RESEARCH
282 Assessment of an audit-feedback instrument for oral health care facilities in South Africa
294 The knowledge, attitude and practice of edentulous patients attending a dental institute in India regarding care of their dental prostheses

CLINICAL REPORT
290 Pterygomandibular ankylosis: a report on two cases

CLINICAL REVIEW
300 Medical emergencies in dental practices in South Africa

Securidaca Longepedunculata polygalaceae - The Violet Tree
The root is chewed for the relief of toothache. One constituent is methyl salicylate (wintergreen) which is used in proprietary mouthwashes. There is wide medicinal use of roots and bark, for example to relieve menstrual cramps. However an overdose can be dangerous.

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CONTENTS

GUEST EDITORIAL

278  Happy Woman’s Day - MN Khan

COMMUNIQUE

280  Financial consent - K Barnard

RESEARCH

282  Assessment of an audit-feedback instrument for oral health care facilities in South Africa - J Oosthuysen, A Fossey

CLINICAL REPORT

290  Pterygomandibular ankylosis: a report on two cases
- M Mabongo, M Machaka, B Buch

ETHICS CASE

308  Taking and making decisions for children in dentistry - S Naidoo

RADIOLOGY CASE

311  Maxillo-facial radiology case 134 - CJ Nortjé

FORENSIC CASE


BOOK REVIEW

313  Management of Temporomandibular Disorders and Occlusion - JP Okeson

CLINICAL COMMUNICATION

306  Nitrous oxide/oxygen conscious sedation: clinical safety and usefulness - MA Gillman

CLINICAL COMMUNICATION

314  What’s new for the clinician? - V Yengopal

CONTINUOUS PROFESSIONAL DEVELOPMENT

320  CPD questionnaire

BUSINESS DIRECTORY

322  Listing of dental product and service providers

CLASSIFIEDS

324  Notice - Small advertisements on the new web platform
To say that women had a slow start in Dentistry would be a generous understatement. Before 1970, there were almost no women in South African Dentistry, which, like all professions, was then a male preserve.

Is it the biology of the sexes, or the sociology of the genders, that really matters? What role do these questions play in Dentistry? More specifically, what is the true nature of changing gender demographics and the impact of women on Dentistry?

The percentage of active private practitioners, and the percentage of new active private practitioners reflects the steady increase of female dental students over the last generation. Within the next generation female practitioners should reach numerical parity with their male counterparts.

These are impressive numbers. Women have come a long way in bridging the gender gap in Dentistry.

But has gender parity erased gender differences? To what extent do oestrogen and testosterone determine behaviour patterns and brain functions for women and men respectively? Are men and women essentially different? Are women more articulate, verbal, compassionate, empathetic, sensitive, cooperative, sentimental, and loving? Are men more competitive, risk-taking, assertive, aggressive, independent, analytical, and self-reliant?

The eradication of the old boundaries separating the worlds of men and women coupled with the increasing sharing of home and work functions forms a behaviour and lifestyle pattern that sociologists call “gender convergence”. The concept applies not only to the soft topic of the mutual sharing of work, but extends to women doing what have been traditionally “men’s jobs”.

What about social and cultural differences? Do they still exist even as the adamantine walls of patriarchy are coming down?

Notwithstanding gender-convergence and the greater role that men play in the household and women outside of it, it is still women who give more time, attention, and care to children and the aged right through the lifespan of the family.

The foregoing raises an interesting question: do women have something of significance to teach, precisely because of the way they learn and appropriate reality, and does that conflict with the traditional male model with its aggressive, competitive, and analytical ethos?

Is the male-dominated paradigm in Dentistry in trouble?

Hardly, but its hierarchical command and control methods of education and practice are coming under increasing, albeit incremental, reform amid the health agenda of women and the growing number of women in school, practice, and leadership positions.

The challenge of changing the dental curriculum (with its narrow focus on science and techniques) to better respond to the needs and talents of a diverse and pluralistic society has been undertaken. The result is that the admissions process at dental schools and the curricula have become more sensitive to women's health differences, as well as to gender and minority equality. Criteria have expanded to encompass a more diverse student population. Admissions at an increasing number of dental schools now include “whole file review,” which evaluates the whole person beyond just academic grades, giving due weight to the "road travelled" (i.e., socio-economic background, non-cognitive abilities, community service, work experience.

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What it does signify is the growing awareness that the dental landscape is enriched by the infusion of the diverse and valuable contributions of women and minorities as they interweave their own unique perspectives and talents. The gender change in student, staff, and leadership is gradually moving toward reorienting Dentistry from its “focus on diagnosis and treatment to a ‘more humanistic’ approach to healthcare, including greater emphasis on primary prevention and health promotion.”

We have seen how biology and culture equip women in a unique way to integrate hard science with the nurturing arts.

In marking the growing numbers, influence, and unique value of women in Dentistry, there is a climactic question: what is the quality of their impact? Do women add more than just a quantitative component by increasing the competitive pool? Do they make Dentistry better? Are their unique talents sufficiently appreciated and optimally exploited? To what degree have they changed Dentistry and to what degree have they been changed by Dentistry? All provocative and tantalizing hypothetical questions for which there are mostly tentative and varying answers as information is preponderantly anecdotal.

The discussion of these questions will revolve around the business and the profession of Dentistry.

Female dentists unanimously agree on the joys of Dentistry for providing not only professional status and revenue, but a flexible schedule tailor-made for family needs. Because of pregnancies and family considerations, women tend to join group practices rather than own a separate practice, which happens to dovetail with the national trend toward group practices, as they are more efficient and capitalize on economies of scale. Women put in the same or more hours than men by working more days and hours to compensate for family obligations and also working longer careers as they outlive men.

Just as the business of Dentistry is kind to women, women are kind to the business of Dentistry as well. Enhanced office aesthetics are a welcome contribution by women to what were once rather clinical dental rooms. Children and women often favour female dentists. One of the reasons for this is the perception that women are more gentle and caring; the other is: women support women. Women spend more time with patients, and minority women do more pro bono work than others because they deal more with disadvantaged and poor patients.

Notwithstanding all of the above—women's equitable representation and special contributions in Dentistry—the traditional business model remains pretty much intact, with “the emphasis on technology, techniques, risk management, science, cost efficiency, and the shifting requirements of insurance companies and employers...,” with the net result of prejudicing a healthy doctor-patient relationship.

What is true of the business model of Dentistry is no less true of Dentistry as a whole—the way it is taught and the way it is practiced. The “scientific” model still reigns, despite some reforms and a growing consciousness of holistic health and the needs and interests of a diverse population. Even though, as noted above, dental schools have changed admissions criteria to recruit and cultivate more women and minorities, they still have not to any extent moved away from the hierarchical, scientific paradigm toward a more humanistic, holistic, and wellness approach that incorporates science and treatment as an equal component among other promising therapies.

Women have some social and biological relationship advantages, but the selection and training process in dental schools tends to negate these, rather favouring people with analytical, deductive aptitudes in science, engineering, tactics, and techniques, as well as a “thing” instead of a “people” orientation.

While much remains to be done, appreciable progress is being made as some dentists are performing relationship-based Dentistry and oral/systemic medicine with a focus on health and wellness instead of disease. The theoretical foundations for a paradigm shift are in place. The call for a more relationship-based, health-centred Dentistry that includes the nurturing voice of women is loud and clear—its time has come.

Men and women are individuals; they are more than just male or female. Our gender is only part of who we are; it does not define us as people.
Without a doubt, the highest percentage of patient complaints received by the Dental Mediator are related to financial consent, and administration around medical aids. About 47% of patient complaints received in 2015 fell into this category. It was therefore decided during the Private Practice Committee meeting on 23 July 2015 that more information is needed by our members to help reduce and hopefully prevent complaints from patients in this regard. Traditionally dentists in South Africa have been reluctant to discuss costs with the patient before treatment is provided. This has resulted in an increase in dissatisfaction amongst patients who are making complaints in increasing numbers to the Health Professional Council. Quite rightly and by law, our patients have a right to know the expected cost of the treatment they require. They also have the right to know, and understand any alternative treatments available at the time. The consent is only valid if the patient has been given all the information about the likely costs of treatment and agrees to proceed on the basis that this is a cost estimate. If informed financial consent is obtained, and documented, complaints are less likely to arise and can be more easily defended.

MEDICAL AIDS

The administration around gaining pre-authorization, and establishing available benefits on behalf of the patient for certain procedures from Medical Aids remains a huge concern. By offering this valuable service to patients, a practitioner arguably undermines the patient’s responsibility for the fees. It comes as no surprise then that most complaints received are because the patient was led to believe by the practice that the medical aid would cover the cost, and cannot possibly afford the shortfall/co-payment not paid by the scheme. In many cases the patients are saying they would not have proceeded with the treatment if they knew exactly how big the portion would be that they would have to contribute.

The complaints normally reach SADA/HPCSA when the dentist hands the account over to the debt collectors, and patients contact SADA out of desperation.

There are many technical challenges when dentists offer to establish available dental benefits, and gain authorisation from the patient’s medical aid on behalf of the patient. The most common ones leading to complaints are:

• Most medical aids, especially Discovery, GEMS and Polmed would give telephonic confirmation of an available amount “at the time”. The problem then occurs when other family members use some of these benefits when visiting the optometrist, doctor or pharmacy. Sometimes these fees are also deducted from the same “day to day OR savings account”. By the time the dentist submits a claim for his treatment on behalf of the patient, there is an unexpected, inevitable shortfall of funds, and patients can’t possibly pay the difference nor were they expecting to make a co-payment.

• There seems to be confusion between getting pre-authorization for certain specialized procedures, and actual available funds. Once pre-authorization is obtained from the medical aid, available benefits still need to be confirmed at the medical aid from a different internal department.

• The “scheme rules” of various different medical aids can vary so much, and there seems to be inconsistency, and confusion especially around which codes can be used from day-day fees vs. which codes are reserved for specialized dentistry. (For example code 8937 - Surgical removal of a tooth).

• Communication with medical aids can be very time consuming, frustrating and often unreliable, despite reference and authorization numbers.

Other common problems leading to complaints are:

• Dentists often exclude certain codes in the original treatment estimate. For example pre/post-operative x-rays, infection control, sutures, examination and follow-up fees. This can add up, and lead to a large discrepancy between the total cost and the original estimate.

• Patients see the treatment estimate as a “quotation” rather than a treatment estimate.

• Patients feel dentists charge exorbitant fees.

DISCUSSION

There are currently NO regulations in place to say what may or may not be charged by a healthcare practitioner. However this does not mean that we can charge exorbitant fees. A clinician’s fees should be fair, and represent his qualifications, experience and the costs of his/her overheads. As healthcare practitioners we should always act in our patient’s best interest, and aim to treat our patients like we would like to be treated.

K Barnard: SADA Dental mediator, E-mail: dentalmediator@sada.ac.za
Good Practice Guidelines:

- Practitioners should give every patient a full cost estimate - before treatment begins. This could be orally, but should preferably be in writing and kept in the patients records. The cost estimate should be presented in a way the patient understands, and include a value in Rand and cents. A situation of “my word against yours” should be avoided where possible. This should be done even if medical aid rates are charged, or if the treatment would be claimed directly from the medical aid.

- Any written estimate agreements to be signed by the patient should be tailored to the patient and specific to the treatment the patient will receive.

- If there is likely to be more than one treatment required, you should provide the patient with a full cost estimate for each treatment that will be undertaken.

- The patient should also be informed; that should there be any short-falls in the amount paid by the medical scheme in relation to the costs of treatment it will be the patient who will be responsible for the remainder of the costs.

- You should make sure that the patient fully understands the costs and their responsibility towards payment. This could be achieved by asking the patient to provide you with a verbal summary of their understanding from the information you have provided them.

- You should make sure that you have recorded your conversation with the patient regarding costs of treatment in your records. This will assist in showing that you have been able to obtain the patients informed consent.

- Never make assumptions about the patient’s ability, or willingness to pay for treatment. Patients are real people, with real problems including financial ones, and they would naturally be reluctant to discuss this with a third party.

- You should inform your patient if there will be any third parties costs involved in their treatment (such as laboratory fees). If this will be the case you should provide the patient with full information of who will provide the treatment and what costs they should expect to receive.

- If any discrepancies occur between the fees the patient thought they would be charged and the final account, this should be addressed pro-actively in a discussion, rather than presume the patient will understand without an explanation. Most of our patients value our services however the right to know about the cost of treatment is now enshrined in law and we all have an ethical duty to discuss costs just as much as the clinical detail.

- Before chasing any outstanding accounts, always check if the patient is satisfied with the treatment you provided. It makes sense to approach unpaid accounts in a non-confrontational way. Any confrontation regarding outstanding fees will naturally invite complaints about the quality of the treatment provided. Warning – Do not assume that every patient who expresses dissatisfaction is trying to avoid payment.

- Practitioners should refrain from taking the responsibility to communicate with the medical aids on behalf of their patients. Neither should they provide guarantees, or expectations that the medical aid would cover the cost of the proposed treatment plan.

- Each member of the team should be trained specifically in dealing sensitively with fee collection. Always respect the patient’s privacy, and dignity. Collecting outstanding debts can be very challenging yet has become a critical business skill. If done correctly it increases profitability, saves time, and prevent the likelihood of complaints arising.

- Take clinical decisions based on the patient’s best interest, and not considering the financial restrictions placed by the patients’ medical aid.

SUMMARY

By law you are required to provide your patients with a cost estimate and it is far better to do so in writing. It is a fact that more patients are prepared to make a formal complaint when they feel they have not been given the correct information about the cost of their treatment.

It is clear that more of your patients will challenge discrepancies in their billing and accounts. Without being able to raise their concerns at the practice, (even though the fault may be with the scheme or their benefits), patients will look to SADA and the HPCSA to help them correct an error. Dentists are required to discuss costs with their patients and record the discussions as you would with their treatment. If you take the time to do so, there might be less need for me to highlight this problem in the future.
Assessment of an audit-feedback instrument for oral health care facilities in South Africa

SUMMARY
The assessment of an audit-feedback instrument (AFI) for infection prevention and control was conducted on a population of South African oral health care facilities, mainly to test its workability in the varied facility configurations. A purposive selection strategy was followed, selecting 50 South African oral health care facilities. Results from 49 completed AFIs revealed demographic details and information on infection prevention and control practices for the 11 AFI focus areas: Administrative controls; personnel protection controls; environmental- and work controls; surface contamination management; equipment maintenance; air- and waterline management; personal protective equipment usage; personal- and hand hygiene practices; sterilisation practices; sharps handling and waste management. None of the participating facilities demonstrated 100% compliance. Notably, administrative controls and air- and waterline management scored the lowest mean values; 31% and 36% respectively, while personal- and hand hygiene practices and waste management performed the best, at respectively 75% and 63%. The general lack of compliance with infection prevention and control precautions in the participating oral health care facilities clearly poses a safety hazard to patients and oral health care workers. These findings demonstrate the urgent need for a monitoring system, such as the AFI, to be instituted in South African oral health care facilities.

Keywords: Audit; dental; oral health care; compliance with infection prevention and control precautions

INTRODUCTION
In 1993, Marianos recommended that, in the absence of formal recommendations and guidelines for infection prevention and control precautions, South African dental practitioners should adhere to the infection control guidelines issued by the Centers for Disease Control and Prevention (CDC) of the United States of America. However, many health care facilities in South Africa lacked even the most basic infection control requirements, such as water and electricity, as a result compromising adherence to any form of international recommendation or guideline. In 2005, the Nelson Mandela Foundation Report confirmed that infection control practices in oral health care facilities were inadequate. Visible and invisible blood had been detected in oral health care environments and on "clean" instruments, signifying a collapse in basic infection prevention and control precautions in the country.

In South Africa there are no policies, regulations or guidelines that sufficiently address infection prevention and control in oral health care. The National Infection Prevention and Control Policy and Strategy sets minimum national guidelines that do not specifically address the oral health care environment. The Norms, Standards and Practice Guidelines for Primary Oral Health Care comprises of a few pages briefly addressing infection prevention and control in primary oral health care facilities. This document is without detailed instructions covering the variety of oral health care procedures; diversity of training levels for oral health care personnel; or the availability of resources in rural and urban facilities, including public and private oral health care facilities. In particular, no mechanisms or auditing procedures to measure compliance with infection prevention and control guidelines are available in South Africa.

The development of an infection prevention and control audit-feedback instrument (AFI) and the ultimate practical application thereof for the health care providers, will

Table 1: Compliance categories and colour coding for infection prevention and control practices in oral health care facilities

<table>
<thead>
<tr>
<th>Category classification</th>
<th>Compliance categories (%)</th>
<th>Category description</th>
<th>Colour code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>100</td>
<td>Target</td>
<td>Target</td>
</tr>
<tr>
<td>Close to target</td>
<td>&gt;80 - &lt;100</td>
<td>Compliance</td>
<td>Green</td>
</tr>
<tr>
<td>Poor</td>
<td>&gt;50 - &lt;80</td>
<td>Poor compliance</td>
<td>Yellow</td>
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<td>&lt;50</td>
<td>Unacceptable</td>
<td>Red</td>
</tr>
</tbody>
</table>

Every oral health care facility should aim for 100% compliance.
contribute to a safer environment in oral health care facilities, taking into account the unique South African conditions; high incidence of the human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS), Hepatitis B and C infection, tuberculosis infection and a violent society leading to trauma with open wounds as a regular feature in many patients.8-12 Thus, the purpose of an AFI is to provide a practical tool that can be applied by a variety of oral health care workers in oral health care facilities to ensure safe practice. Such an AFI was developed for oral health facilities in South Africa. This tool is a user-friendly, self-administered, electronic tool that provides feedback to managers, and an opportunity for education and improvement in oral health care facilities. Besides providing instructions of how to use the AFI, provision is made for demographic details. This is followed by scoring tables which include 11 focus areas organised according to the logical order of the CDC guidelines on infection prevention and control in dentistry.1

These focus areas are:
Focus area 1: Administrative Controls
Focus area 2: Personnel Protection Controls
Focus area 3: Environmental- and Work Controls
Focus area 4: Surface Contamination Management
Focus area 5: Equipment Maintenance
Focus area 6: Air- and Waterline Management
Focus area 7: Personal Protective Equipment Usage
Focus area 8: Personal- and Hand Hygiene Practices
Focus area 9: Sterilisation Practices
Focus area 10: Safe Sharps Handling
Focus area 11: Waste Management

The aim of this study was to assess the AFI that was developed specifically for South African conditions. The assessment of the AFI was conducted on a population of oral health care facilities in South Africa, mainly to test its workability in the varied oral health care configurations and environments.

METHODS
A purposive selection strategy was followed, aimed at selecting 50 easily accessible South African oral health care facilities. This deliberate, non-random sample represented the different practice configurations found in South Africa. The strategy for sampling and data collection included the following:

• Representatives of oral health care facilities in rural and urban areas; including single practitioner-, multi-practitioner oral health care facilities; private dental clinics and governmental dental clinics; as well as exemplars of oral health care training institutions were included in the study.

• The number of each type of oral health care facility included depended upon the availability, accessibility, resources and time available. Therefore, the selected facilities represented a convenience sample.

• Once the oral health care facilities had been identified, appropriate permissions were obtained from managers and gatekeepers. Initial contact was made telephonically, after which an appointment was scheduled for the completion of the AFI.

• The completion of the AFI followed a structured and facilitated face-to-face process. All responses were recorded by the researcher.

SUMMARY STATISTICS were calculated and the compliance with infection prevention and control measures were determined using four compliance categories (Table 1). These categories were developed from the colour categories applied for the assessment of drinking water safety in South Africa.13

RESULTS
Of the 50 selected oral health care facilities, 49 completed an AFI. Information was collected regarding the demographic details of each of the participating oral health care facilities.
### Table 2: Detailed audit results of the forty-nine oral health care facilities ranked by mean % scores

<table>
<thead>
<tr>
<th>Facility ID nr</th>
<th>Administrative controls</th>
<th>Personnel protection controls</th>
<th>Environmental &amp; work controls</th>
<th>Surface contamination management</th>
<th>Equipment maintenance</th>
<th>Air-water management</th>
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care facilities, in addition to the data on infection prevention and control practices in the 11 focus areas.

**Demographic details of the sample population**

**Main provider and practice details**
The majority of the oral health care facilities that participated and were assessed in this study were from the private sector. Most of the main service providers (dental practitioners and dental therapists) in each instance had been in practice for more than 20 years (44.8%) (Figure 1). The qualifications of the main service provider from each participating institution were representative of all five dental faculties in South Africa. Only a few had qualified outside of South African borders. On the other hand, approximately 25% of the main service providers were recently qualified, with less than five year’s experience in clinical practice.

**Audit respondent details**
More than two-thirds of the respondents were male, representing eight of the 11 official South African languages, with Afrikaans being the most prevalent (Figure 2). The ages of the respondents were spread more or less evenly over the different age group categories, except for a number of respondents that were over the age of 65. Most of the research information was obtained from the dental practitioner, while in a few of the oral health care facilities, other members of the oral health care team assisted with the completion of the AFI.

<table>
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<th>Focus area</th>
<th>Questions per focus area</th>
<th>Number of facilities</th>
<th>Blue compliance category</th>
<th>Green compliance category</th>
<th>Yellow compliance category</th>
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| Number of facilities per categories (%) (Total = 49 facilities x 11 focus areas = 539) |
|-----------------------------------------------|----------------|----------------|----------------|----------------|
| 12                                           | 50             | 235            | 242            | 51.1           |
| (2.2%)                                        | (9.3%)         | (43.6%)        | (44.9%)        |                |

* Number of facilities counted in the compliance category

**Figure 3:** Overall compliance performance of the audit-feedback instrument with observed results of the 11 focus areas, ranked from high to low. Target of 100% (1.00).
Audit results

Audit results of individual participating facilities

Overall audit performance varied greatly between the 11 focus areas, as well as among the participating facilities. Only seven of the participating facilities achieved Target (Blue) in one or more focus areas (Table 2). More than half of the facilities exhibited Poor (Yellow) and Unacceptable (Red) compliance for most of the focus areas. One facility (ID #1) reached Target (Blue) in four focus areas, demonstrating the highest mean percentage of 80.8% (close to target). However, the performance of this facility in the focus areas Administrative controls and Personnel protection controls was categorised as Unacceptable (Red). Of all the 49 participating facilities, facility ID #1 was the only facility with a reasonable overall performance reaching close to Target. The overall performance of the remainder of the facilities was categorised as Poor (47%) or Unacceptable (51%).

Audit results of focus areas

The overall mean performance on the 11 focus areas was calculated and categorised according to the different compliance categories. The focus area, Personal- and hand hygiene practices outperformed all the other focus areas, but still scored Poor compliance (Table 3). Similarly, with a lesser score on this result, the compliance of Waste management, Safe sharps handling, Surface contamination management, Sterilisation practices, Personnel protection controls, and PPE usage were also Poor. The most neglected focus areas in this study were Administrative controls and Air- waterlines management, followed by two focus areas, Environmental- and work controls and Equipment maintenance. The overall mean score of all facilities over all focus areas was just greater than 50%.

A comparison was made of the compliance performance between participating government clinics (public sector) and private oral health care facilities (private sector) to gain insight into the overall attention paid to infection prevention and control in these two types of facility. Although only a limited number of government clinics participated in the study, their overall performance revealed better compliance than that of the private sector (Table 4). The data further revealed that in government clinics, focus areas Administrative controls and Personnel protection controls, the government clinics outperformed the private sector by more than 40%. Both sectors paid reasonable attention to Personal- and hand hygiene practices and Waste management. Notable is the relatively high compliance rate obtained for Safe sharps handling in government clinics.

Comparison of audit results with target

To provide a more visual perspective of the results obtained in this study, a horizontal bar graph has been drawn. This graph demonstrates the overall range of compliance of the participating facilities to the Target expectation of 100% (Figure 3). The data collected in this study reveals that the mainly clinical focus areas of the participating facilities appeared to fall within the better compliancy categories, while the less clinical focus areas lie in the less compliant categories. A spider plot was constructed to create a pictorial overview of the compliance performance of the participating facilities in the different focus areas (Figure 4). The relatively small size of the central red outlined shape highlights the lack of compliance across all focus areas, when compared with the target of 100% (outer blue circle). The spider plot highlights the alarmingly low compliance of Administrative controls personnel, Protection controls and Air- waterline management.

DISCUSSION AND CONCLUSIONS

The findings of this research highlight the many shortcomings on a national level, and emphasise the need to improve compliance with infection prevention and control in all South African oral health care facilities. Although some measures of infection prevention and control precautions are executed in all oral health care facilities, the fact remains that unless these precautions are properly, fully and constantly applied, with the same set standard for each potentially exposing clinical procedure, the very purpose of the system will never be met.14,15

The study has revealed that the newly developed AFI could be applied to the wide variety of different configurations of oral health care facilities in South Africa. Contrary to the use of scientific and highly technical language found in other international audit instruments,16-18 the simple, understandable language and ease of interpretation was reported as an advantage by the participating facility managers, employers and the other members of oral health care teams who completed the AFI.

This AFI provided information covering the overall compliance of a facility, as well as the individual compliance of each of the 11 focus areas. These represent the range of areas
presently in compliance with international infection prevention and control precautions in oral health care facilities. This comprehensive analysis of compliance performance enables individual facilities to identify areas of concern and shortcomings in their own workplace, and should thus enable them to implement remedial or improvement action.

The overall compliance of facilities was low, falling mostly into the categories of Poor or Unacceptable compliance, supporting the earlier research findings in South Africa.19,25 It may be relevant to note that the overall compliance performance of the public sector was greater than that in the private sector. This could be due to the fact that the public sector is officially regulated by quality control and accreditation bodies such as the Council of Health Services Accreditation of South Africa (COHSASA), whereas the public sector presently still has a choice of whether to voluntarily seek COHSASA accreditation or not.

The AFI has also provided detailed information regarding the compliance performance of the individual in the 11 different focus areas in the checklist. It is not surprising that the focus area of Personal and hand hygiene demonstrated the highest compliance score, particularly in the light of quite extensive media coverage and promotional initiatives to take preventive measures against disease transmission and injury.26-29 Recently, the CDC indicated that double gloving during surgical procedures is used as reason for non-compliance with protective precautions.30

At the core of any oral health care facility are its personnel. With the specific burden of prevalent disease in South Africa, it is therefore difficult to comprehend the lack of attention that is paid to focus area Personnel protection controls, in all the participating facilities, but particularly so in the private sector. Furthermore, attention to this focus area requires far less resources than many of the other focus areas.31,32

The overall poor general management in facilities is demonstrated by the exceptionally low score of the focus area Administrative controls, again more so in the private sector. This emphasises the lack of record keeping, including proof of the minimum legislative safety or health requirements of all kinds in participating oral health care facilities. This poor result is underscored by the fact that none of the participating facilities fully complied with Administrative controls or Personnel protection controls.

The general lack of compliance with infection prevention and control precautions by the participating oral health care facilities clearly poses a safety hazard to both the patients and the oral health care workers. This study thus demonstrates the urgent need for a monitoring system, such as the newly developed AFI, to be instituted in South African oral health care facilities.

Acknowledgement
A sincere thank you to Dr Elsa Potgieter, Chief Microbiologist Mangung Metropolitan Municipality, Bloemfontein South Africa, for her support, inspiration, valuable inputs and advice. We also thank Sr Laura Ziday, Nurse Educator / IPC Assessor from Mediclinic South Africa, who assisted with language editing.

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References


Pseudo-ankylosis of the temporo-mandibular joint (TMJ) refers to a persistent restricted mandibular hypomobility resulting from a pathologic condition outside the TMJ. Ankyloses may be acquired or congenital. Most congenital ankyloses are extracapsular (pseudo- ankyloses), while most of the acquired ankyloses (true ankyloses) are intracapsular. An extremely rare form of extracapsular ankylosis is bony pterygomandibular fusion, few cases having been reported in the literature. To our knowledge, a case with two separate ipsilateral extracapsular ankylosis sites together with bilateral intracapsular ankylosis has never been reported. This paper considers the case of a 24 year-old patient who had been unable to open his mouth for six years. There was neither a history of trauma nor one of recurrent infection. The patient presented with a slight facial asymmetry with deviation of the mandible towards the right. CT scans confirmed the diagnosis of a complex pseudoankylosis, characterised by unilateral bony fusions between the lateral pterygoid plate and the medial aspect of the ramus, coronoid process and zygoma together with bilateral intracapsular ankyloses. The patient underwent surgery for ostectomy of the pterygomandibular fusion and a bilateral coronoidectomy. Comments on a paediatric case with bilateral bony pterygomandibular fusions are also included.

INTRODUCTION

Pseudoankylosis of the temporo-mandibular joint (TMJ) refers to a persistent restricted mandibular hypomobility resulting from a pathologic condition outside the TMJ. Kazanjian classified TMJ ankylosis into intracapsular (true) ankylosis and extracapsular (false/pseudo-ankylosis). Ankyloses may be acquired or congenital. According to Allori et al 64% of the congenital ankyloses are extracapsular, while most of the acquired (true) TMJ ankyloses (85.7%) are intracapsular. A minority of extracapsular ankyloses may be myogenic, osteogenic, neurogenic or psychiatric. The most common causes of acquired pseudo-ankylosis are trauma, radiation and infections. The congenital forms of pseudo-ankylosis include synechiae and syngnathia. Various forms of extracapsular ankylosis have been described in literature including coronoid to base of the skull, syphilitic myositis involving masseter and temporalis, osteoma of the coronoid process, scar formation within the muscles of mastication and unilateral coronoid hyperplasia. The most common form is coronoid-zygomatic ankylosis, which usually follows fracture of the zygoma. An extremely rare form of extracapsular ankylosis is bony pterygomandibular fusion, few cases having appeared in the literature. A bilateral form of pterygomandibular fusion has also been reported. Accurate diagnosis of pterygomandibular ankylosis requires a computed tomographic (CT) scan, while stereolithographic models add value in planning for surgery.

To our knowledge, a case with two separate ipsilateral extracapsular ankylosis sites together with bilateral intracapsular ankylosis has never been reported in the literature. The main purpose of this paper is to report on a case with a complex pseudoankylosis, characterised by unilateral bony fusions between the lateral pterygoid plate and the medial aspect of the ramus, coronoid process and zygoma together with bilateral intracapsular ankyloses. Observations on a paediatric case with bilateral bony pterygomandibular fusions are also included.

CASE REPORTS

Case 1

A five year old girl presented with inability to open the mouth. She had been delivered by caesarean section as a...
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- Protects against that sharp, sudden, sensitive feeling
- Helps maintain strong teeth
- Helps maintain healthy gums
- Protects against germs that promote plaque
- Protects against germs that cause bad breath
result of foetal distress. The following clinical features were noted at birth: hypoplastic mandible, limitation of mouth opening and low slung ears. Feeding difficulties were reported and needed to be supplemented with nasogastric feeding.

The patient was discharged from the hospital seven months after birth. At age of eleven months a tracheostomy was performed due to poor oxygen saturation. Clinical examination revealed a severely reduced lower third of the face with a hypoplastic mandible. The low slung ears were seen to be notched. No facial asymmetry, however, was present. Poor oral hygiene characterised by rampant caries (Figure 1) was noted.

Computed tomography showed normal joints on both sides, but bony fusion between the medial pterygoid plate and the medial aspect of the ramus of the mandible was noted (Figure 2).

Poor compliance resulted in a delay of a year after the initial examination before surgical intervention could be undertaken to release of the pseudo-ankylosis. An incision was made over the oblique ridge of the mandible and subperiosteal stripping carried out on the lingual aspect of the ramus. A bony ridge was identified along the inferior aspect of the mandible, which was sectioned and small spicules of bone removed. The procedure was carried out on both sides. Bilateral coronoidectomy was performed and an inter-incisal distance of 30mm was achieved postoperatively. Tracheostomy was removed after the procedure as the patient could maintain her airway. Mouth-opening exercises were begun 24 hours after the procedure and continued under supervision for a month. Thereafter the patient relocated to her rural home, returning a year later with severe restriction of mouth opening (Figure 3). Despite the fact that the patient was able to achieve a total mouth opening of only 15-20mm, her parents were not keen on a follow-up operation.

**Case 2**
A 24 year old male presented with a six year history of inability to open his mouth. There was neither a history of trauma nor one of recurrent infections. His general medical history was unremarkable. The patient presented with slight facial asymmetry characterized by deviation of the mandible towards the right and flattening of the left side of the face in the mandibular region. The maximal inter-incisal distance was zero. A panoramic radiograph revealed a pronounced antegonial notch, elongated coronoid process and shortening of the ramus height on the right side. The right lower wisdom tooth was vertically impacted. CT scans demonstrated bony fusion between the left lateral pterygoid plate and the medial aspect of the mandible as well as fusion between the left coronoid process and the zygomatic bone. The joint space could be clearly appreciated on CT scans. Osteophytes in the right joint space could be seen as well as fusion of the lateral aspect of the left condylar head to the mandibular fossa. The three CT scans shown in Figure 5 clearly support the diagnosis of a right bony pterygomandibular ankylosis, a bony zygomatico-coronoïd ankylosis and bilateral ankylosis of the TMJ.

The patient was admitted to theatre for ostectomy of the pterygomandibular fusion and a bilateral coronoidectomy. The zygomatic arch was removed on the right side to improve access and to facilitate an ostectomy of the zygomatico-coronoïd ankylosis. The arch was replaced and fixed with plates and screws at the end of the procedure. Significant mouth opening was still not achieved, and there-
fore exploration of the joints was performed. Exposure of the joints showed bony hyperplasia on the lateral aspect of both joints. Bilateral gap arthroplasty was then performed and arch bars placed on both jaws, enabling a mouth opening of 40mm. The patient slept well but was unable to close his mouth. Heavy elastics were then used to facilitate closure and to prevent anterior open bite. The patient was placed on a physiotherapy protocol. Three months after the procedure the mouth opening was 25mm but thereafter the patient was lost to follow up.

DISCUSSION

Few cases of pterygomandibular fusions have been reported in the literature, but these authors preferred to use the term “complex pseudo-ankylosis” to describe this condition as it involves two extracapsular bony fusions and a bilateral intracapsular component.

The main causes of acquired extracapsular ankyloses that have been reported in the literature are trauma, infections, irradiation and tumours, although a study by Allori et al in 2010 suggests that most extracapsular ankyloses are congenital in origin. Super and Cotton (1978) also suspected a congenital syndrome in their case of pterygomandibular fusion.

Although the aetiology of the second case is idiopathic, the slight deviation of the mandible suggests that ankylosis occurred before the final growth spurt. Elongation of the coronoid process, followed by fusion between the coronoid process and the zygoma, and the intracapsular component would have resulted in limitation of mouth opening.

Although a CT scan is the gold standard for diagnosis of pterygomandibular bony fusions, MRI is superior for fibrous pseudo-ankylosis. In the case of this report, plain x-rays were quite useful in identifying the area and in discerning certain pathological changes. Slice B of the CT scan shows a thick bony pterygomandibular fusion, while slice A shows degenerative changes and early bony fusion on the lateral aspect of the ipsilateral joint.

Simple pseudo-ankylosis refers to the ankylosis that is outside the joint without any radiographic changes on the articular surfaces of the TMJ. Complex pseudo-ankylosis on the other hand refers to a simple extracapsular ankylosis with secondary intracapsular degenerative changes and/or ankyloses. Based on our observations, however, we propose that pseudo-ankylosis of the TMJ be regarded as both simple and complex.

During surgery, discs were found fused to the mandibular fossae. We believe this phenomenon is a secondary response to lack of movement, which is followed by fibrosis and atrophy of the muscles of mastication. Hence, exploration of the joints is mandatory when an extracapsular ankylosis is released.

The challenge faced postoperatively was that the patient could not close his mouth a day after the procedure, and needed to push the lower jaw upward with his hand. This is believed to have been the result of bilateral coronoidectomies in a patient with atrophic and fibrotic muscles of mastication with loss of neural activity. The poorly functional muscles of mastication were too weak to close the mouth while the mylohyoid, digastric and suprathyroid muscles together with gravity could depress the lower jaw after release of ankylosis. The problem was resolved by using arch bars and heavy elastics.

Outcomes in the management of patients with pterygomandibular fusion have not, on the whole, been very successful. Our patient could achieve a mouth opening of only 25mm three months after surgery. A structured postoperative physiotherapy regimen to repair and maintain adequate mandibular movement is essential for a successful outcome.

Conflict of interest: None declared.

References
ABSTRACT

Aim: The role of a dentist does not end with the placement of the prosthesis, for the care of the denture is equally important. This study aimed to assess knowledge, attitude and practice regarding care of complete dentures.

Methods: The sample comprised 192 complete denture patients visiting the Department of Prosthodontics. A questionnaire assessed their socio-demographic status (Kuppuswamy’s socio-economic classification), denture use, denture cleaning and knowledge of denture care. Data was subjected to descriptive statistical analysis.

Results: 69.8% patients had only one set of complete dentures; 77.1% and 25.5% patients removed their dentures at night and during the day respectively. All reported cleaning their prostheses daily; 94.7% patients employed a tooth brush, 5.3% used denture brush and 3.6% used denture cleansers. 35.9% patients did not know about the estimated life expectancy of complete dentures and only 10.9% patients had knowledge of items to be avoided to prevent staining of dentures.

Conclusion: Instruction on how to care for complete dentures should be given special attention by the dentists during insertion. Follow up and reinforcement of denture home care should be done periodically to ensure durable performance of dentures as well as maintenance of good oral health.

Key words: Knowledge, Attitude, Complete Denture, Denture maintenance.

INTRODUCTION

The proportion of older people in the population is increasing faster than is any other age group.1 India will soon become home to the second largest number of older people in the world.2 The number of people in the 60-plus age group in India is expected to increase to 100 million in 2013 and to 198 million by 2030.3 This increase in life expectancy can be attributed to improved medical facilities and the dental needs of this section of the population require special attention.4

A dental prosthesis should restore aesthetics and function. The quality of the prosthesis needs to be regularly monitored as it functions within a changing oral environment comprising the saliva, the oral musculature and the supporting tissues. Microbial plaque on dentures has the potential to be harmful to both the oral mucosa and to general health.5,6 The microporous surface of an acrylic resin denture base provides an environment that harbours opportunistic microorganisms. Denture cleaning is necessary to remove such invaders, as well as extrinsic stains and soft and hard deposits.5

Table 1: Distribution of patients according to sociodemographic data

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>128</td>
<td>66.7</td>
</tr>
<tr>
<td>Females</td>
<td>64</td>
<td>33.3</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper (I)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Upper Middle (II)</td>
<td>39</td>
<td>20.3</td>
</tr>
<tr>
<td>Lower Middle (III)</td>
<td>39</td>
<td>20.3</td>
</tr>
<tr>
<td>Upper Lower (IV)</td>
<td>98</td>
<td>51</td>
</tr>
<tr>
<td>Lower (V)</td>
<td>16</td>
<td>8.3</td>
</tr>
<tr>
<td>Habits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>130</td>
<td>67.7</td>
</tr>
<tr>
<td>Present (Chewing or smoking tobacco)</td>
<td>60</td>
<td>31.3</td>
</tr>
<tr>
<td>Both habits present</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

K Shigli1, M Hebbal2, S Sajan3, N Agrawal4

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The role of dentists does not end with the placement of the prosthesis. Measures must be taken to ensure that any dental prosthesis is properly taken care of by the patient, thereby contributing to the health of the foundation area, the supporting tissues and to the success of the treatment. A neglected dental prosthesis not only represents a lack of patient knowledge but also highlights a potential lack of motivation on the part of the dentist. However, many complete denture patients tend to think that being in the state of edentulism does not require any specific oral hygiene measures and do not return to the dentist for regular denture maintenance. Therefore, in the endeavour to assess the extent of this problem, the present study was carried out to assess the knowledge and attitude of denture-wearing patients as well as practices related to the care of dental prostheses.

Table 2: Distribution of patients according to denture use

<table>
<thead>
<tr>
<th>Questions</th>
<th>Responses</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How long have you been using this set of prostheses? (number of denture-wearing years)</td>
<td>a) 1 year or less</td>
<td>34</td>
<td>17.7</td>
</tr>
<tr>
<td></td>
<td>b) 1-5 years</td>
<td>93</td>
<td>48.4</td>
</tr>
<tr>
<td></td>
<td>c) more than 5 years</td>
<td>65</td>
<td>33.9</td>
</tr>
<tr>
<td>2. How many sets have you used till now?</td>
<td>a) One</td>
<td>134</td>
<td>69.8</td>
</tr>
<tr>
<td></td>
<td>b) Two</td>
<td>40</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>c) Three</td>
<td>11</td>
<td>5.7</td>
</tr>
<tr>
<td></td>
<td>d) Four</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td>e) Five</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>3. If more than one – how often have you changed your dentures?</td>
<td>a) Not applicable</td>
<td>134</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Does not remember</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>c) 0-5 years</td>
<td>35</td>
<td>60.3</td>
</tr>
<tr>
<td></td>
<td>d) 5-10 years</td>
<td>15</td>
<td>25.9</td>
</tr>
<tr>
<td></td>
<td>e) 10-15 years</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>f) 15-20 years</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>g) 20-25 years</td>
<td>2</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>h) More than 25 years</td>
<td>1</td>
<td>1.7</td>
</tr>
<tr>
<td>4. Do you remove your prostheses at night?</td>
<td>a) Yes</td>
<td>148</td>
<td>77.1</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>44</td>
<td>22.9</td>
</tr>
<tr>
<td>5. IF YES where do you keep them at night?</td>
<td>a) Not applicable</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Water</td>
<td>133</td>
<td>89.9</td>
</tr>
<tr>
<td></td>
<td>c) Empty box</td>
<td>6</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td>d) Others</td>
<td>9</td>
<td>6.1</td>
</tr>
<tr>
<td>6. Do you remove your prostheses at some point during the day?</td>
<td>a) Yes</td>
<td>49</td>
<td>25.5</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>143</td>
<td>74.5</td>
</tr>
<tr>
<td>7. Where are your prostheses placed when out of your mouth?</td>
<td>a) Not applicable</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Water</td>
<td>35</td>
<td>71.4</td>
</tr>
<tr>
<td></td>
<td>c) Empty box</td>
<td>4</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>d) Pocket</td>
<td>7</td>
<td>14.3</td>
</tr>
<tr>
<td></td>
<td>e) Others</td>
<td>3</td>
<td>6.1</td>
</tr>
<tr>
<td>8. Do you feel your prostheses regularly cause ulceration?</td>
<td>a) Yes</td>
<td>13</td>
<td>6.8</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>147</td>
<td>76.6</td>
</tr>
<tr>
<td></td>
<td>c) Sometimes</td>
<td>32</td>
<td>16.7</td>
</tr>
<tr>
<td>9. Do you use adhesive with prostheses?</td>
<td>a) Yes</td>
<td>9</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>181</td>
<td>94.3</td>
</tr>
<tr>
<td></td>
<td>c) Sometimes</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. Is any other person in your family a denture wearer?</td>
<td>a) Yes</td>
<td>32</td>
<td>16.7</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>160</td>
<td>83.3</td>
</tr>
<tr>
<td>11. Have the dentures been repaired at any time?</td>
<td>a) Yes</td>
<td>58</td>
<td>30.2</td>
</tr>
<tr>
<td></td>
<td>b) No</td>
<td>134</td>
<td>69.8</td>
</tr>
<tr>
<td>12. IF YES, what was the reason for the repair?</td>
<td>a) Not Applicable</td>
<td>134</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Fracture of maxillary denture</td>
<td>17</td>
<td>29.3</td>
</tr>
<tr>
<td></td>
<td>c) Fracture of mandibular denture</td>
<td>24</td>
<td>41.4</td>
</tr>
<tr>
<td></td>
<td>d) Teeth dislodged</td>
<td>12</td>
<td>20.7</td>
</tr>
<tr>
<td></td>
<td>e) More than one</td>
<td>5</td>
<td>8.6</td>
</tr>
</tbody>
</table>
MATERIALS AND METHODS

Participants were selected from amongst the completely edentulous patients attending the Department of Prosthodontics, Modern Dental College and Research Centre, Indore, Madhya Pradesh, India from March to October 2011.

Ethical clearance was obtained from the Institute before starting the study. The patients who fulfilled the following inclusion criteria were considered for the study: completely edentulous patients with at least two months of denture wearing who had given informed consent for their inclusion in the study. All the patients were independent, hence no other person was involved in the maintenance of denture hygiene. Patients were excluded if they had limited mental or physical abilities and if they were wearing a single complete denture. A questionnaire, was designed to assess the socio-demographic status, denture use, denture cleaning and denture home care knowledge of the patient.

Socio-demographic status included personal details, habit history and Kuppuswamy’s socioeconomic classification (which takes into account the level of education, monthly income and occupation) was used to determine the socioeconomic status of the patients.

The following data were collected: the age of the patient, the number of previous sets of dentures, the frequency of replacing dentures, nocturnal denture wear, denture removal during day, how the dentures were stored, denture-related ulceration, use of adhesives, presence of other denture wearers in the family and the history of any denture repairs.

With regard to denture cleaning the following data were recorded: the schedule of cleaning the dental prostheses, if it was performed within or outside the mouth, the use of tooth/denture brush or other cleaning aids, perception after wearing the cleaned denture and whether denture polishing was ever carried out.

The patients’ knowledge on the life expectancy of complete dentures, and their knowledge of food items that may cause denture staining was recorded. Questionnaire by Barbosa et al. was modified according to Indian scenario and used for the study. A pilot study on ten patients was carried out to check the feasibility of the study and the questions were modified accordingly.

A single trained investigator (K. S.) recorded the answers to the questionnaire. The data was compiled and subjected to descriptive statistical analysis.

<table>
<thead>
<tr>
<th>Table 3: Distribution of patients according to denture cleaning</th>
<th>Responses</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you clean your prostheses daily?</td>
<td>a) Yes</td>
<td>192</td>
<td>100</td>
</tr>
<tr>
<td>2. IF YES, do you clean them………</td>
<td>a) Outside the mouth</td>
<td>166</td>
<td>86.5</td>
</tr>
<tr>
<td>3. How many times a day do you clean them?</td>
<td>a) Once a day</td>
<td>67</td>
<td>34.9</td>
</tr>
<tr>
<td>4. Do you use denture brush/tooth brush to clean your dentures?</td>
<td>a) No</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>5. Use of other aids to clean the prostheses?</td>
<td>a) Water</td>
<td>40</td>
<td>20.8</td>
</tr>
<tr>
<td>6. How long do you put the dentures inside the denture cleanser:</td>
<td>a) Not applicable</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>7. How often do you use the denture cleanser:</td>
<td>a) Daily</td>
<td>3</td>
<td>42.9</td>
</tr>
<tr>
<td>8. Do you feel any difference after wearing the cleaned dentures?</td>
<td>a) Yes</td>
<td>112</td>
<td>58.3</td>
</tr>
<tr>
<td>9. IF YES – what difference was perceived?</td>
<td>a) Feels clean or light</td>
<td>100</td>
<td>89.3</td>
</tr>
<tr>
<td>10. Have you had your dentures polished by dentist?</td>
<td>a) Yes</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
RESULTS

A total of 192 patients participated in the study and included 66.7% males and 33.3% females. The age range was 38-95 years (mean age 64.55). 51% of the patients were categorized as having upper lower socioeconomic status, 20.3% as the upper middle and lower middle whilst 3.3% were placed in the lower socioeconomic status. 67.7% of the patients in the study did not have smoking or tobacco chewing habits (Table 1).

48.4% patients had been using dentures for more than one year but less than 5 years and 33.9% for more than 5 years. 69.8% patients reported using only one set of complete dentures and 1.6% had a history of having five sets of complete dentures. Of the 58 patients who reported using more than one set, 60.3% patients reported changing their dentures within five years and 1.7% reported changing dentures after using them for more than 25 years. This is in stark contrast to a study by Nevala et al.12 which found 64% subjects had a denture –wearing history of over 30 years. The disparity may be related to the age

DISCUSSION

Complete denture wearers should be educated regarding prostheses care and maintenance to ensure health and function of the supporting structures. This study assessed edentulous patients’ knowledge, attitude and practice regarding care of their complete denture prostheses.

The present study showed that 33.9% patients had been using the same complete dentures for more than 5 years in comparison with the results of Chowdary et al.11 and Barbosa et al.10 who have, respectively, reported 8% and 78% usage of the same complete dentures for more than 5 years. Chowdhary et al. conducted the study in 125 complete denture wearers at HKES S Nijalingappa Institute of Dental Science, Gulbarga, Karnataka, India while Barbosa et al. surveyed 150 complete denture wearers at the Federal University of Bahia School of Dentistry, Brazil. The considerable difference in the findings of the two studies may be attributable to variation in the sample populations.

69.8% patients reported using only one set of complete dentures during their life. The remaining patients used more than one set, 60.3% reported changing their dentures within five years and 1.7% reported changing dentures after using them for more than 25 years. This is in stark contrast to a study by Nevala et al.12 which found 64% subjects had a denture –wearing history of over 30 years. The disparity may be related to the age

Table 4: Distribution of patients according to denture cleaning knowledge

<table>
<thead>
<tr>
<th>Questions</th>
<th>Response</th>
<th>Frequency</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How long should you use complete dentures?</td>
<td>Does not know</td>
<td>69</td>
<td>35.9</td>
</tr>
<tr>
<td></td>
<td>5 years or less</td>
<td>28</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>5-10 years</td>
<td>28</td>
<td>14.6</td>
</tr>
<tr>
<td></td>
<td>More than 10 years</td>
<td>08</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>Depends on patient</td>
<td>51</td>
<td>26.6</td>
</tr>
<tr>
<td></td>
<td>Depends on denture material</td>
<td>08</td>
<td>_</td>
</tr>
<tr>
<td>2. From whom was knowledge of denture maintenance obtained?</td>
<td>Does not remember</td>
<td>01</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Dentist</td>
<td>73</td>
<td>38.0</td>
</tr>
<tr>
<td></td>
<td>Other denture wearers</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>Self</td>
<td>108</td>
<td>56.3</td>
</tr>
<tr>
<td>3. Are you aware of items to be avoided to prevent staining of dentures?</td>
<td>Yes</td>
<td>21</td>
<td>10.9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>171</td>
<td>89.1</td>
</tr>
<tr>
<td></td>
<td>Tea</td>
<td>02</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>Tobacco</td>
<td>08</td>
<td>38.1</td>
</tr>
<tr>
<td></td>
<td>Pan</td>
<td>04</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Cigarette</td>
<td>01</td>
<td>4.8</td>
</tr>
<tr>
<td>4. IF YES name them:</td>
<td>More than one</td>
<td>06</td>
<td>28.6</td>
</tr>
</tbody>
</table>
of the patients as the latter study was conducted on the elderly, over 75 years. Older denture wearers manage well with their dentures and are often reluctant to obtain a new set. This may be an indirect measure of an opportunity for a dentist to educate his/her patients regarding denture care.

Of the surveyed population 22.9% patients did not remove their dentures at night which is a finding close to the report of a previous study by Chowdhary et al., where 36% slept with their prostheses in place. However, other studies found that most of their patients wore their dentures through the night. Patients may fear that removal of dentures may result in collapse of the facial tissues.

There is agreement of the important need to leave dentures out of the mouth for a minimum of six of every 24 hours to ensure regenerative blood supply, a relief of pressure and a break in parafunctional habits to allow the tissues to recover.

Most of those who slept without their dentures kept them in water, a finding similar to that reported by Barreiro et al. This may demonstrate that patients knew that this practice avoided dimensional changes of the acrylic resin due to dehydration.

This study found that a quarter (25.5%) of the patients removed their dentures during the day. Barbosa et al. and Chowdhary et al. recorded much higher incidences of this habit (54% and 67.2% respectively). Among those who did take out their dentures during the day, 71.4% placed them in water, a finding disparate from previous studies which had reported an incidence of 35.2% and 86.5% respectively.

Chowdhary et al. had recorded a relatively high occurrence of ulceration related to dentures (50.4%), whilst this study found that most patients had not suffered this problem.

Denture adhesive was used by 4.7% patients, somewhat more than had required this aid in another study (1.3%) but less than the 14.5% found by Chowdhary et al. Extended use of denture adhesives should not be considered without periodic assessment of denture quality and health of the supporting tissues by a prosthodontist.

The lack of awareness regarding the care of the prostheses among most of the patients may possibly be due to their not having a denture-wearing family member with whom to share experiences.

Most of the patients in this study had never required to have their dentures repaired. The few who did had mainly experienced fractures of the mandibular denture, a finding consonant with results reported by Naik. The smaller surface area of the mandibular denture and patient negligence during insertion, removal and cleaning are the contributory factors most responsible.

All patients reported cleaning their dentures daily. The results are similar to those reported in the literature (more than 70% cleaned their dentures daily). Most patients cleaned their dentures twice a day which is similar to the findings of Chowdhary et al. and Barbosa et al. where (majority of patients cleaned their prostheses once a day and three or more times a day respectively). This frequency of denture cleaning would not, however, necessarily indicate clean prostheses. Almost all patients employed a tooth brush to clean the denture, as also recorded by Chowdhary et al. and Barbosa et al. A denture brush was used by only 5.3% patients. Superior cleansing could be expected with a brush specifically designed for complete dentures. The majority of the patients used tooth paste to clean the dentures in common with other reported data. Patients reporting using tooth powder, salt, lemon, ash and bleaching liquid to clean their prostheses probably because these are cheap and easily available.

It is generally understood that abrasives in tooth paste would abrade the dentures. However a study by Himabindu et al. showed that the soap and brush method abraded the denture more than did the tooth paste. Hence the use of tooth paste with brush could be suggested. Brushing in combination with a chemical cleansing agent can be employed as an efficient method of daily denture care. Patients should be encouraged to brush their dentures thoroughly after each meal or snack, outside the mouth, with a brush followed by rinsing under a tap, that is cleaning of the intaglio (tissue contacting) surface of the denture should receive special attention during instruction on denture maintenance. Inaccessible areas on the intaglio surface may require the use of cottonwool swabs or a modified artist’s brush to effectively remove plaque and food debris. On retiring at night, dentures should be brushed and immersed overnight in a denture-cleansing solution. The edentulous ridges should be thoroughly massaged once per day.

Most of the patients did not use denture cleansers, also reported elsewhere. This could be attributed to economic reasons or a limited knowledge of denture cleansers. Shetty et al. suggested the use of natural products like Triphala Churna (an Ayurvedic product made from three fruits) for denture cleaning to overcome the problem of economics.

The majority appreciated the difference after wearing clean dentures which were perceived as odourless and closely adhering to the palate. None of the patients had their dentures polished by a dentist, even after using them for some years. Although the evidence is weak, dentures should be cleaned annually by a dentist using ultrasonic cleaners to minimize biofilm accumulation over time.

Education of the denture-wearing patients is important. Unclean dentures may cause halitosis, inflammatory changes of the oral mucosa such as denture-induced stomatitis and also poor esthetics. Therefore, it is important for dentists to educate their patients about denture cleanliness and to stress the need for frequent recall visits.

The majority of the patients did not know how long a complete denture should be used. Complete dentures should be reviewed annually, with consideration for replacement after five years. The majority of the patients attributed the knowledge of denture maintenance to themselves. Whilst the patient may have forgotten instructions imparted orally, or not followed them, the dentist may have been negligent in not ensuring compliance. Printed information for reference and frequent reinforcement is desirable.

Very few patients had knowledge of which items should be avoided to prevent staining of dentures. Most attributed the cause of denture staining to tobacco usage. Extrinsic staining of acrylic resin dentures can be a major problem for many individuals especially those who smoke tobacco products or drink tea, coffee, cola or red wine. A survey of patients with complete dentures showed that drinking tea and coffee was the main cause of the denture staining.
It could be advantageous to use the “Tell Show and Do” technique in which the dentist demonstrates the techniques of denture cleaning and the patient should be asked to repeat the process in the presence of the dentist. Special care should be taken to reinforce this information at regular intervals, perhaps by developing support groups to educate edentulous patients by conducting seminars and workshops.

To summarize: the patients exhibited limited knowledge regarding care of the dentures. The majority of the patients employed a tooth brush to clean the denture and did not use denture cleansers. Most of the patients were not aware of the life span of a complete denture and attributed the knowledge of denture maintenance to themselves. Very few patients had knowledge of items to be avoided to prevent staining of dentures.

CONCLUSION

Dentists need to be more cognizant of the need to offer denture patients greater support. Instruction on how to care for complete dentures should be given special attention by the dentists during insertion. Follow up and reinforcement of denture home care should be done periodically to ensure durable performance of dentures as well as maintenance of good oral health. More attention must be given to training dental students in the education and motivation of patients regarding denture care and maintenance.

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References

Medical emergencies in dental practices in South Africa

SUMMARY

Purpose: Studies carried out in many countries have shown that dentists were not confident in managing medical emergencies, and that some did not have any emergency drugs and equipment in their practice or had never had any form of practical training. No studies on the prevalence of medical emergencies for dental practices in South Africa have been published.

Method: An email survey was carried out. Sample size was calculated to be at least 239, and 267 respondents participated. The questionnaire comprised demographics; equipment and drugs possessed; number of medical emergencies experienced over a 12 month period; self-evaluation on specific medical procedures; and opinions on the need for training of dentists in managing medical emergencies.

Results: The results in general agreed with those of similar surveys carried out in other countries, and gave rise to similar concerns, in that there are many practitioners who are clearly ill-equipped to deal with medical emergencies. Most respondents felt they required more formal training.

Conclusions: It is recommended that medical emergency courses should be part of all undergraduate curricula; that medical emergency courses should be included as part of CPD accreditation requirements; and that as there is no South African list of recommended equipment and drugs, this should be developed and regularly revised, most suitably by the South African Dental Association.

INTRODUCTION

A medical emergency may occur at any time, and can be life threatening if left or incorrectly treated. In patients with medical conditions, any stress and anxiety associated with a dental visit may increase their risk of having a medical emergency. The ability of a dentist to recognise a problem quickly, and initiate treatment, reduces the risk of morbidity and mortality.

According to the American Dental Association (ADA), three out of four practitioners have experienced a medical emergency, and one in twenty general dental practitioners will have a patient with a cardiac arrest in their lifetime. Studies carried out in many countries have shown that dentists were not confident in managing medical emergencies, and that some dentists did not have any emergency drugs and equipment in their practice or had never had any form of practical training in resuscitation. In other studies, dentists agreed that there was a need for further training and that hands-on courses would improve their preparedness.

However, a lack of information on the prevalence of medical emergencies can make it difficult to formulate continuous education courses for general dental practitioners. A search of the literature revealed that there appear to have been no studies on the prevalence of medical emergencies for dental practices in South Africa. Elsewhere, a wide variety of emergency incidents has been reported with much variation as to the most prevalent. It has been pointed out that as the average age of patients is rising in many countries, and that these patients are likely to be on medication for cardiovascular, pulmonary and endocrine disorders, the risk of side effects and acute decompensation is increasing.

Whatever the prevalence, emergency equipment and drugs should be available. Chapman in 1997 reported that 14% of dentists did not keep any emergency drugs or equipment and Müller et al in 2008 found that 5% of dentists had no equipment to treat emergencies.

Furthermore, a number of studies have shown that dentists did not feel prepared to handle all medical emergencies and others have provided evidence of the need for ongoing training in medical emergencies. The ADA recommended that as procedures and drugs are continuously being updated, dentists should undergo training at least once a year.

It is clear from the above that dentists should have the appropriate drugs and equipment in their practices, and the skills to use them, but also need to undergo regular training, to effectively manage medical emergencies that may occur in a dental practice. It is not known to what extent dentists in South Africa conform to such requirements. The aims of this study were therefore to determine the prevalence of medical emergencies in a sample of dentists in private practice and to assess their capacity to deal with such emergencies.

METHOD

A questionnaire was devised using previous studies, guidelines from the UK Resuscitation Council and the Guide to Preparedness for Medical Emergencies from the ADA. The latter required dentists to have numerous emergency drugs and equipment available in their dental practices, and this guide was used to draw up the list of...
emergency equipment and drugs for the questionnaire. Ethical approval was obtained from the Human Research Ethics Committee (M110410).

*The Questionnaire is available from the authors on request.*

After a pilot study to validate the questionnaire, it comprised the following parts:

1. Demographics.
2. Emergency drugs and equipment possessed.
3. Number of medical emergencies experienced over a 12 month period.
4. Self-evaluation on specific medical procedures.
5. Opinion on the need for training of dentists in managing medical emergencies.

Respondents were asked to record the number of medical emergencies that had occurred in their dental practices in the past 12 months.

The study population was dentists whose email addresses were provided by the South African Dental Association. There were 2,517 email addresses, the majority of which were in Gauteng. Although it has been reported that email surveys had a lower response rate when compared with postal surveys, time and financial considerations made this more favourable. It also enabled a larger geographical area to be accessed with the use of minimum resources. Reminder emails were sent out on four occasions to all the dentists, to improve the response rate. Procedures for determining sample size for continuous and categorical variables using Cochran’s formulæ were used to calculate the sample size based on a study population of 2,517. At a confidence level of 95% and a width of the confidence interval of 5, a sample size of 239 was required.

Inclusion criteria were dentists with a minimum of one year experience in private dental practice and dental specialists. Excluded were maxillo-facial and oral surgeons (it was assumed that they would have had extensive training during post-graduate studies) and dentists working in hospitals and clinics.

Descriptive statistics were used to summarise the demographics, incidence of medical emergencies occurring in private practice, as well as the equipment and drugs used by the dentists in medical emergencies. The average scores, in Part 4 of the questionnaire, were used to determine which statements were the most and least important in the need for training in emergency management.

**RESULTS**

The final response was 10.5% or 267 respondents. Table 1 shows the location of the practices responding, and Table 2 shows the time period since primary dental qualification.

![Figure 1: Emergency equipment](image1)

![Figure 2: Emergency drugs](image2)

Table 1: Location of respondents’ dental practices.

<table>
<thead>
<tr>
<th>Province</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauteng</td>
<td>99</td>
<td>37</td>
</tr>
<tr>
<td>Western Cape</td>
<td>66</td>
<td>25</td>
</tr>
<tr>
<td>Kwa-Zulu Natal</td>
<td>67</td>
<td>25</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Limpopo</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>North West</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Free State</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The experience of the respondents. Eighty four percent (224) of the dentists had been practicing for longer than 5 years. Ninety three percent of respondents were general dental practitioners and 7% were specialists in oral medicine and periodontics (9), orthodontics (8), prosthodontics (7), and there was one community dentist, who was in private practice.

Figure 1 shows the percentages of the recommended emergency equipment which were available in the dental practices. Only three respondents (1%) stated they had all the equipment required in their practice, but 39 respondents (15%) had no equipment to treat medical emergencies. More than half of the respondents had sterile syringes (65%) and blood pressure meters (51%) in their practices. Only 10% (32 respondents) had at least half of the required equipment.

Less than 3% (8) reported that they had all the emergency drugs available in their practices (Figure 2) and 32% (66) had none. Half of the required emergency drugs were available in only 10% (26) of practices.

Table 3 shows the reported occurrence of a medical emergency over the previous 12 months. Nineteen percent (52) of respondents had encountered at least one medical emergency and 44% (117) have none. However, 57% (98) had experienced multiple emergencies over that period. Other reported medical emergencies encountered that were not in the questionnaire were tachycardia, uncontrolled hypertension, and post-operative bleeding.

![Figure 3: Number of Medical Emergencies](image3)
The respondents were given a list of 11 emergency management procedures and were asked to acknowledge whether they were competent in performing each specific procedure (Table 4). Only 9% were able to perform the procedures for Advanced Life Support. One respondent could not perform any of the procedures. In response to whether any respondents had undergone further training, 30% indicated that they had.

Finally, respondents were requested to rate statements relating to emergency training on a scale of 1 (strongly disagree) to 5 (strongly agree). Averages were then calculated for each statement as shown in Table 5. Scores between 2.5 and 3.0 indicate an overall response to the statement as being neutral, which applied to only four questions. The remaining statements produced an average score above 4.0, indicating that most participants were in agreement or strong agreement with those statements.

**DISCUSSION**

In the USA, the UK and Australia, medical emergency management procedures are continuously updated by their Resuscitation Councils to ensure the provision of more efficient treatment to patients in a medical emergency. However, this process is not current in South Africa. The lack of a medical emergency programmes for dentists at a post-graduate level could account for the fact that only 50% of the respondents in this study had undertaken any further studies.

Most of the respondents (82%) had more than five years’ working experience. It was therefore expected that they had adequate knowledge of practice management, as well as of what drugs and equipment should be kept in their practices. However, 15% had no emergency equipment which is similar to the 14% of Australian respondents. A German study showed that only 5% of respondents did not have any emergency equipment. Eight percent of current respondents did have a defibrillator, which was favourable in comparison with the German study where only 2% owned a defibrillator. A defibrillator is vital for the treatment of patients with cardiac arrest, and South Africa has been ranked the 6th highest country regarding the incidence of cardiac arrest in patients. Oxygen tanks (95%) and salbutamol inhalers (70%) were the most common equipment kept in dental practices in Great Britain compared with only 40% of respondents in this South African survey had an oxygen tank.

The most common emergency drug available was adrenaline (51%) followed by glucose (47%) which reflected a much lower adherence than the 77% reported in Great Britain. Glyceryltriminate spray was reported to have a high level of availability (80%) in Great Britain compared with only 11% in South African respondents.

Overall, it appears that it is likely that dentists in South Africa have less emergency equipment and drugs when compared with dentists in Great Britain, Australia and Germany. A lack of basic equipment and drugs places dentists at a high risk of having a mortality or serious morbidity in their dental practice.

The most common medical emergency was syncope, reported by 92% of the respondents, and this was also the most common emergency in Northern England, Australia and Japan where the figures were 63%, 58% and 50% respectively. The next most common emergency experienced was the reaction to local anaesthetic (29%). Atherton et al. in 1999 stated that 20% of medical emergencies occurred after the administration of local anaesthetics. Thus dentists need to have appropriate resuscitative equipment in their practices. Seventeen per cent of the respondents experienced patients with seizures. This condition requires anti-epileptic drugs such a midazolam for treatment which was stored by only 20% of the respondents.

Cardiac arrest of a patient was experienced by three of the respondents over the previous 12 months. All three dentists had blood pressure meters, sterile syringes and needles, and glucose but only one had the necessary additional equipment and drugs. Whilst 25% of respondents felt that they were able to perform defibrillation, only 8% had a defibrillator, which is the most important equipment required to restore a normal heart rhythm. If defibrillation is not provided, the patient can die within minutes. Balmer in 2005 stated “Dental undergraduates must understand the different cardiac arrest rhythms and be trained in the safe use of an AED”. An alarming statistic published by Louw et al. reported that less than half (49%) of general medical practitioners working in hospitals in the Western Cape knew the indications for defibrillation. Of concern also, is that procedures such as performing airway management (inserting an oropharyngeal tube) and establishing intravenous access were able to be carried out by only 34% and 25% respectively of respondents.

**Table 3:** Percentage of responders experiencing medical emergencies over the previous 12 months

<table>
<thead>
<tr>
<th>Medical emergency</th>
<th>Number of responders</th>
<th>Percentage of responders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vasovagal syncope</td>
<td>245</td>
<td>92</td>
</tr>
<tr>
<td>Reaction to local anaesthetic</td>
<td>77</td>
<td>29</td>
</tr>
<tr>
<td>Seizures</td>
<td>45</td>
<td>17</td>
</tr>
<tr>
<td>Hyperventilation</td>
<td>39</td>
<td>15</td>
</tr>
<tr>
<td>Swallowed objects</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Diabetic coma</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Asthma attack</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Angina Pectoris</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Acute steroid insufficiency</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Stroke</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Other:**
- Tachycardia: 2
- Uncontrolled hypotension: 1
- Post-operative bleeding: 1

**Table 4:** Competence in emergency management

<table>
<thead>
<tr>
<th>Specified procedure</th>
<th>Percentage able to perform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse check</td>
<td>95</td>
</tr>
<tr>
<td>Chest compression</td>
<td>89</td>
</tr>
<tr>
<td>Measuring blood pressure</td>
<td>80</td>
</tr>
<tr>
<td>Applying oxygen via face mask</td>
<td>80</td>
</tr>
<tr>
<td>Basic life support</td>
<td>77</td>
</tr>
<tr>
<td>Bag mask ventilation</td>
<td>70</td>
</tr>
<tr>
<td>Measuring blood glucose</td>
<td>54</td>
</tr>
<tr>
<td>Establishing intravenous access</td>
<td>47</td>
</tr>
<tr>
<td>Inserting oropharyngeal tube</td>
<td>34</td>
</tr>
<tr>
<td>Defibrillation</td>
<td>25</td>
</tr>
<tr>
<td>Advanced life support</td>
<td>9</td>
</tr>
</tbody>
</table>
Table 5: Average score for each question relating to dentists attitude towards training.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate training has prepared you to manage medical emergencies.</td>
<td>2.8</td>
</tr>
<tr>
<td>Dentists should have postgraduate training in emergency medicine.</td>
<td>4.3</td>
</tr>
<tr>
<td>Dentists should participate in a medical emergency course once a year.</td>
<td>4.0</td>
</tr>
<tr>
<td>Dental staff should undergo medical emergency training.</td>
<td>4.3</td>
</tr>
<tr>
<td>Medical emergency courses should be a requirement for CPD accreditation.</td>
<td>4.1</td>
</tr>
<tr>
<td>I can manage medical emergencies with the use of self-study material.</td>
<td>2.7</td>
</tr>
<tr>
<td>Dentists must be prepared to manage medical emergencies.</td>
<td>4.5</td>
</tr>
<tr>
<td>Dentists require hands-on training in emergency medicine.</td>
<td>4.4</td>
</tr>
<tr>
<td>There are adequate medical emergency courses available for dentists.</td>
<td>2.5</td>
</tr>
<tr>
<td>The costs of medical emergency courses are reasonable.</td>
<td>2.9</td>
</tr>
<tr>
<td>Emergency equipment and drugs must be available in every dental practice.</td>
<td>4.2</td>
</tr>
<tr>
<td>There should be an emergency flow chart in every dental practice.</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Strongly disagree 1 - Disagree 2 - Neutral 3 - Agree 4 - Strongly agree 5

It was clear from the responses (Table 5) that the respondents felt they required more formal training. A New Zealand study stated that more than half their respondents were dissatisfied with the training they had received for medical emergencies as undergraduate students. The results from this study, however, showed that the respondents were neutral to whether undergraduate training prepared them for medical emergencies.

The respondents clearly felt strongly about the need for being prepared to manage medical emergencies, and that training is an important part of ensuring continued success in treating patients in such circumstances. They were uncertain or neutral to the statements which implied that there are insufficient training courses available or that dentists are unaware of training courses that could prepare them for medical emergencies. Standardising and certifying emergency training would certainly improve the competency level of dentists and prepare their staff in managing such situations.

CONCLUSION AND RECOMMENDATIONS

There were some limitations in this study, as there are in surveys of this nature, such as the uneven geographic distribution of the respondents, and the inherent biases in such a sample in that only those practitioners with access to email and interested enough in the topic would have responded. However, the results in general seem to agree with those of similar surveys carried out in other countries, and give rise to similar concerns as expressed in those studies, in that there are many practitioners who are clearly ill-equipped to deal with medical emergencies. The following recommendations are therefore made:

1. Medical emergency courses should be part of all undergraduate curricula.
2. Medical emergency courses should be included as part of CPD accreditation requirements by the Health Professions Council of South Africa.
3. As there is no South African list of recommended equipment and drugs, this should be developed and regularly revised, most suitably by the South African Dental Association.

Acknowledgments: We are grateful to Dr V Karic for the inspiration of this study and its inception.

References

1 COMPLETE SENSITIVITY TOOTHPASTE
SPECIALLy DESIGNED WITH 7 BENEFITS*

* With twice-daily brushing.
† Parkinson C et al., 2013 reported a 33% reduction from baseline in Schiff sensitivity score at Week 8 for a stannous fluoride toothpaste.

NEW SENSODYNE® COMPLETE PROTECTION PROVIDES ALL-ROUND CARE FOR YOUR PATIENTS WITH DENTIN HYPERSENSITIVITY*1-5

Stannous fluoride forms a robust layer over the exposed dentin and within the exposed dentin tubules.1 This layer starts to build from first use6 and continues to build with twice-daily brushing1,6 66%

20% reduction in plaque build-up after 24 weeks compared to regular fluoride toothpaste*5

Clinically proven relief from dentin hypersensitivity pain*2,3 reduction in dentin hypersensitivity from baseline after 8 weeks*†

Helps control dental plaque*4,5 29%

Improvement in gingival inflammation after 24 weeks compared to regular fluoride toothpaste*5

Supports good gingival health*4,5

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Stannous fluoride forms a robust layer over the exposed dentin and within the exposed dentin tubules.¹ This layer starts to build from first use⁶ and continues to build with twice-daily brushing¹,⁶

Clinically proven relief from dentin hypersensitivity pain²,³

Helps control dental plaque⁴,⁵

Supports good gingival health⁴,⁵

Up to 66%

20%

29%

reduction in dentin hypersensitivity from baseline after 8 weeks†¹,³

reduction in plaque build-up after 24 weeks compared to regular fluoride toothpaste⁵

improvement in gingival inflammation after 24 weeks compared to regular fluoride toothpaste⁵


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Now available in store
Nitrous oxide/oxygen conscious sedation: clinical safety and usefulness

M A Gillman

INTRODUCTION
Whitwam and McCloy1 define conscious sedation as a ‘controlled state of pharmacological depression of consciousness that maintains protective reflexes, retains a patent airway independently and continuously, and permits appropriate responses to physical stimulation or verbal command.’ It is a state similar to that of ‘Minimal Sedation’ (Anxiolysis), defined by the American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists as a ‘state that although cognitive function and co-ordination may be slightly impaired, ventilatory and cardiovascular functions are unaffected.’2

Clearly, this is much lighter than deep sedation, where consciousness is lost and there is a loss, or partial loss, of protective reflexes and an inability to respond to verbal commands. Conscious sedation is thus even further removed from general anaesthesia where there is a complete loss of protective reflexes and unconsciousness occurs.3-5

In comparison with other drugs, nitrous oxide/oxygen is the safest, most effective agent for out-patient dentistry, readily producing conscious or minimal sedation.6 Provided that the operator has the required theoretical and practical training and that the correct technique and equipment is used, a mixture of nitrous oxide and oxygen is almost ideal to produce this state.6 It has been claimed that the technique ‘has never been replaced and has stood the test of time’.7 N2O is a natural constituent of the atmosphere (0.5 ppm)8 and should not be confused with nitric oxide (NO), a closely related chemical.

HISTORY
The early use of N2O by Davy, and the discovery of anaesthesia by Horácio Wells more than forty years later, are well known.7,8,10 Nonetheless, there are many who dispute Wells’ rightful claim as the discoverer of general anaesthesia.4 Less well known is the fact that Davy conducted his pioneering human experiments at concentrations similar to those currently used by dentists or that the first general anaesthetic operation was the extraction of Well’s own third molar.8 Also relatively unknown is that it was a Polish physician, working in Russia, S.S. Klikovich, who was the first practitioner to realise the potential of using N2O for its anxiolytic and analgesic effects.11 He used it successfully at concentrations currently recommended by modern dentists for conscious sedation, but for obstetrics, asthma and angina.11 Since the work of Klikovitch, the medical profession has largely confined the use of nitrous oxide for conscious sedation to obstetrics and general anaesthesia.3 Over the ensuing more than 150 years, N2O has proved a safe and effective agent, and there are few if any other agents currently used for medicine and dentistry that has such an outstanding record of safety and efficacy.1,4,6-7,12 Indeed, Jastak has noted that when used correctly it is, ‘…one of the safest drugs in clinical practice.’13

It is however, important to distinguish between anaesthesia and analgesia. N2O has low potency as an anaesthetic agent, requiring hyperbaric conditions to produce safe surgical anaesthesia. While the administration of N2O as an anaesthetic by single-handed dental practitioners is hazardous, this does not apply to the low concentrations used to achieve analgesia in conscious sedation, or inhalation sedation.3,7

The descriptive term “psychotropic analgesic nitrous oxide (PAN)” has been recommended when non-anaesthetic concentrations of N2O are used, as in dentistry, to evoke the anxiolytic, anti-stress and mood-elevating effects of the gas.2 In dentistry, the availability of reliable and safe local anaesthetic agents in the 1940’s led to the widespread use of PAN for conscious sedation. It has been popular among dentists ever since.3

PHARMACOLOGY
N2O at levels used for conscious sedation (PAN) fulfills the criteria to be described as a partial opioid agonist.5,10,17 In common with other opioids e.g. morphine and pethidine it nevertheless acts on neurotransmitter systems such as the adrenergic, dopaminergic and GABA-ergic.5,17 Idiosyncratic sensitivity to N2O is rare but has been encountered.3

PRACTICAL NOTES
The dedicated equipment for the administration of N2O/O2 in providing conscious sedation has important safety features. Training in the use of this equipment is essential, involving a short course of a few hours duration. A built-in fail-safe device halts the supply of N2O should the oxygen flow to the patient fall below 30%.14 As a result, the danger of hypoxia is avoided.13,15,21 particularly as a nasal mask and not a facial mask is used.2 The dose is titrated for every patient and in any event, the effects of PAN can be reversed within seconds by substituting pure oxygen. Although intravenous benzodiazepines can also be titrated very accurately, reversal of the effects of those drugs is unlikely to be as rapid, safe or predictable.3

PAN can be used alone or in combination with almost all available sedative agents (oral or parenteral), including opioids, benzodiazepines, chloral hydrate and local...
anaesthetics. However, such combinations can result in deep sedation or anaesthesia, an effect which should be avoided for those operators more extensively qualified. N\textsubscript{2}O is also non-allergic and can be used safely in patients with poor renal and/or hepatic function. It also acts synergistically with hypnotherapy, audioanalgesia, acupuncture and electroanalgesia.

PAN can be useful for all dental procedures, from conservation to paediatric dentistry and in surgical procedures including implants and third molar extractions. In medicine it has been used in numerous clinical situations including paediatric surgery, radiology, ophthalmology, terminal refractory pain, emergency medicine and painful medical procedures as well as the treatment of substance abuse withdrawal states. It can also be used by properly trained dentists to treat nicotine abuse, in which case it is appropriate that the medical practitioners’ tariff code (0203/0204) plus the dental code (8141/8143) plus the modifier 007, are applied.

**PATIENT SAFETY AND MONITORING WHEN USING N\textsubscript{2}O/O\textsubscript{2} CONSCIOUS SEDATION**

Safety of N\textsubscript{2}O/O\textsubscript{2}

The safety of N\textsubscript{2}O/O\textsubscript{2} for conscious sedation (i.e. PAN) has been well established and indeed, in combination with local anaesthesia (LA), is safer than LA on its own. The unpleasant side effects of LA are reduced or avoided, including syncope, which on rare occasions is accompanied by drastic blood pressure changes, attacks of angina and vomiting with aspiration. Of course, N\textsubscript{2}O/O\textsubscript{2} does produce minor side-effects, which are relatively rare e.g. nausea or headache, which usually can be avoided by adequate post-operative oxygenation.

Contraindications

PAN should be avoided in chronic obstructive pulmonary disease or pneumothorax, or where the patient is receiving bleomycin sulphate for various neoplasms, including lymphomas, squamous carcinomas and testicular tumours. Concentrations in excess of 30% of oxygen can cause pulmonary fibrosis in patients receiving bleomycin sulphate. As N\textsubscript{2}O oxidizes vitamin B\textsubscript{12}, patients with severe B\textsubscript{12} avitaminosis should be preloaded with either the vitamin or with folinic acid, which are protective. Careful history taking is certainly essential when using N\textsubscript{2}O.

Safe patient monitoring

When using N\textsubscript{2}O/O\textsubscript{2} conscious sedation, no specialised monitoring equipment is required, as long as no other sedative drugs are used.

**CONSIDERATIONS FOR STAFF SAFETY**

Importance of scavenging with N\textsubscript{2}O

Low level chronic exposure can result in dyshaemopoiesis which can be severe enough to produce agranulocytosis. Female infertility and spontaneous abortions can also follow chronic pollutant exposure. These consequences may be a problem for the dentist and dental staff. However, there are no clinical sequelae for healthy patients exposed for up to 5 hours of continuous N\textsubscript{2}O at anaesthetic concentrations, which are much higher than those used for N\textsubscript{2}O/O\textsubscript{2} conscious sedation. Simple inexpensive scavenging will avoid all of these untoward effects.

Apart from the fact that it is unethical to knowingly expose staff to a potential biohazard, it is a criminal offence.

**N\textsubscript{2}O abuse**

N\textsubscript{2}O abuse is so rare that it has been described as a “toxicological curiosity” and is usually confined to those health professionals who have easy access to the gas, such as dentists, anesthetists and nurses. However, it may cause a serious syndrome which is similar to combined degeneration of the spinal cord, due to demyelination.

**CONCLUSION**

Conscious sedation is a state which never approaches anything near anaesthesia, and there is no other technique as safe, as rapidly effective, as swiftly and simply reversible as the N\textsubscript{2}O/O\textsubscript{2} mixture, despite all the advances of modern medicine.

Conflict of interest: Since 2003 I have been the medical adviser to Sedatek, a company that sells conscious sedation equipment. I have no shareholding in Sedatek.

**References**

In dentistry one rarely deals with life-or-death decision-making, however important human values are at stake during the course of any dental treatment. These include preventing pain, preserving and restoring oral function for normal speech and eating, preserving and restoring the patient’s physical appearance, and promoting a sense of control over and responsibility for his or her own health. The dental management and treatment of children can be challenging to the practicing dentist in many ways including dealing with ethical issues related to the best interests of the child, obtaining valid consent or assent, surrogate decision making and access to care.

THE MORAL STATUS OF THE CHILD

The Declaration of Human Rights states that the child must be recognised as a person with the basic rights of all human beings to be free and equal in dignity and rights. Therefore, all health-care professionals must be dedicated to the respect of the life and dignity of the child as an entity of full value at each stage of development. This is particularly important where the more children are dependent on the protection and the support of their parents or others, the more the health professional should focus on the interests and needs of the child. In partnership with parents and guardians, all health professionals have a duty to enhance, encourage, protect and promote children’s development from the dependency of infancy to the autonomy of adults. Parents are given the ethical and legal responsibility to make decisions for their children provided that they do so in the best interests of the child. The Convention also provides that children should have access to the best available standards of health care, the right to information, the right not to be subjected to inhuman or degrading treatment and the right to privacy. Children are right owners, even if they are not able to understand the nature and effect of the health service even though they may not have the legal capacity to consent. In such circumstances the child must be consulted, but their parent or guardian will have to give the necessary consent. When eliciting informed consent, the National Health Act of No. 61 of 2003, Section 6(2), requires that the following information be given to the patient:

- Range of diagnostic procedures and treatment options available
- Benefits, risks, costs and consequences associated with each option
- User’s right to refuse care, in which case the dentist should explain the implications, risks and obligations of such refusal
- Furthermore, this information must be provided in a language that the patient understands and in a manner that takes into account the patient’s literacy level.

While the National Health Act does not specifically mention consent by children it is self-evident that the provisions apply to children who have the legal capacity to consent to medical treatment.

ETHICAL JUSTIFICATION FOR OBTAINING CONSENT/ASSENT

Traditional moral theory and ethical principles justify the imperative to obtain consent/assent for medical treatment. Autonomy is the right to self-determination. It refers to the right of every individual to make decisions for him/herself and to determine what is in their best interests. In health care this would mean allowing the patient to make the final decision regarding his/her treatment, after all the necessary and relevant information had been provided. Furthermore, by encouraging active participation of individuals in the decision-making processes that are intended to restore their health, compliance for treatment is often improved. The universal need to obtain consent/assent also involves treating people justly and protects patients from the physical and psychological harms which may occur as a result of illness or its treatment. The broader social benefits of obtaining valid consent/assent include the fostering of the dentist-patient relationship which is based on partnership, mutual trust, understanding and respect.

The traditional ethical principles and moral theories are usually used for persons who have the capacity to make their own decisions. It should not be used for patients who are incompetent or lack capacity as a result of their being immature, incapacitated, ignorant, coerced into a decision or exploited. In accordance with all sections of the Children’s Act (Act 38 of 2005), any child seeking dental
treatment or surgery must consent to treatment or surgery and practitioners now need to actively involve children in making and taking decisions about their own oral health care. This has required a paradigm shift in the attitudes of health professionals to the moral status of children and the moral claims which they may make on society.3

THE CHILD’S ROLE IN DENTAL DECISION MAKING

The Children’s Act (Act 38 of 2005)11

The Children’s Act (Act 38 of 2005) that came into effect on 1 April 2010 lowered the age at which a minor can consent to dental and surgical treatment and any child seeking dental treatment or surgery must consent to treatment or surgery.

For dental treatment the Children’s Act 38 of 2005 Section 129(2) provides that a child may consent to his or her own dental treatment (i) if they are over the age of 12 years and (ii) if the child is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the treatment. For surgical operations, the Children’s Act 38 of 2005 Section 129(3) provides that a child may consent to the performance of a surgical procedure on himself or herself (i) if he/she is over 12 years of age (ii) is of sufficient maturity and has the mental capacity to understand the benefits, risks, social and other implications of the surgical operation; and (iii) if he/she is duly assisted by his or her parent or guardian. Practitioners must ensure that prior to surgery the child’s consent is obtained in writing and must be completed by the practitioner performing the surgery or by a representative of the institution where the procedure is carried out and must be signed by the child. The parent or guardian who assists the child must assent to this in writing.12

In instances where a child is under 12, or over 12 years of age but lacks the maturity to make an informed decision or is unable to understand the benefits, risks, social and other implications of the treatment or surgical operation, then in terms of Section 129 (4) and (5), a parent, guardian or care-giver of the child may consent to dental treatment or surgical operation.

THE HEALTH PROFESSIONS COUNCIL OF SOUTH AFRICA

The Health Professions Council of South Africa13 in their guidelines related to the ethical considerations in seeking of children’s informed consent state that:

9.5.1 Health care practitioners must assess a child’s capacity to decide whether to consent to or refuse a proposed investigation or treatment before they provide it.

9.5.2 In general, a competent child will be able to understand the nature, purpose and possible consequences of the proposed investigation or treatment, as well as the consequences of non-treatment.

9.5.3 A health care practitioner’s assessment must take account of the following:

9.5.3.1 A minor with sufficient maturity over the age of 12 years can be treated as an adult and is legally competent to decide on all forms of treatment, and medical and surgical procedures.

9.5.5 Where a child is not legally competent to give or withhold informed consent, the parent or guardian may authorise investigations or treatment which are in the child’s best interests. Such parent or guardian may also refuse any intervention, where they consider that refusal to be in the child’s best interests, but health care practitioners are not bound by such a refusal and may seek a ruling from the court.

9.5.6 In an emergency where there is no time to contact the parent or guardian and the health care practitioners consider that it is in the child’s best interests to proceed, they may treat the child, provided it is limited to treatment which is reasonably required in that emergency. In such circumstances in State Hospitals consent must be given by the clinical manager.

Furthermore, the HPCSA provides that in deciding what options may be reasonably considered as being in the best interests of a patient who lacks capacity to decide, health care practitioners should take into account:

10.1.1 The options for investigation or treatment which are clinically indicated;

10.1.2 Any evidence of the patient’s previously expressed preferences, including an advance statement;

10.1.3 Their own and the health care team’s knowledge of the patient’s background, such as cultural, religious or employment considerations;

10.1.4 Views about the patient’s preferences given by a third party who may have other knowledge of the patient, for example, the patient’s partner, family, carer, or a person with parental responsibility;

10.1.5 Which option least restricts the patient’s future choices, where more than one option (including non-treatment) seems reasonable in the patient’s best interests.13

THE MORAL AND LEGAL AUTHORITY OF THE PARENT OR SURROGATE DECISION MAKER

Surrogate decision making is often a practical necessity and ensures that the interests of the incompetent individual are represented. In making decisions for another person, a surrogate must make choices based on the individual’s previous preferences, if they are known ‘(substituted judgement)’.14 The fact that parents generally bear the consequences of treatment choices for their children support the presumption that they will make decisions with the child’s ‘best interest’ in mind.15 The ‘best interest’ principle includes what a reasonable person might choose under similar circumstances and is often applied in situations of special need and where people do not have capacity to take decisions for themselves. It is a way of enabling a clinician to provide treatment that would generally be regarded as being in the best interests of patients who are not capable of making such decisions themselves. The question then arises as to who determines what is in the best interest and if there is a disagreement between parent and provider with an interest in the welfare of the patient? In most cases the law will usually set a particular age over which patients may provide consent for treatment and this can be different to the age of majority when the law recognises a person as an adult.

Parents are usually regarded as acting in the best interests of their children and decision making for children is a shared process between parents and health professionals.16 Regardless of the parent’s request, the dentists’ primary ethical, moral and legal duty is to the child, and the dentist is not obligated to acquiesce to treatment if it is unreasonable or not in the child’s best interest. It must be noted that parents giving consent on behalf of their child, must meet the criteria for informed consent in terms of their own capacity for reasoning and understanding and their voluntariness.14
CHILDREN’S ASSENT TO CARE

Informed consent means approval of the legal representative of the child or of the competent child for medical interventions following appropriate information. Informed assent means a child’s agreement for medical procedures in circumstances where he or she is not legally authorised or has insufficient understanding to be competent to give full consent. The American Academy of Paediatrics defines four aspects of assent for the clinical context: (i) helping the child to achieve a developmentally appropriate awareness of the nature of his or her condition, (ii) telling the patient what he or she can expect from the tests and proposed treatment, (iii) making a clinical assessment of the child’s understanding of the situation and the factors influencing his or her response and (iv) soliciting an expression of the child’s willingness to accept the proposed care.

As the child matures, the shared decision making of the parents and the health professional becomes more complex. When applied to medical or dental treatment consent or assent involves more than just agreement that a diagnostic test or a therapeutic procedure can be done. It is an active participatory process that involves a patient receiving information about the proposed procedure at a pace and a level which they can comprehend and the ability to use that information to make a voluntary choice as to whether to undergo that procedure. A child’s cooperation may be more easily obtained if he or she is understands the treatment planned. Such honesty will show respect to the child and it will enhance qualities of partnership, mutual understanding and trust which underline the dentist-patient relationship.

The legal purpose of consent of the patient is to safeguard his or her autonomy or right to self-determination. However, practitioners should also carefully listen to the opinion and wishes of children who are not able to give full consent and should obtain their assent. The dentist has an ethical and legal responsibility to determine the ability and competence of the child to give his or her consent or assent. Although consent/assent is often perceived as one-off event, it is better regarded as an ongoing process.

REFUSAL OF CONSENT TO HEALTH SERVICES BY CHILDREN

The capacity to take and make decisions is intimately involved with cognitive and emotional development. Whether or not a refusal of consent to health care by children under the age of 18 years is legally valid depends on the age of the child and the nature of the health service. Letting a child exercise autonomy in medical decision making depends on his or her own capacity and the decision to be made and it can be argued that competence is decision-specific i.e., the riskier the procedure or consequences of refusing it, the greater the level of competence that must be demonstrated by the decision maker. According to Piaget’s classic work on the cognitive development of the child, the ability to reason abstractly and to understand and predict future consequences of an action does not occur until the ages of 11 and 14 years. By age of 15 years, the cognitive capabilities of the normal adolescent are similar to an adult.

In South Africa, children under the age of 18 years may not consent or refuse consent to an operation unless it is a termination of pregnancy. Children under the age of 18 years but over the age of 14 years may, however, refuse consent to medical treatment. Although children under the age of 14 years have the right to participate in any decision affecting their personal health and treatment, they are not legally competent to refuse or to consent to medical treatment. Even though such children do not have the legal capacity to refuse treatment they must still be given the information required by the National Health Act to enable them to participate in the decision-making process. If children under the age of 14 years refuse to consent to treatment they should be counselled by the practitioner provider regarding the implications, risks and consequences of their refusal. If after such counselling they still refuse care, they should only be treated against their will, and with the consent of their parents or guardian, where it is in their best interests because lack of such treatment may result in death or irreversible damage to their health.

Children aged 14 years or older are legally competent to consent to medical treatment without the assistance of their parents or guardians. They are also legally competent to refuse medical treatment. Provided that the child is sufficiently mature to understand the nature and effect of the refusal of treatment, and the implications, risks and obligations of such refusal have been explained, understood and accepted, the refusal should be respected.

CONCLUDING REMARKS

Making and taking decisions on behalf of a child is fraught with ethical complexities relating to autonomy, obtaining informed consent, assent and parental permission. In addition, the dental practitioner needs to be cognisant of the best interests of the child, the moral and legal authority of the parents or surrogate decision maker and the evolving capacity of the child to make decisions about their care and management.

References
Maxillo-facial radiology case 134

This 20-year-old male patient presented with periorbital and facial soft tissue masses of the left side of the face and a swelling affecting upper left maxilla (Figure A, B). The patient also presents with mental retardation and epilepsy. What is your diagnosis?

INTERPRETATION

Cropped pantomograph showing sharply demarcated lytic lesions of left mandibular ramus and angle and an enlarged mandibular notch, red arrow (Figure C). Follow-up cropped pantomograph three years later showing subperiosteal "blister" lesion at left mandibular ramus, fusiform enlargement of the left mandibular canal, and "elongated" left condyle, blue arrows (Figure D). Lateral skull radiograph demonstrating neurofibroma subjacent to mandible which has resulted in upward displacement of lower border, yellow arrow (Figure E). Figure F is a coronal CT scan showing the soft tissue mass affecting the left orbit. A diagnosis of multiple neurofibromatosis was made. The classic description of this disease was given by von Recklinghausen in 1882 and the disease is often mentioned together with his name. The main features of the disease are the presence of multiple subcutaneous neurofibromas, and café au lait cutaneous pigmentation. Neurofibromatosis occurs in all races and is found in about 1 in 3,000 in the general population. Affected patients develop multiple neurofibromas. Superficial lesions are sessile or pedunculated, frequently consisting of numerous smooth-surfaced nodules that are widely distributed in the skin. Deeper, more diffuse lesions, or "elephantiasis neuromatosa" are often large in dimension. Moreover, most affected individuals have asymmetric areas of alanine pigmentation of the skin, termed café au lait spots. Intraoral neurofibromas occur in up to 20% of cases. When neurofibromas are present within the jaws, they are usually associated with the mandibular nerve, resulting in a fusiform enlargement of the canal with pain or paraesthesia. In the early literature, malignant transformation of neurofibromas was reported to occur in 15% of patients. Radiolucent defects involving the maxilla and mandible have been described in some cases. Generally the radiolucent areas are closely related to the foramina of the trigeminal nerve. The cardinal radiologic features are: fusiform enlargement of mandibular canal, sharply defined, and occasionally corticated radiolucency, subperiosteal "blister" lesion and enlargement of the jaw adjacent to a soft tissue tumour.

Reference

A light aircraft flying in bad weather collided with the side of a mountain in southern Kwa- Zulu Natal. The pilot and passenger were carbonised in the fire that ensued after the impact. The bodies were brought to the Medico-legal mortuary in Pretoria for identification. Both had intact dentitions with multiple dental restorations, despite being severely burnt (Figure 1).

Relatives of the two deceased provided the names of the dentists who had treated the victims of the crash. The wife of deceased #2 informed us that her husband had been busy with a dental treatment plan and that he had a follow up appointment to have the rest of his teeth “fixed”. The two dentists were contacted and ante- mortem records were duly collected by the South African Police Services. The ante-mortem records of deceased #2 recorded that the 17 had an old occlusal amalgam filling and three newly placed composite resin fillings on the 14, 15 and 16. This information was used to positively identify deceased #2. The radiological examination of the dentition during the post mortem examination showed no signs of additional caries or any other recognisable pathology. Figure 2 shows the fillings in the first quadrant and the sound dentition in the second quadrant, perhaps putting into question the need for further “fixing” of the dentition.

Although no steps were taken against the dentist, it seemed highly likely that the fillings in teeth 14, 15 and 16 had been placed in healthy teeth, and that a similar over-servicing was scheduled for the second quadrant. Radiological examination confirmed that the teeth in the rest of the dentition were indeed sound.

**DISCUSSION**

Over-servicing of patients is regarded as unprofessional conduct by the Health Professions Council of South Africa. The principle of non-maleficence which is based on the Hippocratic maxim “primum non nocere” (first, do no harm) is considered to be more important than to do good. The information provided by his wife and the physical examination of the entire dentition made the placing of composite resin fillings on 14, 15 and 16 rather suspicious, although actual over-servicing would have been difficult to prove. Had the individual not died in the aircraft accident, the same fate would quite possibly have befallen the rest of the extremely healthy dentition.

**Reference**


**Notice:** All names and places have been changed to protect the next of kin.
Management of Temporomandibular Disorders and Occlusion

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WG Evans

Copyright Mosby, by imprint of Elsevier Inc. Seventh Edition 2013

468 pages of text and illustrations.

This is a well respected and widely read textbook which first appeared in 1985. Why then a book review of the Seventh Edition? The answer lies in the extensive revision and enhancement in the new presentation.


This logical progression through the intricacies of one of the most, if not the most, complex joints in the human body has proven eminently readable through all previous editions but the text is now enhanced by superb full colour illustrations and explicit flow charts. The text and illustrations are carefully balanced to ensure ready comprehension of the principles.

Part One deals firstly with the essential factual description of the components and their inter-relationships. It is most apposite that the detail of the anatomy is couched in terms of how it will contribute to function…. and in the long run, to therapy. Indeed, Okeson quotes Okeson with the entirely apt maxim leading into the chapter: “Nothing is more fundamental to treating patients than knowing the anatomy” Hence it is no surprise to find in the ensuing five chapters a deeply investigative analysis of just how the masticatory system works... the discussion and descriptions link muscle, bone, nerves, blood supply in drawing an intellectual image of contemporary concepts of function activity of the normal joint system. Okeson does not stint in his dealings with the contradictions between different philosophies and schools of thought. Contrasting opinions are unveiled and debated and where there is no consensus a balanced explanation is provided to the reader.

Part Two commences with a telling resume of previous work on Temporomandibular Disorders, a vivid illustration of the complexity of the problems. The text explores the contributory factors in the several formats in which the disorders may present and once again the illustrations are precise in emphasising or elucidating a concept. This section comprises four chapters which consider Etiology, Signs and Symptoms, History and Examination and Diagnosis. There are some 150 pages filled with these descriptions and discussions.

Part Three moves into Treatment and there is evident an overt intention to link therapeutic approaches with the underlying etiology. In the approximate 150 pages devoted to Treatment there is a depth of consideration given to all the varied approaches to management of this vexacious problem. Considerable space is afforded to concepts of myofunctional therapy and guiding the patient in conservative programmes of self directed treatment. Chapter 16 includes several highly valuable flow charts detailing the treatment sequences and options applicable to the different classes and subclasses of the affliction. Once again it is apt to have Okeson quote Okeson: “The complexity of TMD makes developing a cookbook impossible, even though that is precisely what everyone would like. Here is an attempt.”

Part Four takes a separate view by considering only the options offered by Occlusal Therapy. This is a shorter contribution but most relevant to the dentist seeking guidance on whether occlusal adjustments are appropriate and in which category of patient. Here appears analyses of functional movements, here are descriptions of managing the interferences and here are some presentations of the techniques of jaw tracking by electronic systems. Of course recognition is emphasised that Occlusal Therapy will not solve all TMD difficulties.

The extensive referencing will be invaluable to serious students of the joint. It may be relevant that most of the more recent references are reflected in the later sections of the book, giving an indication of how the emphasis has been in contemporary times focussed on diagnosis and therapy.

This is a book for the shelves of every practitioner who has grappled with the problem….. which is a very real difficulty for those who suffer TMD in all its varied manifestations. It is a book which will quite frequently be consulted. If the precise answer is not there, excellent guidance will be, pointing in the most apposite direction.
Cardiac implantable electrical devices (CIEDs), which include pacemakers (PMs) and implantable cardioverter defibrillators (ICDs), are electronic appliances that are capable of analyzing the heart’s rhythm and regulating cardiac arrhythmia through an electrical stimulus.¹ These devices are typically placed subcutaneously, through a surgical procedure, in the left infraclavicular region and are connected by flexible electrode leads via the subclavian vein.¹ In spite of the fact that present-day CIEDs possess protective mechanisms that recognize and filter most interference, some electromagnetic currents could temporarily affect their function.

Dental practice frequently involves the use of sophisticated electronic and electromagnetic equipment within the oral cavity. The proximity of the lower third of the face to the infra-clavicular region, where CIEDs are usually implanted, could augment the risk of interference in their function.¹ The increased number of patients with CIEDs has made it necessary to establish a consensus concerning their compatibility with certain electronic instruments employed in the field of clinical dentistry.¹ Lahor-Soler¹ and colleagues (2015) reported on an in vitro study that sought to examine the behaviour of CIEDs under the influence of electronic and electromagnetic equipment employed in the field of dentistry.

MATERIALS AND METHODS
For inclusion, all electronic dental instruments tested in the study were required to possess the capacity to generate electrical or electromagnetic fields derived from their mechanisms of action. In addition, manufacturers had contraindicated their use in patients with cardiac implantable electrical devices.

The following equipment was included in this study: an electrosurge (XO Odontosurge); an electric pulp tester (Denlux B 1000 Pulppen); an ultrasonic piezoelectric dental scaler (Satelec Suprasson P5 Booster); and an electronic apex locator (Morita Root ZX); and the osseointegration monitoring tools, Periotest M and Osstell ISQ.

Three different types and manufacturers of pacemakers (PMs) and implantable cardioverter defibrillators (ICDs) were included in this study. The study was performed with a simulated model made of Forex, a plastic derived from expanded polyvinyl chloride (PVC). The model reproduced a number of life-size anatomic structures of reference, such as the thorax, neck, and lower jaw. It was filled with a solution of 0.4% saline in order to obtain an electrical impedance similar to that of the human body. The CIEDs were placed with their electrode leads in positions corresponding to where these leads would be placed in vivo.

The following variables were taken into consideration: application distance (dA) and application time (tA) of the instruments; dental equipment type; the type and manufacturer of the CIEDs; and the state of the insulation of the electrode leads of the CIEDs: normal (nI) vs. deteriorated (dI).

The dental equipment was set at pulse mode – on/off – in the tests with the variable application distance (dA) in order to test the most critical phases of the CIEDs that occur when these devices are switched on and off. In the tests with the variable application time (tA), the instruments were continuously set at the ‘on’ mode. In all testing the dental equipment was set at maximum potency and the CIEDs were programmed to maximum sensitivity mode.

A positive control – direct contact of an electrosurge with a CIED – which always induced electromagnetic interference, was established. The negative control corresponded to the normal functioning of the CIEDs, as reflected in their corresponding electrocardiography register.

The experiments with the variable dA were performed with electrode lead insulation in normal (dAnI) and deteriorated (dAdI) conditions. There was continuous application of the instrument for 10s at 20cm from the pacemaker and
implantable cardioverter defibrillator. In the tests where electromagnetic interference was observed, the time period of application was increased to 60s.

Data from each test were registered as binary, according to whether or not interference was produced, the class of electromagnetic interference, and its category (degree of severity). For the PMs/ICDs, the electromagnetic interference categories were: electrical noise, electrical reset, deprogramming, and short- and long-lasting stimulation inhibition. Inappropriate discharge was considered as electromagnetic interference exclusively for the ICDs and was a consequence of a false signal incorrectly interpreted as an arrhythmia. Classification of the severity of the observed interference was determined by an electrophysiologist with respect to possible clinical repercussions: absence, no interference; light, electrical noise or reset; moderate, deprogramming; severe, short-lasting stimulation inhibition (<3 pacings); and very severe, inappropriate discharge and long-lasting stimulation inhibition (>3 pacings).

RESULTS

During analysis of the dental instruments, all, at some time, showed the capacity to induce electromagnetic interference in the CIEDs. With respect to the severity of the interference, significant differences were observed among the different instruments tested (P < 0.001). In the light and moderate categories the greatest amount of electromagnetic interference was triggered by the electrosurge. In the severe category, however, it was the electric pulp tester that caused the most electromagnetic interference.

With respect to the application distance (dA), the quantity of interference induced in the CIEDs was statistically significant for all the dental equipment (P < 0.001).

For the ICDs, the electric pulp tester and ultrasonic piezoelectric dental scaler displayed significant differences in the amount of electromagnetic interference induced according to the distance of application (P < 0.001) and (P = 0.002), respectively. The electronic apex locator, electrosurge, Osstell ISQ, and Periotest M did not, however, present significant differences for this variable (P > 0.05).

The greatest amount of electromagnetic interference was produced 1cm from the area where the electrode lead insulation had deteriorated (1cm Fx) (P < 0.001)

In the case of pacemakers (PMs), the electric pulp tester (P < 0.001), Osstell ISQ (P=0.001), Periotest M (P=0.003), and ultrasonic piezoelectric dental scaler (P=0.005) displayed significant differences in the amount of electromagnetic interference induced, according to the distance of application. A significantly greater quantity of electromagnetic interference was associated with a distance of 1cm from the electrode tip (1cm ET) (P < 0.001) However, the electronic apex locator and electrosurge did not present significant differences for this variable (P>0.05).

The distance between the CIED, located in the infraclavicular region, and the oral cavity is generally about 20cm. At this distance only two electric noises (electromagnetic interference light category), which were induced by electrosurge, were reported in PMs. For the ICDs, 24 electric noises were observed (electromagnetic interference light category), which were induced by various dental instruments.

In the analysis of application time (tA), it was observed that lengthening the time from 10 s to 60 s did not modify the amount of electromagnetic interference for any of the CIEDs (P = 1.000), a result that was reported for both normal (P = 1.000) and deteriorated (P = 1.000) electrode lead insulation.

In the analysis of the type of CIED variable with respect to interference and its degree of severity, overall the ICDs experienced the greatest amount (P < 0.001) and the largest number of electromagnetic interferences in the category light (P < 0.001). The PMs, however, displayed the greatest amount of moderate and severe interference (P < 0.001).

In the analysis of the variation in the integrity of the electrode lead insulation (normal vs. deteriorated), a statistical significance was globally observed in the number of interferences (P < 0.001), with higher electromagnetic interference values when the insulation was deteriorated.

CONCLUSIONS

The results show that at a clinical application distance (20cm), the electronic dental equipment tested provoked only light interference (electrical noise) in the CIED examined, irrespective of manufacturer. Therefore, the researchers concluded that the dental instruments analyzed in the study may be used in clinical dentistry for patients with PMs and ICDs.

IMPLICATIONS FOR PRACTICE

Dental instruments do cause interferences on cardiac implantable electrical devices (CIEDs). Cardiac patients should be informed about the small risk of interference when having dental treatment.

Reference

2. Endodontic re-treatment: clinical comparison of reciprocating systems versus rotary system in disinfecting root canals


As occasionally happens with any dental procedure, a tooth that has undergone root canal treatment may not heal as anticipated after initial treatment for a variety of reasons, which results in infection not being cleared or a recurrence of infection, often presenting as an apical periodontitis. It is known that chemomechanical procedures are unable to promote an optimal disinfection of the root canal systems. Thus other modified systems that are designed to shape the root canal completely from start to finish with one single file, e.g., the Reciproc (VDW) and WaveOne (Dentsply Maillefer) reciprocating systems have been introduced. However, evidence on their cleaning and disinfecting abilities is only now emerging.

Rotary Shaping instruments are replacing the conventional hand file systems with the promise of enhancing the ability to shape the canal, and reducing clinical mishaps like blocks, ledges, transportations and perforations. When the clinician masters the “method-of-use” protocols of rotary shaping instruments, unpredictable file breakage, metal fatigue, loss of cutting efficiency, variation in length, diameter and curvature of the canal can be avoided and better shaping of the canals with a desired taper will be achieved. There are various rotary shaping instruments that are available on the markets. The concepts, strategies and techniques for successful use are not unique to any one system; they generally apply to all NiTi rotary systems regardless of their brand names or geometries. Most widely used rotary NiTi instruments are: Profile system GT, Profile .04 .06 taper, Protaper, Quantec series, Light speed, Hero 645, k3 file series, etc.

No clinical study has compared the ability of single-file instruments to rotary systems in the disinfection of endodontically treated teeth. Martinho and colleagues (2015) reported on a clinical study that sought to compare the effectiveness of single-file reciprocating systems and rotary systems in removing endotoxins and bacteria in endodontic retreatment.

MATERIAL AND METHODS

Thirty teeth in thirty patients in need of endodontic retreatment were selected. All the teeth had previously been root-filled and showed radiographic evidence of apical periodontitis. The pulp chambers had no visual communication with oral fluid such as would be caused by extensive decay or a failure in restoration. A detailed medical and dental history was obtained from each patient. None of the patients evaluated presented periodontal disease. Teeth that could not be isolated with rubber dam were excluded. Patients who had received antibiotic treatment during the last three months or who had undergone root canal treatment in the last two years were excluded from the study. Samples were collected from the final 30 single-rooted teeth.

Files, instruments, and all materials used in this study were treated with Coγ radiation (20 kGy for 6h) for sterilization and elimination of pre-existing endotoxins. The crown and surrounding structures were disinfected with 30% H2O2 (volume/volume for 30s), followed by 2.5% NaOCl for the same period of time and then inactivated with 5% sodium thiosulfate. The sterility of the external surfaces of the crown was checked by taking a swab sample from the crown surface and streaking it onto blood agar plates, which were then incubated both aerobically and anaerobically.

A two-stage access preparation was performed. The access cavity was made without the use of water spray but under manual irrigation with sterile/endotoxin-free saline and by using a sterile/endotoxin-free high-speed diamond bur. In the second stage, before the pulp chamber was entered, the access cavity was disinfected. Sterility was checked by taking swab samples of the cavity surface and streaking them onto blood agar plates with subsequent incubation at 37°C under both aerobic and anaerobic conditions.

A new sterile pyrogen-free bur was used under irrigation with sterile/endotoxin-free saline to access the canal. In order to achieve the full length of the canal for the first microbiological and endotoxins samplings [8], a K-file (Dentsply) pathway was used through root-filling materials into the full length of the canal—determined by the pre-operative radiograph. The first endotoxin sampling was taken by introducing sterile/a pyrogenic paper points (Dentsply Maillefer) into the full length of the canal, which was determined radiographically, and retained in position for 60s for sampling. This sampling procedure was repeated with three paper points that were pooled in a sterile tube containing 1-mL Viability Medium Göteborg Agar III (VMGA III) transport medium for microbial cultivation.

After the pulp chamber had been accessed and the first endotoxin sample had been secured, the patients were randomly divided into three groups: WaveOne (Dentsply Maillefer) (n = 10); Reciproc instrument (VDW) (n = 10), and ProTaper Universal Retreatment system (Dentsply Maillefer) (n = 10). After the first endotoxin sampling, the root canal length was determined from the pre-operative radiograph and confirmed using an apex locator (Novapex). The root canals were then prepared with a standardized procedure within each group according to the allocated instrumentation.

All instruments were set into permanent rotation with a 6:1 contra-angle handpiece (Sirona, Bensheim, Germany) powered by a torque-limited electric motor. Irrigation was performed with disposable syringes and 30-G NaviTip needles (Ultradent) by using 5mL 2.5% NaOCl solution between the pecking sequences (WaveOne and Reciproc groups) and between files (ProTaper).

After instrumentation, the NaOCl was inactivated with 5-mL sterile 0.5% sodium thiosulfate during a 1-min
Antibacterial activity of a mouthwash on oral biofilm: essential oils vs. 0.2 % chlorhexidine


Listerine® and Corsodyl® are popular mouthwashes on the South African market. Listerine® contains a fixed combination of four essential oils (EO) as the active ingredients (thymol 0.042%, eucalyptol 0.092%, methyl salicylate 0.060%, menthol 0.064%). EO kills microorganisms by disrupting their cell walls and inhibiting their enzymatic activity. They prevent bacterial aggregation, slow down bacterial multiplication, and extract endotoxins.

In oral applications, chlorhexidine binds to the mouth tissue, oral mucosa and teeth. It is then released over time to kill bacteria and fungi. This helps to reduce the bacterial count and prevents dental plaque. It has become the gold standard in dentistry due to its ability to adhere to soft and hard tissue and maintain a potent sustained release.

Recognizing that biofilm bacteria may be ten to 1,000 times more resistant to antimicrobial agents than planktonic cells, a more predictive assessment of mouthwash efficacy may be better achieved with biofilm tests. Studies have been performed on the activity of essential oils on oral biofilm, both in vitro and in situ. The latter have greater value when establishing the antiseptic efficacy of several mouthwashes since their activity is tested under in vivo clinical conditions.

There are few studies in the literature in which the effects of essential oils on in situ undisturbed plaque-like biofilm (PL-biofilm) have been measured by applying confocal laser scanning microscopy (CLSM) together with bacterial vitality techniques. Quintas and colleagues (2015) reported on a study that sought to evaluate the in situ antibacterial activity of an essential oil mouthwash on undisturbed de novo PL-biofilm up to 7 h after its application using CLSM and a dual-stain fluorescence solution.
METHODS

This was a randomized, double-blind, crossover study of the antibacterial efficacy of essential oils on an in situ model of PL-biofilm growth. The study group was composed of 15 systemically healthy adult volunteers between 20 and 45 years old and who presented a good oral health status: a minimum of 24 permanent teeth with no evidence of gingivitis or periodontitis (community periodontal index score = 0) and an absence of untreated caries at the beginning of the study. The following exclusion criteria were applied: smoker or former smoker, presence of dental prostheses or orthodontic devices, antibiotic treatment or routine use of oral antiseptics in the previous three months, and presence of any systemic disease that could alter the production or composition of the saliva. Professional tooth cleaning was performed on all volunteers before starting the study.

An individualized splint of the lower arch was created for each volunteer, which was able to hold six glass disks (6mm in diameter, 1mm thickness) and polished at 4,000 grit.

The splints with the glass disks were worn by the volunteers for 48 h to favour growth of the PL-biofilm, withdrawing it from the oral cavity only during meals (it was stored in an opaque container in humid conditions) and to perform oral hygiene procedures, using only mechanical removal of bacterial plaque with water without the use of any toothpaste or mouthwash.

After 48h, the glass disks were withdrawn one by one from the splint from each volunteer (from right to left in a distal–mesial direction) at baseline, 30s, and 1, 3, 5, and 7h after the splint from each volunteer (from right to left in a distal–mesial direction) at baseline, 30s, and 1, 3, 5, and 7h after the application of the antibacterial efficacy of essential oils on an in situ model. The study group was divided into three zones or equivalent layers: outer layer (layer 1), middle layer (layer 2), and inner layer (layer 3).

Quantification of bacterial vitality in the series of XY images was determined using cytofluorographic analysis (Leica confocal software).

RESULTS

The mean Plaque Like-biofilm thickness at baseline was 22.1 μm (range 12–28 μm). Significant differences were not found over time for M-EO (Listerine) with regard to basal thickness. However, for M-0.2 % CHX (Chlorhexidine), lower PL-biofilm thickness values were obtained in comparison to both the basal thickness and the M-EO thickness.

The basal vitality in PL-biofilm was 73.6 % (44–94 %). The M-WATER mouthwash did not have any significant effect on PL-biofilm vitality compared with the basal level. The results after M-0.2 % CHX and M-EO showed significant differences compared with their respective basal levels from 30 s after mouthwash use to 7 h later. In comparison with the values obtained, 30 s after M-0.2 % CHX and M-EO, a significant recovery of the bacterial population was observed in the later PL-biofilm samples (after 3 and 5h, respectively). Comparing M-0.2% CHX and M-EO, M-EO presented lower percentages of bacterial vitality up to 7h after application, obtaining significant differences from 1 to 5h post-mouthwash.

In comparison with M-WATER, the prevalence of live bacteria was significantly lower in the three biofilm layers in all the biofilm samples taken after M-EO (p < 0.05 in all comparisons). In comparison with M-0.2% CHX, the prevalence of live bacteria was significantly lower in the middle and inner layers from 1 h after mouthwash use to 7h later.

CONCLUSION

A single application of essential oil mouthwash presents high antibacterial immediate activity and penetration capacity in situ and substantivity which lasts for at least 7h after its application over de novo biofilm. These results are better than those observed with 0.2 % chlorhexidine under the same conditions.

IMPLICATIONS FOR PRACTICE

This study provides evidence of the efficacy of both mouth washes using an in situ model. Clinicians should note that clinical trials are the gold standard in treatment decision making as regards which product is superior.

Reference

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CPD Questionnaire

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

GENERAL
Assessment of an audit-feedback instrument for oral health care facilities in South Africa (p282)
1. Identify the incorrect statement:
   The Audit-Feedback Instrument for oral health care facilities:
   a. was developed as a tool which would contribute to safer health care facilities
   b. took into account the high caries rate in South Africa
   c. Focussed on eleven key areas
   d. Revealed that the majority of dental care facilities rated poor or unacceptable
   e. Revealed that the most neglected focus areas in this study were Administrative controls and Air-waterlines management.

2. How many facilities achieved Target Blue (Acceptable) in at least one Focus Area?
   a. Five
   b. Three
   c. Eight
   d. Seven

3. An overall rating of Close to Target was achieved by how many facilities?
   a. Fifteen
   b. Six
   c. One
   d. Eleven

4. Those completing the Audit Feedback Instrument considered the presentation to be too simplified.
   a. True
   b. False

5. Pterygomandibular ankylosis: a report on two cases (p 290)
5. Pseudoankylosis of the temporo-mandibular joint is a persistent restricted mandibular hypomobility resulting from a pathologic condition which does not affect the joint itself.
   a. True
   b. False

6. A common form of pseudoankylosis is fusion of the coronoid and zygomatic bones.
   a. True
   b. False

7. The surgical release of pterygomandibular bony fusion achieves complete recovery without any supportive physiotherapy.
   a. True
   b. False

The knowledge, attitude and practice of edentulous patients attending a dental institute in India regarding care of their dental prostheses (p 294)
8. This study showed that few edentulous patients knew how to avoid food items which could stain their dentures.
   a. True
   b. False

9. There is weak evidence that dentures should be cleaned by a dentist using ultrasonic cleansers to minimize biofilm accumulation over time:
   a. every six months
   b. every three years.
   c. every two years
   d. every year

Medical emergencies in dental practices in South Africa (p 300)
10. Sudden cardiac arrest should be treated by:
    a. CPR
    b. Adrenaline
    c. Defibrillation
    d. Gliceryltrinitrite

11. In Germany 69% of the dentists surveyed felt competent in basic life support.
    a. True
    b. False

12. The ADA recommended that dentists should undergo training:
    a. Every 6 months
    b. Every 12 months
    c. Every 24 months
    d. Every 36 months

13. The percentage of respondents to this study who had an automatic defibrillator was 35.69.
    a. True
    b. False

14. The most frequent medical emergency encountered by the respondents to this survey in the previous 12 months was:
    a. Seizures
    b. Reaction to local anaesthetic
    c. Hyperventilation
    d. Vasovagal syncope
    e. Cardiac arrest
Nitrous oxide/oxygen conscious sedation: clinical safety and usefulness (p 306)

15. In properly administered Conscious Sedation, ventilatory and cardiovascular functions are unaffected,
   a. True
   b. False

16. Identify the incorrect statement:
The term “psychotropic analgesic nitrous oxide (PAN)” refers to;
   a. the use of nitrous oxide in anaesthetic concentrations
   b. the use of nitric oxide in non-anaesthetic concentrations
   c. a technique which utilizes the anxiolytic, anti-stress and mood elevating effects of nitrous oxide.
   d. The use of nitrous oxide in non anaesthetic concentrations.

Maxillo-facial Radiology case book 134 (p 311)

17. Fusiform enlargement of the mandibular canal is a cardinal feature of von Recklinghausen disease?
   a. True
   b. False

18. Malignant transformation does not occur in von Recklinghausen disease
   a. True
   b. False

Clinical Windows (p 314)

19. In the Lahor-Soler et al, study, the electric pulp tester was found to cause the most severe electromagnetic interference.
   a. True
   b. False

20. In the Martinho et al study, regarding bacterial reduction, significant differences were found comparing WaveOne, Reciproc, and ProTaper Universal Retreatment.
   a. True
   b. False

ETHICS
Taking and making decisions for children in dentistry (p 308)

21. Children aged 11 years or older are legally competent to consent to medical treatment without the assistance of their parents or guardians.
   a. True
   b. False

22. The Declaration of Human Rights states that the child must be recognised as a person with the basic rights of all human beings to be free and equal in dignity and rights.
   a. True
   b. False

23. From an ethical perspective, the principle of autonomy requires the dentist to:
   a. “Tell the truth”
   b. “Respect the privacy of others”
   c. “Protect confidential information”
   d. “Obtain consent for interventions with patients”
   e. All of the above

24. It is not necessary for health care practitioners to always regard concern for the best interests or well-being of their patients as their primary professional duty.
   a. True
   b. False

25. National Health Act of No. 61 of 2003 requires that the following information be given to the patient:
   a. Range of diagnostic procedures and treatment options available
   b. Benefits, risks, costs and consequences associated with each option
   c. User’s right to refuse care, in which case the dentist should explain the implications, risks and obligations of such refusal
   d. Furthermore, this information must be provided in a language that the patient understands and in a manner that takes into account the patient’s literacy level.
   e. All of the above
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