc may be contacted on 010 020 1013 or via e-mail: ruan@edoc.co.za

Conditions:
Advert advertisement wording must be supplied in writing to SADA via e-mail to ABayman@sada.co.za or via fax to 086 683 0392.

Details of the advertiser must be supplied when requesting the placement of an advertisement. These should include the advertiser’s postal address, contact telephone number, e-mail address or fax number and SADA membership number. These details are not published and are required for invoicing purposes.

An invoice will be raised and e-mailed or faxed to the advertiser. Please use the reference given on the invoice when making payment; this reference should appear on the beneficiary banking statement.

Only when payment is received and matched to the original request for advertising will the advertisement be released to the publishers for publication.

Enquiries:
South African Dental Association: Ann Bayman:
Tel: 011 484 5288; Fax: 086 683 0392; E-mail: ABayman@sada.co.za

SADA Contact Numbers:

MEMBERSHIP
Adjustment / Application / Contact detail change / General enquiry / Renewal

All membership enquiries should be channelled through your allocated MRO (Member Relations Officer) who will direct your enquiry accordingly should they not be able to assist you.

Branch: Algoa Midlands
MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
Fax: 086 758 9889

Branch: Border Kei
MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
Fax: 086 758 9889

Branch: Free State
MRO: Joseph Moalusi
Email: JMoalusi@sada.co.za
Fax: 086 743 1309

Branch: Gauteng South
MRO: Sylinda Bayman
Email: Sylinda@sada.co.za
Fax: 086 685 5799

Branch: KwaZulu Natal
MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
Fax: 086 758 9889

Branch: Limpopo
MRO: Anna Tsumane
Email: ATsumane@sada.co.za
Fax: 086 644 2411

Branch: Mpumalanga
MRO: Anna Tsumane
Email: ATsumane@sada.co.za
Fax: 086 644 2411

Branch: North West
MRO: Anna Tsumane
Email: ATsumane@sada.co.za
Fax: 086 644 2411

Branch: Northern Cape
MRO: Joseph Moalusi
Email: JMoalusi@sada.co.za
Fax: 086 743 1309

Branch: Western Cape
MRO: Joseph Moalusi
Email: JMoalusi@sada.co.za
Fax: 086 743 1309

Branch: DPL Only Member
MRO: Nelisa Makubalo
Email: NMakubalo@sada.co.za
Fax: 086 758 9889

Branch: Affiliate (Non Branch Member)
MRO: Anna Tsumane
Email: ATsumane@sada.co.za
Fax: 086 644 2411

If you are not currently a member of SADA/DPL and would like to apply for SADA membership, please speak to the MRO relevant to your provincial area.

Continuing Professional Development
If your enquiry is related to a CPD Accreditation Application or CPD Event, please forward your enquiry to CPD@sada.co.za
Sensodyne® Repair & Protect
Powered by NovaMin™

The first fluoride toothpaste to harness advanced NovaMin™ calcium and phosphate bone regeneration technology to help relieve the discomfort of your patients’ dentine hypersensitivity.

Helps repair exposed dentine: Building a hydroxyapatite-like layer over exposed dentine and within dentine tubules.

Protects patients from the discomfort of future sensitivity: The robust layer firmly binds to dentine and is resistant to daily oral challenges.

Think beyond relief - recommend Sensodyne® Repair & Protect

References:
11. Touchstone research February 2014.

GlaxoSmithKline South Africa (Pty) Ltd, 57 Sloane Street, Bryanston 2021, Consumer Care Line: Tel: 0800 118 274, E-mail: consumer.caroline@gsk.com. For full prescribing information see package insert. For product safety issues, please contact GSK on +27 (0) 11 745 6001.
The appointment solution for you.

Whether you have one client or hundreds, B4Appointments is the right tool for you to increase your client base and simplify the management of appointments.

REGISTER YOUR PRACTICE NOW AT b4appointments.co.za

Let this automated system fill your scheduled appointment book.

A fast, reliable, simple and effective way to manage appointments.

IT IS SO SIMPLE!
An online web-based solution - no software needed.

AS BUSINESS - REGISTER AND GET THE 1ST MONTH FOR FREE (QUOTE REF NR B4SADJ1407)