

Spekboom (Aka Pork Bush, Elephant Bush, Dwarf Jade)

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What makes a spekboom special is its uses. This wonder plant can alleviate skin conditions, quench thirst, treat mouth sores, increase a mother's milk supply and be used in construction.



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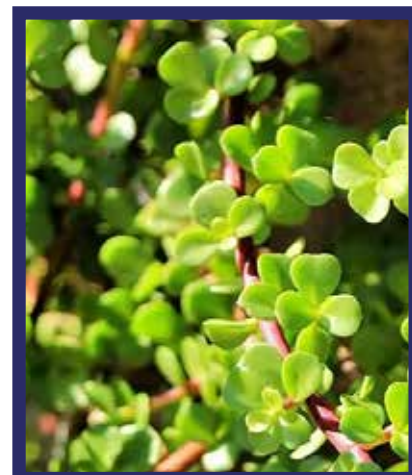
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Addressing the Mental Health of Dental Professionals: A Hidden Crisis in South African Healthcare

SADJ AUGUST 2024, Vol. 79 No.7 p355-358

Prof NH Wood, Managing Editor, SADJ - BChD, DipOdont(MFP), MDent(OMP), FCD(SA), PhD

In recent years, there has been a growing recognition of the critical importance of mental health across all sectors of society. However, within the healthcare profession, and more specifically among dental professionals, the conversation around mental health has often been overshadowed by the pressing demands of the job itself. Dentistry is a profession that inherently carries a high level of stress, driven by the precision required in procedures, the responsibility of patient care, and the frequent exposure to patients' anxiety and discomfort. Despite these challenges, the mental health of dental professionals remains an underexplored and under-supported aspect of the healthcare system, both globally and within South Africa.

The COVID-19 pandemic has further intensified these challenges, revealing the vulnerabilities in the mental health support systems available to healthcare professionals. Dental practitioners have faced unprecedented pressures, from the economic strain of running practices during lockdowns to the increased risk of exposure to the virus in a profession that requires close contact with patients. These factors have not only exacerbated existing mental health issues but have also brought new stressors to the forefront, making it clear that the mental well-being of dental professionals cannot continue to be ignored.

In South Africa, the need to address the mental health of dental professionals is particularly urgent. The profession is characterized by a duality where a significant portion of dental practitioners operate in well-resourced private practices, while others work in underfunded public healthcare settings. Both environments present unique stressors, yet the support systems in place to address these mental health challenges are inadequate. The stigma around mental health, combined with the isolation that many dental professionals experience, further compounds the problem, leaving many to struggle in silence.

This editorial seeks to shine a light on the hidden crisis of mental health among dental professionals in South Africa. By exploring the specific stressors associated with the profession, the mental health outcomes they lead to, and the current gaps in support systems, we aim to advocate for a more comprehensive and proactive approach to supporting the mental well-being of those who are tasked with caring for the oral health of the nation.

Identifying the Stressors in Dentistry

Dentistry is widely recognized as a high-stress profession, with multiple factors contributing to the mental strain experienced by dental professionals. These stressors



are not only inherent to the nature of the work but are also exacerbated by external factors such as economic pressures, professional isolation, and the evolving challenges brought about by the COVID-19 pandemic.

Professional Stressors

One of the most significant stressors in dentistry is the need for precision and perfection in clinical procedures. Dental work often involves intricate, detail-oriented tasks performed in a confined space, under time pressure, and with the expectation of achieving optimal results. The high stakes of dental procedures, where a single mistake can lead to significant patient discomfort or long-term health issues, create a constant source of stress. Additionally, dentists frequently manage patients who are anxious, fearful, or in pain, which can be emotionally taxing and contribute to the cumulative stress load.

Another aspect of professional stress is the physical toll of the job. Dentists often work long hours in ergonomically challenging positions, which can lead to chronic musculoskeletal issues such as back, neck, and shoulder pain. The physical discomfort associated with these conditions can further contribute to the overall stress and mental fatigue experienced by dental professionals.

Economic and Financial Pressures

In South Africa, many dental professionals, particularly those in private practice, face significant economic pressures. Running a dental practice involves managing substantial overhead costs, including equipment, staff salaries, and facility maintenance. The financial burden of these costs is compounded by the need to maintain a steady flow of patients to ensure profitability. Economic downturns, such as those experienced during the COVID-19 pandemic, have led to a decrease in patient visits, further straining the financial stability of dental practices.

For those working in the public sector, economic pressures manifest differently. Public sector dentists often contend with limited resources, inadequate equipment, and high patient volumes, not to mention often-extensive bureaucracy and red-tape which can lead to burnout and job dissatisfaction. The disparities between the public and private sectors in terms of resources and working conditions add another layer of complexity to the stress experienced by dental professionals.

Isolation and Professional Loneliness

Professional isolation is another critical stressor for dental practitioners, particularly those who operate solo practices or work in remote areas. Unlike other healthcare professionals who may work in teams or collaborative environments, many dentists work independently, which can lead to feelings of loneliness and isolation. This lack of professional support and camaraderie can exacerbate stress and contribute to mental health issues such as anxiety and depression.

The isolation experienced by dental professionals is further intensified by the stigma surrounding mental health within the profession. There is often a reluctance to seek help or discuss mental health challenges due to fears of being perceived as weak or incapable. This stigma, combined with the isolation of the job, creates a situation where many dental professionals suffer in silence, without the support they need.

The stressors faced by dental professionals in South Africa are multifaceted, involving a combination of professional demands, economic pressures, and the isolating nature of

the work. These stressors not only affect the mental health and well-being of dentists but also have implications for the quality of care they provide to their patients. Understanding these stressors is the first step in addressing the mental health crisis within the profession and creating a more supportive and sustainable work environment for dental practitioners.

Mental Health Outcomes

The cumulative stressors inherent in the dental profession often lead to significant mental health challenges, which, if left unaddressed, can have severe consequences for both the practitioners and their patients. The most prevalent mental health outcomes empirically reported among dental professionals include burnout, anxiety, depression, and, in extreme cases, an increased risk of suicide.

Burnout

Burnout is a psychological syndrome that arises from chronic workplace stress that has not been successfully managed. It is characterized by three primary dimensions: emotional exhaustion, depersonalization, and a reduced sense of personal accomplishment. Among dental professionals, burnout is particularly common due to the high demands of the job, the need for precision, and the emotional toll of managing patient expectations and anxieties.

Research indicates that burnout among dental professionals is not only widespread but also underreported. Many dentists experience symptoms of burnout, such as fatigue, cynicism, and feelings of inefficacy, which can severely impact their ability to provide quality care. Burnout also contributes to a decline in job satisfaction, leading to higher rates of turnover and early retirement within the profession.

Anxiety and Depression

Anxiety and depression are other common mental health outcomes observed in dental professionals. The high-pressure environment of dental practice, combined with the financial and operational challenges of running a practice, contributes to elevated levels of stress and anxiety. Dentists often face fears of litigation, concerns about patient satisfaction, and the burden of maintaining high standards of care, all of which can exacerbate anxiety.

Depression is closely linked to the chronic stress experienced in the profession. Symptoms of depression among dental professionals may include persistent sadness, loss of interest in work, changes in sleep and appetite, and feelings of hopelessness. Unfortunately, the stigma surrounding mental health in the dental field often prevents practitioners from seeking help, leading to untreated depression and further deterioration of mental health.

Suicide Risk

One of the most alarming mental health outcomes in the dental profession is the increased risk of suicide. Studies have shown that dentists have a higher suicide rate compared to the general population and other medical professionals. This heightened risk is attributed to several factors, including the isolating nature of the job, access to means, the high levels of stress and pressure, and the stigma associated with seeking mental health support. The issue of suicide among dentists is complex and multifaceted, often involving a combination of professional, personal, and psychological factors. The reluctance to discuss mental health issues, coupled with the perception of dentists as highly capable and resilient, contributes to a dangerous culture of silence that can have tragic consequences.

The mental health outcomes associated with the stressors in the dental profession are severe and far-reaching. Burnout, anxiety, depression, and the increased risk of suicide are not only detrimental to the individual well-being of dental professionals but also to the overall quality of care they provide. Addressing these mental health outcomes requires a concerted effort to reduce the stigma around mental health, provide accessible support systems, and create a more supportive work environment for dental professionals.

Current Mental Health Support Systems

Despite the clear need for robust mental health support systems for dental professionals, the existing frameworks in South Africa fall short of adequately addressing these needs. The mental health support currently available to dental practitioners is often fragmented, underutilized, and marred by significant barriers, including stigma and a lack of awareness.

Existing Support Mechanisms

In South Africa, some mental health support is available to dental professionals through employee assistance programs (EAPs), professional counselling services, peer support networks, and private professionals offering support services. Larger dental practices or hospital settings may offer EAPs that provide access to counselling and mental health resources. These programs typically offer confidential services that include short-term counselling, stress management workshops, and referral to specialized mental health services if needed.

Professional organizations, such as the South African Dental Association (SADA), also play a role in offering support to their members. SADA has provided resources and guidance on managing stress and maintaining mental health, particularly during crises like the COVID-19 pandemic. They have been instrumental in advocating for the mental health needs of dental professionals and have emphasized the importance of maintaining mental well-being as part of overall professional health.

However, despite these available resources, there are significant limitations. The effectiveness of EAPs is often limited by low awareness among dental professionals and the stigma associated with seeking help. Moreover, these programs are not universally accessible, particularly to those in smaller practices or rural areas. The mental health services provided through professional organizations are often general in nature and may not address the specific stressors unique to the dental profession.

Gaps in Support

One of the most significant gaps in mental health support for dental professionals is the pervasive stigma surrounding mental health issues within the profession. Many dentists fear that admitting to mental health struggles could be perceived as a sign of weakness or professional incompetence. This stigma discourages practitioners from seeking help, leading to untreated mental health conditions that can worsen over time.

Another major gap is the lack of tailored mental health services that specifically address the unique challenges faced by dental professionals. While general counselling services can be beneficial, they may not fully understand the specific pressures of the dental profession, such as the high-stakes nature of clinical work, the isolation of solo

practice, or the financial pressures of running a practice. This disconnect can make it difficult for dental professionals to find the support they need.

There is a need for more proactive mental health support, including preventive measures and regular mental health check-ins, rather than reactive services that only address issues after they have escalated. Preventive mental health care could involve regular workshops on stress management, resilience training, and creating a workplace culture that openly discusses and supports mental health. While there are some existing mental health support mechanisms available to dental professionals in South Africa, they might be inadequate in addressing the specific needs of the profession. The stigma around mental health, lack of tailored services, and gaps in proactive support contribute to a system that is reactive rather than preventive. To truly support the mental health of dental professionals, there needs to be a shift towards more comprehensive, accessible, and stigma-free mental health care, with resources specifically designed to meet the challenges of the dental profession.

Proposed Solutions

Addressing the mental health crisis among dental professionals in South Africa requires a multifaceted approach that tackles both the systemic issues and the specific needs of the profession. The following are proposed solutions aimed at improving the mental well-being of dental professionals and fostering a more supportive and resilient work environment.

1. Enhancing Awareness and Education

The first step in addressing mental health issues in the dental profession is to break down the stigma associated with seeking help. This can be achieved through comprehensive awareness campaigns and education initiatives that emphasize the importance of mental health as an integral part of professional well-being. Dental schools and continuing professional development (CPD) programs should include mandatory training on mental health, stress management, and resilience building. By normalizing discussions around mental health and providing tools for managing stress, the profession can create a more supportive culture that encourages individuals to seek help without fear of judgment.

2. Improving Access to Tailored Mental Health Services

To effectively support dental professionals, there is a need for mental health services that are specifically tailored to the unique challenges of the profession. This could involve the development of specialized counselling services that understand the pressures of dental practice, as well as peer support networks that provide a platform for sharing experiences and coping strategies. These services should be easily accessible, confidential, and promoted actively within the profession. Additionally, telehealth options for mental health consultations could be expanded to reach practitioners in remote areas, ensuring that support is available regardless of location.

3. Creating Proactive Mental Health Programs

Preventive mental health care is crucial in reducing the incidence of burnout, anxiety, and depression among dental professionals. Employers and professional organizations should implement regular mental health check-ins and offer workshops on topics such as work-life balance, time management, and dealing with patient anxiety. Establishing

a routine of mental health care, rather than only responding to crises, can help practitioners manage stress before it escalates. This proactive approach could also include offering mental health days, where professionals can take time off specifically to focus on their well-being without stigma or penalty.

4. Integrating Mental Health into Practice Management

Mental health considerations should be integrated into the management of dental practices. This could involve creating supportive work environments that prioritize the well-being of the entire dental team. For instance, practice owners could implement flexible working hours, ensure adequate staffing to reduce workload, and provide opportunities for professional development that includes mental health training. By fostering a workplace culture that values mental health, practice managers can help reduce the stressors associated with the day-to-day operations of dental practice.

5. Policy Recommendations and Advocacy

At a broader level, there is a need for policy changes that recognize and address the mental health challenges faced by dental professionals. SADA can play a crucial role in advocating for these changes, such as the inclusion of mental health support in health insurance coverage for dental practitioners and the establishment of national guidelines for mental health in the workplace. Additionally, SADA and other organizations should continue to lobby for government support in providing resources and funding for mental health initiatives within the profession.

The mental health of dental professionals is a critical issue that demands urgent and sustained attention. By enhancing awareness, improving access to tailored services, implementing proactive mental health programs, integrating mental health into practice management, and advocating for supportive policies, the dental profession in South Africa can move towards a future where the well-being of its practitioners is prioritized. These solutions not only benefit

the individual professionals but also contribute to the overall quality of care provided to patients, creating a healthier, more resilient healthcare system.

Conclusion

The mental health crisis among dental professionals in South Africa is an urgent issue that cannot be ignored. The stressors inherent in the profession, ranging from the demands of precision and patient management to the economic pressures of running a practice, have led to alarming rates of burnout, anxiety, depression, and even suicide. Despite these challenges, mental health support for dental professionals remains inadequate, hampered by stigma, a lack of tailored services, and reactive rather than proactive care approaches.

Addressing this hidden crisis requires a concerted effort from all stakeholders within the dental community. Enhancing awareness and education about mental health, improving access to specialized support services, and fostering a culture of openness and support are crucial steps in this direction. Moreover, integrating mental health considerations into practice management and advocating for policy changes will help create a more supportive and resilient work environment for dental professionals.

The solutions proposed are not just about addressing the mental health needs of individual practitioners; they are about ensuring the overall sustainability of the dental profession. By prioritizing the well-being of dental professionals, we can enhance the quality of care they provide to their patients, ultimately contributing to a healthier society.

It is time for the dental profession in South Africa to take bold steps toward recognizing and addressing the mental health challenges within its ranks. By doing so, we can transform not only the lives of dental professionals but also the broader healthcare landscape, creating a future where mental health is valued as much as physical health.

NOTICE OF 22nd ANNUAL GENERAL MEETING (AGM) OF The South African Dental Association NPC (“SADA”)

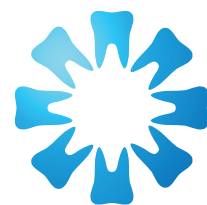
Notice is hereby given that the 22nd 2022 Annual General Meeting of Members (AGM) of The South African Dental Association (SADA) NPC, will be held on **Thursday 26 September 2024** at **18h00**, which will be conducted virtually on this date through Zoom virtual meeting platform or similar digital platform. The agenda together with supporting documents for the meeting will be posted on the SADA website.

SADA is your Association and your voice counts.

KC Makhubele

Chief Executive Officer

August 2024



SADA

THE SOUTH AFRICAN
DENTAL ASSOCIATION

SADA's statement on the High Court ruling against the certificate of needs scheme as proposed by the NHI

SADJ AUGUST 2024, Vol. 79 No.7 P359

Mr KC Makhubele – CEO, South African Dental Association

The South African Dental Association (SADA) welcomes the recent ruling by the Gauteng High Court which declared the certificate of need (CoN) provisions in the National Health Act unconstitutional. This landmark decision, delivered by Judge Anthony Millar on July 24 2024, is a significant victory for healthcare professionals and institutions across South Africa, safeguarding their fundamental rights and freedoms.

The certificate of need scheme

The CoN scheme, detailed in sections 36 to 40 of the National Health Act, aimed to regulate the geographic distribution of private healthcare services. It required all new private health establishments, including hospitals, clinics and private healthcare providers, to obtain a certificate from the Director-General of Health to operate in specific areas. Existing facilities were given a two-year compliance window, with penalties for noncompliance, including fines or imprisonment.

Key findings of unconstitutionality

Expropriation of property and services: The court ruled that the CoN provisions would effectively result in the expropriation of property and services from healthcare providers. By mandating professionals to relocate or limit their practice to certain areas, the government would infringe on the constitutional rights to property and livelihood.

Arbitrary and unfair process: Judge Millar pointed out the lack of procedural fairness in the CoN scheme. The provisions failed to consider the social, professional and financial impacts on healthcare providers, granting the Director-General excessive power to deny or revoke certificates without due consideration of affected parties' rights.

Infringement on personal freedoms: The court observed that the CoN scheme infringed on personal freedoms, including the right to choose where to live and work. Compelling healthcare professionals to work in designated areas was seen as an undue restriction on personal liberty and professional autonomy.

Economic impact and healthcare costs: The judgment highlighted the economic ramifications of the CoN scheme,

noting its potential to deter investment in the healthcare sector. The requirement for a CoN could dissuade investors from establishing new facilities, thereby increasing healthcare costs. The court found no rational connection between the CoN scheme and its intended goal of improving healthcare access.

Public-private partnership coercion: The CoN provisions also included mechanisms that could coerce private healthcare providers into public-private partnerships, sharing resources as a condition for the right to practice. This aspect was deemed an expropriation of services, commandeering private resources for state use without due compensation or voluntary agreement.

A call for constructive engagement and reform

SADA has consistently voiced concerns over the CoN scheme and the broader implementation strategy of the National Health Insurance (NHI) system. In 2015, SADA, alongside the Hospital Association, successfully petitioned the Constitutional Court to set aside the proclamation enacting sections of the National Health Act related to CoN.

The court's recent ruling presents a crucial opportunity for the government to address these concerns. SADA urges the government to engage in transparent and inclusive dialogue with all stakeholders, including professional associations, healthcare providers and the public, to reformulate the NHI Act in a manner that respects constitutional rights and promotes equitable healthcare access.

Our ultimate goal is to develop a healthcare system that balances public health needs with the rights and freedoms of healthcare providers. This includes ensuring that any regulatory measures are fair, rational and justifiable within South Africa's legal and constitutional framework.

SADA remains committed to collaborating with the government and other stakeholders to achieve these objectives. We believe that constructive engagement and a collaborative approach are essential for developing a healthcare system that serves the best interests of all South Africans.

The orthodontic treatment needs in children aged 12-15 years in a school in Khomas, Namibia: A cross-sectional study

SADJ AUGUST 2024, Vol. 79 No.7 P360-366

C Serebe¹, A Harris², F Kimmie-Dhansay³

Orthodontics, Khomas, Namibia, Children, Treatment need, Perceived need, Normative need, Index of Orthodontic Treatment need (IOTN), Modified Dental Health Component, Aesthetic Component.

ABSTRACT

The aim of this study was to determine the orthodontic treatment needs of a population of 12-15 year old school children and to express it as percentages of those subjective and objective orthodontic treatment need over the whole sample population.

There has been a disagreement between normative and subjective need for orthodontic treatment. This is especially true in an African setting.

The aim of this cross-sectional study was to determine the orthodontic treatment needs of a population of 12–15-year-old children attending a school in Khomas, Namibia. The Modified Index of Orthodontic Treatment Need (IOTN), using the Dental Health Component (DHC) and the Aesthetic Component (AC), was used to determine the normative and subjective need for orthodontic treatment respectively.

One hundred and two participants were examined, of which 36.2% were males and 63.7 % were female. The normative need as measured by the DHC was 59.8%. The subjective need was 17.7% and 31.4% as measured by the Child-rated AC (CRAC) and Examiner-rated AC (ERAC) respectively. There were no significant associations between Orthodontic treatment need and gender or age. Although there was a minimal subjective need for orthodontic treatment, there was a relatively high normative need for orthodontic treatment recorded by the researcher. The association between DHC and CRAC revealed that 88.8% of the children shown to have normative need also perceived need according to the CRAC. Of the 70 children with no need for treatment according to Examiner, 91.4% of the children agreed.

In assessing orthodontic treatment need, the normative need was higher than the perceived need. This discrepancy could be due to the IOTN tool not being Afrocentric and thus

overestimating the treatment needs of children. The expert's objective assessment may not always agree with the child's perception of the problem, especially in an African setting.

1. LITERATURE REVIEW

Malocclusion is defined as an irregularity of the teeth or a mal-relationship of the dental arches beyond the range of what is accepted as normal¹. Malocclusion is classified under handicapping dentofacial anomalies by the World Health Organization². According to a global systematic review, the prevalence of malocclusion was 56%³. Prevalence of malocclusion differed according to differences in races/ethnicity, countries, age range of the surveyed children, and setting^{3,5}.

The majority of patients seek orthodontic treatment primarily to improve their aesthetics and self-esteem⁴⁻⁸, with anterior teeth malalignment being the most common presenting complaint⁹. Malocclusion can have a negative impact on patients' oral health related quality of life¹⁰. The need for orthodontic treatment is dependent on how the patient perceives their condition and how much function and aesthetics is affected^{11,12}. Self-perceived and normative need does not always lead to the utilization of service any more than the availability and utilization infers a need^{13,14}. People will seek treatment depending on their difficulty in functional and esthetic concerns¹⁵⁻¹⁸, dissatisfaction with their appearance¹⁵, enhanced self-confidence and patient perceptions of need¹⁶.

Traditionally, the common model of oral health needs assessment depends almost entirely on dental or orthodontic professionals' opinions^{19,20}. Normative need assessment refers to the impairments and diseases which an expert, administrator or scientist defines as need²⁰. A major shortcoming, however, is that wider concepts of general health which consider the incorporation of functional, psychological and social well-being in patient care are not usually accounted for in the normative approach²⁰.

Rather than a disease, it has been shown in most patients that malocclusion is a deviation from a documented average therefore making psychological and social factors integral to the distinction between acceptable and unacceptable occlusion²¹. Self-esteem, peer group norms, previous orthodontic treatment, gender, age, and socio-economic background, are some of the factors that have been seen to affect an individual's perception of dental appearance,

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malocclusion and the readiness to receive and comply with orthodontic treatment²²⁻²⁴.

In assessing orthodontic treatment need, it is best to use an index that is standardized so that comparisons can be done with other populations classified by the same criteria and methods^{25,26}. The Index of Orthodontic Treatment Need (IOTN) is one of the most widely used occlusal indices in epidemiological studies^{27,28}. The IOTN combines aesthetic components and dental health components, namely the Dental Health Components (DHC) and Aesthetic Components (AC)²⁹.

This will be the first time that the prevalence of malocclusion will be studied in Namibia using a tool that was created for a Eurocentric audience.

The aim of this cross-sectional study was to assess the orthodontic treatment needs in a sample population of Namibian school children aged 12-15 years in a school in Khomas.

2. MATERIALS AND METHODS

Ethics approval was sought from BMREC at Ethics committee of University of the Western Cape (Registration number BM18/3/19). Authors confirm that this study was performed in accordance with relevant guidelines and regulations of the Declaration of Helsinki³⁰. Informed consent was taken from all parents/guardians of all included participants and informed assent was taken from all included participants. The Region of Khomas was chosen for this study as it represents a diverse group of children and has the largest population of all regions in Namibia. According to the 2011 census, there are 342,141 people out of the total population of 2,113,077, making it 16%. Therefore, a representative sample could present a diverse view and understanding of malocclusion and perceived orthodontic treatment needs and it also has a diverse socio-economic grouping.

Using a list of schools in the area obtained from the Department of Education's EMIS, (Education Management Information System) a school was selected based on the ethnic diversity primarily found in this school. The inclusion criteria consisted of participants whose parents gave informed consent and who were 12-15-year-olds, in Grades 6-9 were invited to participate (174 children). This particular age range was chosen as malocclusion becomes more prominent at this age and adolescents are more aware of their appearance and it can impact their OHRQoL.

The exclusion criteria were that participants had to not have current or previous orthodontic treatment, had cranio-facial abnormalities, if consent was not obtained from parents or if assent was not obtained from the participant.

Convenience sampling was used to select individuals to participate in the study. Information sheets were provided to the parents and children and written consent was obtained for clinical examination and answering the questionnaires.

In assessing orthodontic treatment need, it is best to use an index that is standardized so that comparisons can be done with other populations classified by the same criteria and methods^{25,26}. The IOTN combines aesthetic components and dental health components, namely the Dental Health Components (DHC) and Aesthetic Components (AC). The

DHC has 5 grades: Grade 1 being "no need for treatment, Grade 5 being "Treatment need" while the grades in between denote varying degrees of malocclusion severity and treatment need.

Grade 1	No treatment
Grade 2	Minor anomaly, no treatment need
Grade 3	Borderline treatment need
Grade 4	Treatment need
Grade 5	Treatment need

The DHC is based on the evaluation of 5 occlusal traits with the acronym MOCDO

- Missing teeth: This includes aplasia, displaced and impacted teeth. Hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for prosthesis.
- Overjet: Includes reverse sagittal overjet. Increased overjet greater than 6mm. Reverse overjet greater than 3.5 mm with no masticatory or speech difficulties. Reverse overjet greater than 1 mm but less than 3.5 mm with recorded masticatory and speech difficulties.
- Crossbite: Anterior or posterior crossbites with greater than 2 mm discrepancy between retruded contact position and intercuspal position.
- Displacement: Contact point displacements greater than 4 mm.
- Overbites: Including Lateral or anterior open bites greater than 4 mm. Deep overbite with gingival or palatal trauma.

The Aesthetic Component (AC) consists of 10 standard reference photographs representing different grades of dental attractiveness (Figure 1). The rating is based on matching the dental appearance of the patient with one of the photographs by the dentist and/or any other non-professional. Grade 1 represents the most attractive and grade 10, the least attractive. Brook and Shaw, 1989.

A rate is awarded for overall dental attractiveness and not necessarily the specific similarities to the photographs. The final value reflects the treatment need on the grounds of aesthetic impairment and by implication of the social psychological need for orthodontic treatment³¹.

The need for treatment is determined as follows:

- Grades 1-2: No need for treatment
- Grades 3-4: Slight need for treatment
- Grades 5-7: Moderate need for treatment
- Grades 8-10: Definite need for treatment

In the Modified IOTN, The AC maintains the same ten-point scale but the recording is simplified in that Grades 1-7 indicate no need for treatment and Grades 8-10 indicate a need for treatment. The Modified IOTN aims to simply identify people in need of orthodontic treatment and not necessarily the complexity of the occlusal anomaly (Carlos Bellot-Arcis, 2012). This in turn improves the reliability and validity of the index³¹.

The objective need for orthodontic treatment was determined by using the Dental Health Component (DHC) of the Modified IOTN. The subjective need for orthodontic treatment was determined by using the Aesthetic Component (AC) of the

Modified IOTN. The Aesthetic Component of the IOTN (AC) was used to capture the subjective orthodontic treatment need (both the child's perceived treatment need CRAC as well as the examiner rated treatment need ERAC). Intra-oral examinations were carried out for the use of the Aesthetic component and the Dental Health component of the IOTN. The examiner was trained and calibrated against two independent competent examiners (kappa statistic was 0.906). Intra-examiner reliability and reproducibility tests were carried out during the examinations to make sure the data remained reliable. Unfortunately, test-retest scores were not recorded.

The study included two questionnaires per family: One to the child being examined to capture demographics and determining their self-assessed need for orthodontic treatment, and one to the child's guardian to determine the socio-economic status of the child. To ensure anonymity, the survey did not contain information that could personally identify the participants. All hard data was securely locked away in a filing cabinet and soft copies kept using password-protected computer files.

The Dental Health Component was used to determine the normative (objective) need for orthodontic treatment as well as to record the presence of malocclusion. The child was asked to sit or to stand in front of the examiner and with the use of natural light the examiner carried out an intra-oral examination of the dentition. No radiographs, study models or previous records were used.

Using the DHC of the modified IOTN, a distinction was made between those individuals with a definitive treatment from those with no definitive treatment need.

Therefore, each child was examined and according to the scale, if one of the conditions described in the DHC of the modified IOTN was found, a 1 was allotted and no further conditions were sought.

The ten-point scaled illustration by a series of photographs rated for attractiveness by a panel of lay judges was used as the tool to determine the felt need. In an effort to avoid bias, a random series of photographs were presented to the children in place of the standard AC pictograph. The child was seated in front of the examiner in natural light and asked to bite on their back teeth and smile for the assessment by the examiner. The examiner then studied the smile and an examiner-rated grade was picked from the 10-point scale and recorded. A rating was allocated for overall dental attractiveness rather than specific similarities to the photographs. This exercise took 1-2 minutes per child.

Each child was asked to fill in a questionnaire; the questions were few and limited to capturing demographics, self-assessed grading according to the AC of IOTN and an opinion on the need for treatment. In the questionnaire, the child was also asked to pick a grade on the scale that they feel best represents their own dental attractiveness.

To obtain information regarding the socio-economic status a questionnaire on education level, location of dental services, receipt of social grants, household amenities and employment status was provided for the guardians to complete.

The relationship between the examiner-rated AC and the child rated AC was analyzed. The relationship of AC

compared to the DHC in the determination of the orthodontic treatment need and various other factors which affected the need for orthodontic treatment were also analyzed.

With a statistical level of confidence of 95%, an expected proportion of 80%, and a precision of 0.05. The sample size was calculated to be 103.

Differences in groups for continuous data were evaluated using a t-test if the data was normally distributed. Differences in categorical data were evaluated using Chi square test. Data analysis was performed using STATA software version 15. A statistical *p* value was set at 0.05 to denote statistical significance.

3. RESULTS

3.1 Demographic Information

There were 174 children in grade 7- 10 that were invited to participate in the study, 102 children and their guardians gave their informed consent. Three participants were excluded because two were currently receiving orthodontic treatment and the other participant was not eligible due to their age. Of the 102 participants, 65 (63.7%) were female and 37 (36.2%) were male.

Table 1: Demographic information of the sample

Variable	Total n (%)
Gender	
Female	65 (63.7)
Male	37 (36.2)
Age	
12	9 (8.8)
13	27 (26.5)
14	40 (39.2)
15	26 (25.5)
Frequency of visits	
0 x annually	60 (58.8)
1-2 x annually	36 (35.3)
More than 2 times annually	6 (5.9)
Highest education level of parent	
Grade 12	6 (5.9)
Certificate	15 (14.7)
Diploma	45 (44.1)
Undergraduate Degree	34 (33.3)
Postgraduate Degree	2 (1.9)
Home	
Own	48 (47)
Rent	40 (39.2)
Lives with family	14 (13.7)
Transport	
Own car	61 (59.8)
Hire a taxi	29 (28.4)
Walks to school	12 (11.7)

The majority (39.2%, n=40) of the study population consisted of fourteen-year-olds (Table 1). More than 58% (n=60) of the sample population do not visit the dentist at least once per year, while only 5.9% (n=6) visited the dentist more than twice per year. Ninety-four percent (n=96) of the guardians who returned the questionnaire were employed. More than 87% (n=89) of the guardians did not receive any form of social grant while 12.8% (n=13) received some form of social grant.

All of the participating guardians had some basic education. The majority, 44.1% (n=45) were diploma holders while only 1.9% (n=2), were in possession of postgraduate degree. undergraduate degrees, certificate holders and Grade 12 holders made up 33.3% (n=34), 14.7% (n=15), and 5.9% (n=6) of the sample respectively.

All the participants were shown to have electricity and piped water in their homes. 59.8% (n=60) of the guardians owned cars, 28.4% (n=29) hired a taxi (rented a car) to take their children to school while 11.7% (n=12) of the children walk to school.

As far as housing is concerned, 47% (n=48) lived in their own home, 39.2% (n=40) rented a home and 13.7% (n=14) lived with family.

Age

The highest number of children (39.2%, n=40) who participated were 14-year-olds and this age group had the highest number of children in definite need for treatment objectively. There was no statistically significant association between age and DHC (p=0.528) (Table 2).

There was no statistically significant association between Age and CRAC, $p = 0.846$. There was also no statistically significant relationship between ERAC and age (p=0.081).

Sex

Although 39 (60%) of the 65 females and 22 (59.4%) of the 37 males were identified as having definite need for treatment, there was not a statistically significant association between DHC and Gender (p=0.957). There was no statistically significant association between Gender and CRAC, p=0.296.

Dental Visits

It was found that the children who visited the dentist more than once a year had a very low need for treatment according to the DHC of the modified IOTN. There was no statistically significant association between DHC and visits, $p = 0.439$. The children who visited the dentist more than once per year were shown to perceive their need for treatment as lower than those who visited the dentist less or not at all. There was no statistically significant association between Visits and CRAC, $p = 0.828$.

Socio-Economic factors

Employment

DHC and Employment

Just over 57% (n=55) of the children whose parents were employed were shown to have a definite need for treatment according to the DHC. There was a statistically significant relationship between employment status and DHC need (p=0.041) (Table 3)

Table 2: DHC (Dental Health Component), ERAC (Examiner Aesthetic Component) and CRAC (Child Aesthetic Component) and the demographic variables

		CRAC			DHC			ERAC		
		Need	No need		Need	No need		Need	No need	
Age	12	1 (11.11)	8 (88.89)	0.846	7 (77.78)	2 (22.22)	0.528	6 (66.67)	3 (33.33)	0.081
	13	6 (22.22)	21 (77.78)		17 (62.96)	10 (37.04)		9 (33.33)	18 (66.67)	
	14	6 (15)	34 (85)		24 (60)	16 (40)		12 (30)	28 (70)	
	15	5 (19.23)	21 (80.77)		13 (50)	13 (50)		5 (19.23)	21 (80.77)	
Gender	Female	10 (15.38)	55 (84.62)	0.296	39 (60)	26 (40)	0.957	19 (29.23)	46 (70.77)	0.537
	Male	8 (21.62)	29 (78.38)		22 (59.46)	15 (40.54)		13 (35.14)	24 (64.86)	
Employed	No	1 (16.67)	5 (83.33)	0.715	6 (100)	0 (0)	0.041*	4 (66.67)	2 (33.33)	0.076
	Yes	17 (17.71)	79 (82.29)		55 (57.29)	41 (42.71)		28 (29.17)	68 (70.83)	
Grant	No	15 (16.85)	74 (83.15)	0.412	51 (57.3)	38 (42.7)	0.148	25 (28.09)	64 (71.91)	0.062
	Yes	3 (23.08)	10 (76.92)		10 (76.92)	3 (23.08)		7 (53.85)	6 (46.15)	
Visits	Never	11 (18.33)	49 (81.67)	0.828	35 (58.33)	25 (41.67)	0.439	16 (26.67)	44 (73.33)	0.221
	At least once	7 (16.67)	35 (83.33)		26 (61.9)	16 (38.1)		16 (38.1)	26 (61.9)	
Total		18 (17.65)	84 (82.35)		61 (59.8)	41 (40.2)		32 (31.37)	70 (68.63)	

More than 82% (n=79) of the children whose parents were employed did not perceive need for treatment for their own dentition. There was no statistically significant association between Employment and CRAC, $p = 0.715$.

Grant

Ten (77%) of the 13 children whose parents receive a grant were found to have need for orthodontic treatment while only 3 (25.7%) of the children whose parents do not receive a grant were found to have a need for treatment (Table 3). However, there was no statistically significant association between DHC and Grant, $p=0.148$

Of the 89 guardians who did not receive grant 74 (83.1%) of their children did not perceive a need for treatment. On the other hand, 23.1% of the 13 who receive a grant perceive a treatment need. However, there was no statistically significant association between CRAC and grant, $p = 0.412$.

Dental Health Assessment

Dental Health Component (DHC), ERAC (Esthetic Component) and CRAC (Child Aesthetic Component) Of the 102 participants, 59% (n=61) presented a definite need for orthodontic treatment (DHC). More than 17% (n=18) of the 102 participants found that they had a need for orthodontic treatment (CRAC). 31.4% (n=32) were found to have need for orthodontic treatment according to the AC grade chosen by the examiner (ERAC) (Table 2).

Of the 68.6% (n=70) who do not need treatment according to the examiner, 76.2% (n=64) of the children were in agreement (Table 3).

There was a statistically significant association between CRAC and ERAC, $\chi^2(1) = 12.65, p < 0.001$.

Aesthetically, the examiner recorded 31.3% (n=32) in need of treatment according to the ERAC of the IOTN (Table 3). Of the 32 children who were shown to be in need of orthodontic treatment by the ERAC, 30 (49.18%) were in agreement according to the objective DHC ($p < 0.001$) (Table 3).

Thirty-nine (95.12%) participants who did not show need according to DHC, also did not perceive need for treatment aesthetically ($p=0.004^*$) (Table 3).

4. DISCUSSION

There was a low CRAC for the sample, but a reasonably high DHC component. This shows that the modified IOTN

may not be the most ideal tool to detect treatment need in an African setting. What may appear to be a “normal” occlusion for a child (CRAC) may not necessarily be the same for an examiner (ERAC) or by the normative (DHC) assessment. This could be due to the skewed determination of a normative assessment of occlusion, which is more suited for a non-African setting. Malocclusion for an African setting may include diastemas, bimaxillary protrusion, cres and open bites, which are all not included in the modified IOTN. The other reasons that the CRAC was much lower than the DHC and ERAC could be because of cultural perceptions of beauty. Community members tend to resemble one another and certain characteristics such as diastemas may be common and seen as a sign of wisdom or even attractive ³². Therefore, a non-community member may view a somewhat “normal” appearance of a population and deem it an abnormality. When in fact, it is a culturally accepted form of beauty ³³.

Dental aesthetics in communities where health is not prioritized, would not necessarily view malocclusion as a “problem”. Poorer communities may experience more health-related issues. Factors such as education, age, employment status and dental visitation frequency may affect the awareness and perception of dental aesthetics. However, in this sample education, age, employment status or dental visitation frequency had no impact on CRAC or ERAC.

The findings in this study are consistent with those of Siddiqui et al (2014) who concluded that the patient and orthodontist tend to perceive patient malocclusions as more aesthetically pleasing. In a study on South African children ³⁴, 81.7% of the children graded themselves aesthetically pleasing with only 6.9% showing a definite need for orthodontic treatment. Similarly, the Examiner rated AC showed that 25.2% were in definite need for treatment while 56.2% fell into the “no to slight need for treatment” category. In a Nigerian study, 65 % were found to have no need for treatment according to the AC of the IOTN ³⁵. This finding reinforces our study’s results that malocclusion using a modified IOTN would not accurately describe the CRAC of African children.

Like this study, others found a lack in significance statistically between the two genders ³⁶. They found that gender did not play a significant role at all in perception of orthodontic need and treatment uptake ^{37,38}. The normative need for orthodontic treatment, on the contrary, was shown to be higher in men than in women ^{36,37}.

Table 3: DHC (Dental Health Component) VS ERAC (Examiner Aesthetic Component) VS CRAC (Child Aesthetic Component)- a correlation analysis

		ERAC			DHC			CRAC		
		Need	No need		Need	No need		Need	No need	
CRAC	Need	12 (66.67)	6 (33.33)	0.001*	16 (88.89)	2 (11.11)	0.004*			
	No need	20 (23.81)	64 (76.19)		45 (53.57)	39 (46.43)				
DHC	Need	30 (49.18)	31 (50.82)	<0.001*				16 (26.23)	16 (73.77)	0.004*
	No need	2 (4.88)	39 (95.12)				2 (4.88)	2 (95.12)		

With regards to gender, other studies done in South Africa, Kenya and Tanzania^{34,39,40} had similar results. Some studies have shown females to be more critical of their dental appearance⁴¹⁻⁴³, while others concluded that males were more likely to seek orthodontic treatment than females (Otuyemi 1995,^{36,37}.

Body image perception differs with age. Adolescents and younger adults are more conscious and have higher expectations than children though they may be unwilling to undergo treatment⁴⁴. By age 12, a child's dentition consists of permanent teeth and most or all the primary teeth have been shed therefore it is usually at this age that orthodontic treatment is initiated^{45,46}. Similarly, by this age, the child has reached the stage in which they develop new tools for abstract and deductive thinking^{47,48}. This further emphasizes this age group as an attractive target for research in dentistry particularly orthodontics because of body image and self-perception⁴⁹. In this study age was not associated with CRAC, DHC or ERAC.

Socio-economic backgrounds influence orthodontic treatment need because the education, access, availability and affordability vary in different socio-economic groups, with the higher end usually more advantaged.

The modified IOTN has been used in various studies across the world to assess Orthodontic treatment need. In a South African study, Rampersadh (2015) found that the normative need for orthodontic treatment was higher than the patient's self-perceived need (child rated AC), and also lower than the examiner's perceived need (examiner rated AC)³⁴.

5. CONCLUSION AND RECOMMENDATIONS

There was a discrepancy between the CRAC, ERAC and DHC. From this we can conclude that there is a general need for orthodontic treatment even though the general perception by children and the examiner says otherwise. Therefore, there is a need for dialogue with regards to treatment needs and expectations between the child, guardian and orthodontist before treatment starts to ensure that the child understands and a good outcome is realized.

Also significant is the high need for orthodontic treatment objectively despite being in a middle to high socioeconomic status. It shows that there is a lack of awareness of malocclusions and as such the need for orthodontic treatment.

Based on the results of this study, a recommendation can be made that a large-scale survey on malocclusion prevalence and orthodontic treatment needs be carried out. Of significance would also be the creation of an awareness campaign on orthodontic treatment especially for those that have the need.

Considering the ERAC and CRAC were similar in their assessment with the greater percentage showing no need for treatment, it would be valuable to modify the index to include subjects with common African features, which may seem normal but are actually malocclusions.

Limitations to the study were:

Guardians who did not give consent to the children at all or in time therefore reducing the sample size

With regards to the AC of the IOTN, the photographs were based on Caucasian 12-year olds and have been stated as being referenced to this group and not any other ethnic groups⁵⁰. Therefore, some occlusal profiles, which are endemic to African ethnicity, may not be regarded as malocclusions thereby affecting the subjective perceptions for orthodontic treatment in both the child and the examiner

The study's results cannot be extrapolated to the rest of Namibia as it only examined one area in Namibia
No test-re-test reliability was performed

6. DECLARATIONS

Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author contributions

All authors wrote the main manuscript text and FKD and KS prepared Tables 1-3. All authors reviewed the manuscript.

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Ethics approval and consent to participate

Ethics approval was sought from BMREC at University of the Western Cape (Registration number BM18/3/19). Informed consent and assent was obtained from parents and participants.

Consent for publication

NA

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

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Abbreviations

IOTN	Index of Orthodontic Treatment Need
DHC	Dental Health Component
AC	Aesthetics Component
WHO	World Health Organization
ERAC	Examiner-rated Aesthetic Component
CRAC	Child-rated Aesthetic Component
DAI	Dental Aesthetics Index

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CPD questionnaire on page 400

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.



Exploring perceptions of workplace-based risks and hazards: A study of dental assisting students at a South African university of technology

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ABSTRACT

Introduction

Dental assistants play a vital role in delivering four-handed dentistry and oral healthcare to patients. However, they face many risks and hazards at work that could negatively affect their physical and emotional health. These may range from mental health problems to chemical exposure, infectious diseases, and ergonomic issues.

Objectives

To explore the understanding of dental assisting students regarding potential occupational risks and hazards in the dental environment and to determine the awareness of perceived occupational risks and hazards using a self-administered questionnaire.

Methods

This cross-sectional, descriptive study used qualitative and quantitative research methods to explore the perspectives of student dental assistants regarding occupational health risks and hazards for data collection through open-ended and short answers.

Results

Seventy-six dental assistants participated in this study, yielding a (85.3%) response rate. The findings indicated that only 17% (n=13) of the participants had not received an orientation on occupational risks and hazards, and 59% (n=45) were unsure. Eighty-two percent (n=62) had been taught correct posture and sitting methods. Regarding psychological well-being, 53% (n=40) agreed to being

stressed, over 34% (n=26) indicated that the university offered various mental health services, and 86.6% (n=66%) expressed satisfaction with the current training.

Conclusion

This study highlights the critical need for comprehensive education, better ergonomics at work, and more robust preventative measures to protect dental assistants' health and well-being.

Keywords

Occupational health, hazards, risks, dental education, curriculum

INTRODUCTION

Students studying dental assisting are always at risk of occupational exposure because of inexperience during the educational process.¹ In addition, dental assistants may be underqualified, which raises the possibility of these dangers.¹

Dental assistants are vital to the dental practice and contribute to dental patients' health. They help to speed up treatment by preparing materials and assisting with procedures.² Because dental assistants are unaware of the potential risks at work, they are susceptible to illnesses, injuries and other occupational hazards.³ A few of these are radiation, noise, vibration-induced neuropathy, musculoskeletal diseases (MSDs), psychological illnesses, dental material exposure, percutaneous exposure incidents (PEI) and exposure to infectious agents such as bioaerosols.⁴

According to the World Health Organisation, a third of the lives of individuals worldwide will be spent at work, and between 30% and 35% of those people will face significant occupational risks.² Developing nations have a controversial situation regarding occupational health risks and hazards because of inadequate facilities in both rural and urban areas.⁵ According to Haas et al (2020), the upper extremity is particularly vulnerable to the tremendous impact dentistry has on the musculoskeletal system, and dental practitioners worldwide have a high prevalence of muscular-skeletal diseases (MSDs).⁶

According to Biradar and Narayan (2018), establishing preventive measures and raising awareness of potential workplace hazards can contribute to a safe dentistry environment for all parties.⁴ While the risks that other dental professionals face have been extensively documented, less emphasis has been paid to the risks that dental assistants

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Author's contribution

1. Feziwe Kokela – study conception and design, data collection, data analysis, data interpretation and drafting of the manuscript
2. Rajeshree Moodley – supervision of the entire work, study design and manuscript review

Both authors critically revised the article for valuable intellectual content and approved the final version to be published.

face.⁷ According to Ohlendorf et al (2020), it is necessary to fully comprehend the kinds of professional risks that could occur at work and pay more attention to ergonomics in dental assistants' working practices, along with the precautions that must be taken to avoid them.^{4,8} Additionally, Ohlendorf et al (2020) noted that continued research into appropriate therapy and education is necessary to reduce the incidence of MSD; raising awareness among these professions is imperative.^{5,9}

Dental assistants face several occupational health concerns. Risk factors include instrument vibration, inadequate lighting, incorrect patient positioning and poor dental professional placement when treating patients.⁶ Fatima (2020) found in her literature that dental assistants are underqualified, which may lead to the emergence of occupational dangers.⁵ Many risks, such as biological, physical, chemical, biomechanical and psychological risks, are encountered by dental assistants.¹⁰ According to Siva Naga Yasaswi et al (2018), dentistry is perceived as a challenging field that starts at university and continues through clinical work after graduation.¹¹ Like in other medical professions, dentistry has several risky variables that put health professionals at significant risk if they disregard occupational health norms.¹² Literature research by Moodley et al (2018) indicates a correlation between dental labour and occupational risks and hazards such as musculoskeletal disorders, percutaneous injuries, stress and biological dangers.¹³

Biradar and Narayan (2018) also mentioned a substantial risk of infection from various microorganisms associated with the dental environment. Infectious microorganisms may be detected in blood or saliva due to bacteraemia or viremia linked to systemic illnesses.^{4,14}

According to pertinent research, everyone engaged can benefit from a safe dental workplace by being aware of these occupational risks and hazards and implementing preventive measures.¹⁵ For optimal patient treatment, a practitioner of oral health care must be in good health and able to work for lengthy periods, more so because pathogens can spread in a dental setting by direct contact with contaminated blood, saliva or other bodily fluids, or indirectly through contaminated tools, surfaces or materials.¹³

Numerous studies have been undertaken worldwide on occupational health issues pertaining to dental professionals; however, few studies have been conducted among dental assistants in Africa. According to Moodley et al (2018), there is a correlation between dental work and several occupational challenges, such as musculoskeletal disorders, percutaneous injuries, stress and biological risks.¹⁶

This research aimed to explore the understanding of dental assisting students regarding potential occupational risks and hazards in the dental environment and to determine their awareness of perceived occupational risks and hazards using a self-administered questionnaire.

METHODS

Research setting

This study was conducted at a university of technology in South Africa among dental assistants (n=76) based in the Free State. The University of KwaZulu-Natal Human and Social Science Research Ethics Committee granted ethical permission (HSSREC/0000/4922/2022). All the UKZN

HSSREC's policies and principles were followed throughout the study. Before the study commenced, gatekeeper permission was acquired from the appropriate heads of department.

Research design and analysis

A cross-sectional, descriptive method was used to explore the perspectives of student dental assistants regarding occupational health risks and hazards for data collection using a self-administered questionnaire. The data collected from the responses was analysed using SPSS version 29.0. The results will present the descriptive statistics in graphs, cross-tabulations and other figures for the quantitative data collected. Inferential techniques include using correlations and chi-square test values, which are interpreted using the p-values. The traditional approach to reporting a result requires a statement of statistical significance. A p-value is generated from a test statistic. A significant result is indicated with "p<0.05".

Data collection process

Student dental assistants (n=84) were invited to participate, and the study allowed students to participate if they wish to. Each participant received an information sheet and consent form, and they were free to discontinue participation at any time; anonymity was observed in this research. A self-administered questionnaire was used to collect data, and the completed questionnaires (n=76) were used to analyse the qualitative and quantitative data on occupational risks and hazards among dental assistants.

Validity and reliability

The study's questions were formulated to gather the necessary data, and their arrangement was impartial and consistent with validity.¹⁷ Internal consistency ensured reliability, guaranteeing that study participants were asked the same clear-cut, legitimate, and unambiguous questions to provide comparable results.¹⁷ The qualitative data included long-answer questions that explored the students' perspectives on occupational risks and hazards. A pilot study was conducted among ten dental assisting students to determine if the participants would understand the questionnaire; thereafter, minor changes were made to the research tool.

Results

The results and findings obtained from the questionnaires in this study are discussed below. The questionnaire was divided into sections measuring various themes and illustrated demographic data, occupational risks and hazards and psychological wellbeing.

Demographic data

The questionnaire was the primary tool used to collect data and was distributed. In total, (n=84) questionnaires were despatched and (n=76) were returned, which gave an (85.3%) response rate. Within the dataset, the distribution of gender was significantly weighted towards females, comprising 85.5% (n=65) of the cohort, as opposed to males, who accounted for 14.5% (n=11) (p<0.001). The age profile of the population was predominantly within the 18-25-year age group, 98.7% (n=75), and over 30; 1.3% (n=1) year categories were markedly less represented (p<0.001). The marital status revealed a substantial majority of single individuals, 97.4% (n=74), with married 2.6% (n=2) participants.

Psychological wellbeing

In this section, participants (n=76) were asked if they exercised and indicated the number of hours of exercise; 42% (n=32) said that they exercised and 56% (n=18) three times a week for 30 minutes. Nearly 53% (n=40) indicated that they were aware that exercising impacts their lifestyle. Almost all the participants, 76% (n=58), agreed that their mental health was more important than physical health.

The respondents were further asked if they feel stressed out and overworked as students by their studies, 37% (n=28) of participants agreed that they feel stressed out and overworked as students, yet there is also a substantial portion, 28% (n=21) that may not feel overworked or may not be willing to acknowledge it as stress (p<0.001). Additionally, the respondents were asked if they were worried about their mental health. The following was observed: a total of 40% (n=37) agreed that they were worried about their mental health, which was a substantial proportion and indicates a high level of concern among students.

Qualitative data analysis

In this study, we explored the students' perspectives on occupational risks and hazards using open-ended questions as part of the questionnaire. Questions 1-2 have supporting statements from the participants.

Question 1: What coping mechanisms do you use when you are stressed out?

Physical activities and hobbies were popular for managing stress among participants, with 42% (n=32) agreeing to using exercise as their strategy; thus, offering both a distraction and a release of tension; social and emotional support was crucial for many and indicating the importance of having a trusted network to turn to.

"I just take few minutes to breathe and motivate myself to start again." (Participant 40)

"I usually go for a jog or walk to clear my mind. I listen to spiritual music to make me feel at ease." (Participant 88)

"I tend to read books almost every day. Exercise 3 times a day." (Participant 76)

"I usually eat a lot and hanging out with my friends; sometimes I cry out a lot; after crying, I motivate myself to stop stressing." (Participant 86)

"I always tell myself that this is a yearly course I'll manage. And also told myself that I cannot be stressed out by something that can't talk." (Participant 17)

Question 2: What sources of support does the university offer with regard to mental issues?

Of all the respondents, 34% (n=26), who agreed to get support from the university, the participants' responses suggested that the university offers various mental health services, primarily through counselling and therapy. A significant level of support is offered through academic channels, highlighting an integrated approach to student wellbeing; however, a few participants disagreed with these statements.

"Sessions with a psychologist are available." (Participant 38)

"There's a student campaign that focuses on mental issues and academic issues that engage with students wanting to know how are we performing or coping with all my academic." (Participant 70)

"Lecturers talk with students when they need some mental support and comfort students when needed." (Participant 28)

"Giving us toothpaste and money as some don't have enough money to buy stuffs." (Participant 15)

"They don't offer any help; instead, they add more stress with allowances." (Participant 72)

"Nothing." (Participant 33)

Occupational risks and hazards

Participants were asked if they had been taught correct standing posture and how to sit while assisting. Eighty-two percent (n=62) of the respondent's statements related to being taught correct posture and sitting methods. The graph below presents data on respondents' levels of agreement with statements related to their education on correct posture during standing and sitting while assisting.

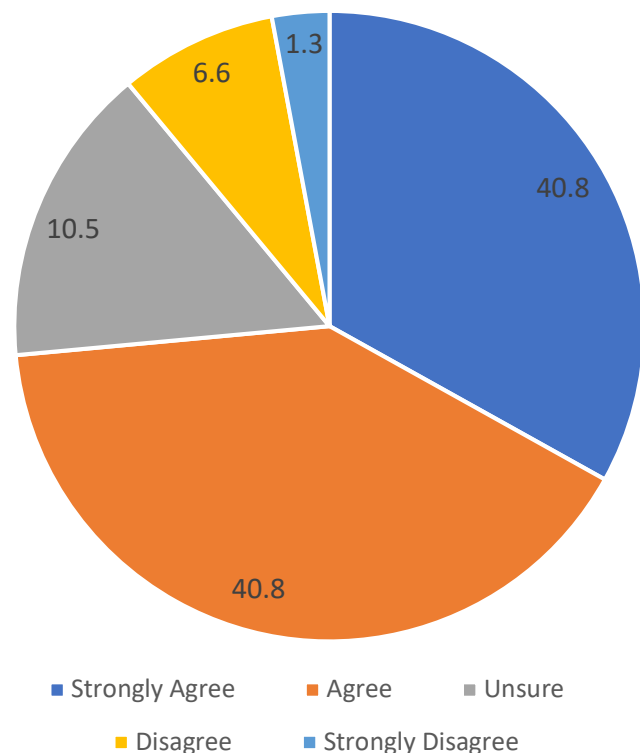


Figure 1. Posture and sitting

Participants were asked if they had received any orientation as students; 17% (n=13) did not agree, while a substantial number 59% (n=45), were not sure, and 24% (n=18) agreed to have received orientation. The questions about occupational risks and hazards were further broken down into sub-themes discussed below.

Table 1: Blood-borne Pathogen Safety Awareness

		Strongly Agree		Agree		Unsure		Disagree		Strongly Disagree		Chi-Square p-value
		Count	Row n%	Count	Row n%	Count	Row n%	Count	Row n%	Count	Row n%	
I'm aware that saliva may be a source of disease transmission	D1.1	52	69.3%	21	28.0%	2	2.7%	0	0.0%	0	0.0%	<0.001
I have been taught about the precautions needed when working with blood	D1.2	59	77.6%	16	21.1%	1	1.3%	0	0.0%	0	0.0%	<0.001
I make use of a mask while working	D1.3	63	82.9%	13	17.1%	0	0.0%	0	0.0%	0	0.0%	<0.001
I have been taught about needle-stick injuries	D1.4	59	77.6%	16	21.1%	0	0.0%	1	1.3%	0	0.0%	<0.001

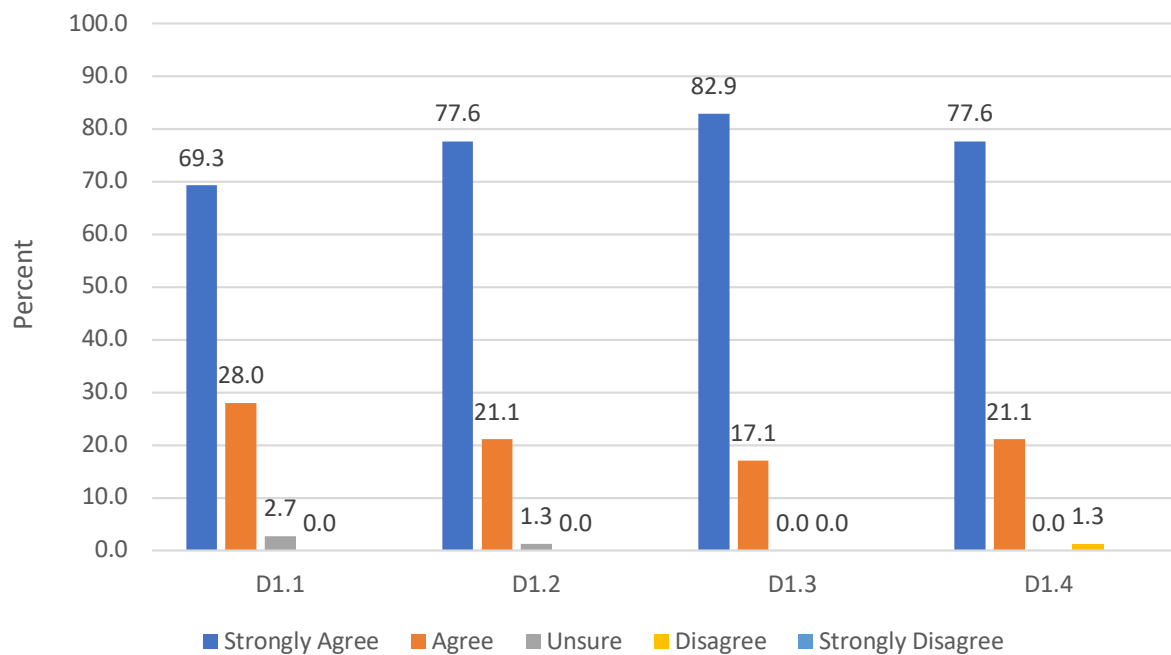


Figure 2. Blood-borne Pathogen Safety Awareness

The data suggests that respondents feel highly aware and educated about infection control and blood-borne pathogen awareness, ie saliva 69.3% (n=52) and being taught about needle-stick injuries 77.6% (n=59). Nearly 49% (n=37) of the participants indicated that they used tools that vibrate during training, and a substantial 67% (n=51) indicated that they do not use amalgam, with 23% (n=18) agreeing to use it and 9.2% (n=7) were not sure. Participants were asked about an extraction ventilator in their training sites; more than 43% (n=33) indicated having one, 15.8% (n=12) disagreed with ever seeing one and 34% (n=26) were unsure.

Furthermore, this study explored the students' perspectives on occupational risks and hazards using open-ended questions. Questions 3-7 follow with participants' statements.

Question 3: In the current curriculum, have you been taught about work-related health risks and hazards? If yes, please explain how.

Participants were asked to rate whether occupational risks and hazards were covered in the curriculum; over 86% (n=66) agreed that they had been taught about hazards, 11.8% (n=9) were not sure, and 1.3% (n=1) disagreed. Further, the participants' responses suggested that the curriculum emphasized the importance of wearing PPE and other protective measures to safeguard against potential health risks in dental practice.

"...been taught of dangers that arise from the dental materials, equipment and materials and certain methods to follow in case of medical related issues." (Participant 4)

"By wearing PPE, handling sharp instruments with care, avoid unauthorised places." (Participant 7)

"...yes in the notes we have, there is lectures about hazards and risks." (Participant 14")

There was a significant focus on managing sharp instruments and infection control, reflecting the high-risk nature of dental work environments.

"I have been taught that wearing PPE wear is a very important thing before you even start with working. And that you take precautions of sharp materials." (Participant 16)

"Putting dental needles in sharps container, anything that comes out of the patient's mouth in the red bin." (Participant 49)

"Taught how to handle needle and avoid needle pricks, how to wear PPE and protect myself from dental diseases that can be contaminated in the dental practice." (Participant 51)

Question 4: Have you received any orientation regarding occupational health as a student? If yes, please explain how.

Participants were asked if they had any receipt of occupational health orientation; 24% (n=18) agreed, 17% (n=13) indicated that they had yet to receive any orientation, and 59% (n=45) were not sure. The observation from the respondents who agreed was that orientation included both theoretical instruction and practical training, and there is a mention of formal modules, like dental assisting theory, which seems integral to the curriculum.

"I was shown how to operate the equipments and how to approach situations in the clinical environment." (Participant 16)

"The contents of the module dental assisting theory has parts of that in the beginning." (Participant 21)

"We were taught on what to expect when going to our practicals and what are we supposed to do as dental assistants in a practice." (Participant 34)

"The curriculum organised people professionally made to inform and give out orientation regarding occupational health." (Participant 22)

Question 5: Since I started training, I experienced pain or discomfort. If you agree, briefly explain the pain experience and where.

Participants 19.5% (n=15) reported that training appeared to involve extensive periods of standing, leading to various forms of musculoskeletal discomfort, particularly back and foot pain; some discomforts were associated with specific incidents or reactions to materials, which may require targeted interventions, while 43.4% (n=33) disagreed.

"After suctioning a patient, I had back pains, and my eyes were so painful as a result of curing light." (Participant 4)

"Ever since I started training, I experience ankle pains, and sometimes I knock off with swollen feet. I ended up buying crocs for comfortability." (Participant 6)

"I experience sinus and flu with my first practicals." (Participant 14)

"I experienced syncope but felt pain after falling as I regained consciences. Needle prick, but it did nothing, it did not infect me." (Participant 17)

Question 6: What could be included in the curriculum to inform students about occupational health while training?

The data from the participants suggested a need for more comprehensive and applied learning opportunities concerning occupational health.

"After every lecture of practicals, the lecturer must put a small section of occupation health for students up until they cover all the tips." (Participant 6)

"Assess risks involved in the department and implement safety measures." (Participant 9)

"Incorporating occupational health education into the curriculum can include stress management and preventive measures." (Participant 35)

"There must be a course that is dedicated to teaching about the risks included in dental assisting." (Participant 73)

Question 7: What changes do you want to see in dental training as a student regarding occupational risks?

Some respondents expressed satisfaction with the current training, 86.6% (n=66), while others sought specific improvements, 11.8% (n=9); furthermore, there was a call for more practical experience and improved facilities and equipment to ensure safety, 1.3% (n=1).

"Nothing everything is in a good state." (Participant 56)

"No changes must be done; everything is alright; there is enough training for students." (Participant 51)

"Practical class hours should be increased may be more than twice a week so that students can be more exposed to the dental procedures, equipments and instruments." (Participant 60)

"Precautions that are important before practicals outside the clinic start because we get shocked sometimes." (Participant 62)

"Students should be more informed about occupational risks before going to practicals." (Participant 69)

DISCUSSION

The data collected in this study set out to explore the students' perspectives regarding occupational risks and hazards in the dental environment. Anjum et al. (2019) observed that dental assistants who experience high levels of stress and burnout are linked to poor mental and physical health, which may impact their ability to provide patients with safe and healthy care. Most participants in our research indicated that they were aware that exercising impacts one's lifestyle and that their mental health is more important than physical health. According to another cross-sectional study by Maragha et al. (2023), the nature of the dental curriculum has led dental

students to report great stress while studying. The two most common causes of excessive stress were a heavy workload and fear of failing, while their go-to coping strategies were sleeping and watching television, respectively.^{18,19}

The findings in our study revealed that the respondents were worried about their mental health, and this indicates a high level of concern among students. A survey conducted by Bhayat and Madiba (2017) has indicated that over 90% of dental assistants are predicted to experience burnout.¹⁹ Furthermore, in this research, students agreed to be stressed out and overworked. However, there was also a portion of respondents that may not feel overworked or may not be willing to acknowledge it as stress. Many issues, including time constraints, position ambiguity, role conflicts, work overload, social support and a lack of authority in the workplace, can lead to stress and burnout in dental assistants.²⁰

The statements observed in our investigation concerning the healthcare and well-being of the students indicated participants who were worried about their mental health, as cited in a research report by Wali et al. (2021), a significant amount of stress was noted from participants because of the concern that patients might carry infectious diseases (Wali et al., 2021).²¹

Unmanaged stress can result in burnout.²² In support of the above, in the current investigation, we found that overall, the frequency and intensity of stress experienced by students, the overwhelming nature of their studies, and concerns about stress were high. The results further captured the psychological strain and discomfort related to students' academic demands. This single-factor structure suggests a coherent construct associated with the mental well-being of students under academic pressure. Additionally, research has indicated that over 40% of dental assistants working in public dental care were at high risk of burnout, according to a survey by Khammissa et al. (2022).²²

Furthermore, Malsam and Nienhaus et al (2021) cited that high-burnout dental assistants are more likely to be involved in and create more procedural mishaps that end in injuries connected to their jobs and endanger the health of their patients.²³ The likelihood of getting post-traumatic stress disorder rises as a result, and one can also safely handle and dispose of sharp objects and hazardous materials.²³

According to research by Bhagat et al (2022), programmes that support and foster open communication about risks and issues at work and provide access to help or counselling for anxiety and psychological stress management should be implemented.²⁴ Dental assistants can further reduce occupational risks and maintain a healthy work environment by prioritising safety and following best practices.²⁵ Similarly, in this research a high level of agreement is observed with the respondents. This suggests that most respondents feel their healthcare and wellbeing are prioritised in their educational environment.

Overall, the data suggests that respondents generally feel optimistic about their work environment and educational experiences, particularly regarding time management, healthcare and well-being, and education.

According to available research, dental offices should develop a thorough occupational health strategy to inform

their personnel and the public about the disease and lessen its effects.²⁶ We observed that in this study population, respondents' levels of agreement with statements relating to their education on proper posture when standing and sitting when assisting were much greater. Regarding poor posture and sitting, no assertions had a higher degree of disagreement. This suggests that the primary focus of this component is the training received in maintaining ergonomic practices to ensure physical health and prevent work-related musculoskeletal disorders. In agreement with this, Moodley et al's (2018) research indicates that dental staff members ought to receive training in dental ergonomics since these skills and knowledge are required for dentistry education and to enable them to practise in an ergonomically sound position.²⁷

Most dental schools around the globe provide their students with this kind of training in accordance with their curricula.¹⁶ Further to this, a study by Aghani et al (2018) suggests graduates would have the wrong posture for the job since they were not taught, not even implicitly, how to maintain their bodies in the right position by using ergonomic practises; one can reduce the chance of physical strain and damage.²

Both dynamic and static dental tasks can lead to musculoskeletal illnesses, according to research by Mahdi et al. (2021).²⁸ Nevertheless, dental students are frequently unaware of ergonomic factors' negative effects on their health. In dentistry, musculoskeletal disorders frequently manifest as pain, weakness, decreased touch sensitivity, itching, and numbness.² Regarding this study's curricular content, most respondents affirmed that their current curriculum included education on work-related health risks and hazards. However, a significant portion of participants were unsure about the inclusion of occupational health orientation in the curriculum, suggesting potential differences in how this component of their education was delivered or assimilated.

In existing literature conducted by Pillay and Moodley (2023), students' perceptions of clinical training, modules and teaching strategies, among other things, may help identify institutional issues and achievements.²⁹ Additionally, the comments may inspire modifications and fresh approaches to dentistry education.²⁹

Participants reported discomfort associated with adverse reactions to equipment, such as discomfort from eyestrain due to curing lights and pain from using old or improperly designed equipment. In comparison, other respondents indicated that they wore protective eyewear during procedures. This suggests that while most adhere to safety practices regarding eye protection, a subset may not, indicating potential areas for improved training or enforcement of safety protocols. Overall, the data suggested that students were aware of occupational hazards; however, an emphasis needs to be placed during training, as cited by Al-Aslami et al. (2018), that to reduce dental-related occupational dangers in the future and to improve dental products, education and training are essential components.³⁰ Still, evidence indicates risks associated with education and training.³⁰

In the current investigation, a substantial majority of respondents indicated a high level of awareness of needle-stick injuries and about the potential for disease transmission through saliva. Results in a study by Moodley and Naidoo

(2015) indicated that adopting safe work practices to minimise percutaneous injuries is likely the most effective way to stop the spread of blood-borne illnesses such as HIV and hepatitis.³¹ Sivakumar et al (2012) at a prosthodontic practice found that there is a possibility of encountering harmful chemicals, inhaling dust or vapours, becoming injured by fast-moving rotating machinery or breathing in flammable materials.³²

The findings in our study suggested that respondents felt highly aware and educated about infection control and blood-borne pathogen awareness, as also indicated by the high levels of agreement with a statement in this sub-theme of being taught about needle-stick injuries. These findings related to our study as most participants indicated using tools that vibrate during training. The respondents were further asked about the dental amalgam usage at their training site; most disagreed or strongly disagreed, suggesting that dental amalgam was not widely used among respondents in their clinical practice. In contrast, a smaller proportion agreed or strongly agreed with using amalgam which may reflect varying practices or preferences for dental restoration materials among clinics. Furthermore, the data suggested a moderate level of education about mercury-related illnesses. In summary, the data in this research reflected a trend towards a decreased use of dental amalgam in clinical settings among the respondents, with a significant preference for alternative restoration materials such as composite.

In accordance with our research, a cross-sectional study by Moodley and Naidoo (2015) revealed that percutaneous exposure events are still a big concern even though exposure to harmful pathogenic germs is a virtual risk.³¹ Moreover, dental professionals are in danger from pathogenic bioaerosols, dental product toxicity, contact dermatitis, noise-induced hearing loss and, most recently, an epidemic of musculoskeletal disorders.¹⁰ It was further noted in our research that it would be beneficial for training programmes to ensure that trainees are fully informed about the safety and control measures, including the presence and use of extraction ventilators, since 29% indicated the use of amalgam during their clinical training.

The results in our study suggested the need for improved compliance with protective measures during X-ray procedures and better communication about the safety facilities available at training sites. They also pointed to a disparity in the practical experience of taking X-rays, which could reflect differences in the curriculum or the facilities of the various training sites. Similar results were observed in research by Agrawal et al. (2014), where it was revealed that a professional aware of the many risks would be more equipped to take care of their personal health and work habits.³³ Overall, the data reflected a general awareness of some areas of uncertainty or non-compliance that may warrant further educational efforts or policy reinforcement regarding radiation exposure.

Therapeutic approaches such as yoga, acupuncture, weight training, physiotherapy, and stretching could help lessen the severity of MSDs.⁶ The HPCSA further stated that a healthcare professional must care for their health and well-being, recognise when another professional is in need, and act accordingly.³⁴ Additionally, Pillay and Moodley (2023) cited that feedback from students on instruction and learning should be welcomed as it can positively impact the creation of curricula.²⁹ Overall, the data in this study suggested

that respondents generally feel positive about their work environment and educational experiences, particularly in terms of time management, focus on healthcare and well-being.

CONCLUSION

Based on this research, the study found that while some dental assistants showed knowledge of specific risks, such as infectious diseases and radiation exposure, others only had a moderate comprehension of potential workplace risks and hazards. To ensure that prospective dental assistants are sufficiently equipped to protect themselves, this study recommends that dental assisting programs give comprehensive training on occupational risks and hazards, including prevention techniques.

This study's findings further suggested that even though the university programme featured orientation during practical sessions that teach students about occupational risks and hazards, the data collected indicates a desire to balance theoretical knowledge and practical skills with a strong emphasis on the safety and prevention of occupational risks. Respondents appeared to advocate for enhanced protective measures, better workload management and more focused educational work on occupational health. Despite some respondents being content with the status quo, there is a clear interest in the augmentation of the curriculum to better equip students for the risks in the dental industry. Educational content should be enhanced to include more detailed information on occupational risks and infection control.

The study also showed that public knowledge of occupational health risks and hazards is needed to provide students with a safe learning environment. This justifies the inclusion of these topics in education programmes and dental curricula; although these are already in place, the coverage needs to be increased and include training institutions.

RECOMMENDATIONS

This is the first research study to evaluate occupational risks and hazards among dental assisting students in the Free State. The participating university in the study will be presented with the research results, which will provide the basis to modify the current teaching module to improve student outcomes and training services. This study's results catalyse more research, noting the lack of research on occupational risks and hazards in the university. Although this research recognises that knowledge does not always translate into action, the disparities found in this study may be primarily resolved using occupational health hazards education, prevention strategies and better training services.

LIMITATIONS OF THE STUDY

The study participants were drawn from one place, so the results cannot be generalised to other departments. With its limitations, this study can provide insight into students' occupational risks and hazards. Further research about occupational health risks and hazards still needs to be explored in other dental training institutions.

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Conflict of interest

The authors declare no financial or personal relationship(s) that may have inappropriately influenced them in writing

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Contribution

The principal author (FFK) contributed substantially to the conception and design, data acquisition, analysis and interpretation of data. The co-author (RM) assisted with the discussion, literature review and questionnaire exploring occupational risks and hazards using open-ended questions. Both authors critically revised the article for valuable intellectual content and approved the final version to be published.

SUMMARY

Introduction

Occupational hazards are a side effect of dentistry and dental assistants are subject to various occupational risks. Their work's prolonged and immobile nature might result in musculoskeletal issues. Dental patients have small, narrow mouths and require extended, immobile seated postures and repetitive arm exercises. Dental assistants are subjected to extreme physical strain in their work environment.

Objectives

To explore the understanding of dental assisting students regarding potential occupational risks and hazards in the dental environment and to determine the awareness of perceived occupational risks and hazards using a self-administered questionnaire.

Methods

This cross-sectional, descriptive study used qualitative and quantitative research methods to explore the perspectives of student dental assistants regarding occupational health risks and hazards for data collection through open-ended and short answers.

Results

Seventy-six dental assistants participated in this study, yielding an (85.3%) response rate. The findings indicated that only 17% (n=13) of the participants had not received an orientation on occupational risks and hazards and 59% (n=45) were unsure. Eighty-two percent (n=62) had been taught correct posture and sitting methods. Regarding psychological wellbeing, 53% (n=40) agreed to being stressed, more than 34% (n=26) indicated that the university offered various mental health services and 86.6% (n=66%) expressed satisfaction with the current training.

Conclusion

This study highlights the critical need for comprehensive education, better ergonomics at work, and more robust preventative measures to protect dental assistants' health and wellbeing.

Keywords

Occupational health, hazards, risks, dental education, curriculum

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Development of a framework for a dental curriculum to align to AfriMEDS Competency Framework through document analysis

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INTRODUCTION

In response to the adoption of the AfriMEDS competency framework by the HPCSA, all dental schools in South Africa were required to incorporate and implement these core competencies described in AfriMEDS within the undergraduate curricula. Due to the paucity of literature on how dental schools have implemented the AfriMEDS core competencies framework, an exploration of the latter is invaluable. The aim of the study was to develop an implementation framework to align the undergraduate dental curriculum at a dental school in South Africa to the AfriMEDS competency framework.

Methods

Document analysis was used to develop the implementation framework to align the AfriMEDS competency framework. A two-layered approach was used; first, literature suggesting implementation strategies of CanMEDS assisted with the extraction of themes from the documents selected (best practice). For the second part of this framework development, the document analysis of the selected documents (curriculum mapping, focus group discussions and a systematic review) were conducted.

Results

The following themes/categories emerged from the data: the AfriMEDS core competency framework; institutional framework; dental school/faculty; faculty development; teaching and learning; and curriculum. From these categories a proposed framework was developed that is dynamic and illustrates how processes, faculty development

and curriculum impacts and informs teaching, learning and assessment.

Discussion and conclusion

From the results an implementation framework to align the undergraduate curriculum to the AfriMEDS core competency framework (similar to CanMEDS) was developed. This proposed implementation was deemed feasible.

As CanMEDS was developed for specialist training in Canada, the authors suggest a review of these core competencies that would consider the context of South Africa and the specific dental discipline. It might be valuable to consider the decoloniality strategy when considering African dental graduate competencies.

INTRODUCTION

Background

Globally, competency-based education (CBE) is currently the appropriate and acceptable approach in dental education. Following the definition of the outcomes-based competencies required by a health professional, competency frameworks were developed. Competency-based frameworks offer structural, content- and process-based benefits. Perceived advantages of competency-based medical education (CBME) include increased transparency and accountability to all stakeholders with a shared set of expectations and a common language for education, assessment and regulation.¹ CBME is rapidly being adopted across the globe.² Similarly, in South Africa, the Health Professions Council of South Africa (HPCSA) adapted the African Medical Education Directions for Specialists (AfriMEDS) core competency framework from the Canadian Medical Educational Directives for Specialists (CanMEDS) and required all schools in the country to adopt this.³ Part of the HPCSA accreditation process requires South African dental schools to present evidence of the incorporation of competencies and alignment of the AfriMEDS core competency framework to the undergraduate dental curricula.⁴ Unlike CanMEDS, there is no clear implementation guideline or strategy for the AfriMEDS core competency framework. It is therefore advisable that all four dental schools in the country share a common understanding of the implementation of this framework. In doing so, the AfriMEDS core competency framework could offer similar structural, content- and process-based benefits as suggested of competency-based frameworks.

Concerns have been raised and challenges identified regarding the implementation of CBME, and thus caution is

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advised.¹ Addressing the challenges in the implementation of CBME requires a consideration of the implications for the complex systems in which our education programs reside/exist.¹ A multifaceted implementation strategy for CanMEDS included four domains, namely: 1) standards for curriculum, teaching and assessment; 2) faculty development; 3) research and development resources; and 4) outreach.⁵ All four of these domains as part of the implementation strategy were essential ingredients in supporting the adoption and dissemination of the CanMEDS initiative.⁵ A more comprehensive alignment of the CanMEDS with the practice of specific specialties may address difficulties in implementing the CanMEDS competencies in medical education.⁶

Competencies for dental education

The clinical competency of a dental student cannot be determined by merely referring to the list of courses in the programme. Similarly, the respect and culture of inquiry essential for learning will be difficult to ascertain from a course list. The goal of a CBE model is to ensure students are able to demonstrate their knowledge, skills and values by means of reliable and measurable performance outcomes.⁷ Statements of competence and attainment define what students are expected to learn.⁸ Dentists are expected to contribute to the achievement of the general health of patients by implementing and promoting appropriate oral health management.⁹ The US, Canada and the UK have published official documents on competence.⁹ The American Dental Education Association (ADEA) approved the following competencies for the New General Dentist: 1) critical thinking; 2) professionalism; 3) communication and interpersonal skills; 4) health promotion; 5) practice management and informatics; 6) patient care A (assessment, diagnosis and treatment planning); and 7) patient care B (establishment and maintenance of oral health).⁷

In 1994, most Canadian dental programmes adopted a national consensus document specifying competencies for a beginning dental practitioner.¹⁰ This document comprises 47 competency statements. Canadian dental programmes have used these competencies to guide curriculum content and to provide evidence of curriculum outcomes.¹⁰

The General Assembly of the Association for Dental Education in Europe (ADEE) approved competencies for the European dentist.⁹ Seven domains were identified, namely: 1) professionalism; 2) knowledge base; 3) communication and interpersonal skills, information and information literacy; 4) clinical information gathering; 5) diagnosis and treatment planning; 6) therapy: establishing and maintaining oral health; and 7) prevention and health promotion.⁹ Within each domain, the following major competencies were identified:⁹

- Professional attitude and behaviour
- Ethics and jurisprudence
- Communication
- Application of basic biological, medical, technical and clinical sciences
- Acquiring and using information
- Obtaining and recording a complete history of the patient's medical, oral, and dental state
- Decision-making, clinical reasoning and judgment
- Establishing and maintaining oral health
- Improving the oral health of individuals, families and groups in the community

It is apparent that there is some overlapping of the agreed or approved competencies globally, with the focus on practicing dentistry. The overlapping is aligned to the discipline and scope of practice of a general dentist. An important driver of the development of norms of competencies was the movement to CBE for dentistry. As highlighted, the development of these competencies was led and managed by global, region and country specific licensing or dental organisations. From the literature, the role of dental academia in the development of the competencies is not evident. If dental schools are responsible for ensuring dental graduates' competence at graduation, the involvement should be essential.

Following the definition of the outcomes-based competencies required from a health professional, competency frameworks were developed. Englander et al¹¹ defined a competency framework as an organised and structured representation of a set of interrelated and purposeful competencies. A clearly articulated framework of practical real-world objectives provides opportunity for students to develop a clear pathway towards relevant competencies.¹²

AfriMEDS Core Competency Framework

In South Africa, the HPCSA developed specific dental graduate exit outcomes. The AfriMEDS Core Competency Framework was adopted in 2011 with permission from the CanMEDS Physician Competency Framework by the Undergraduate Education and Training Subcommittee (UET) of the Medical and Dental Professions Board (MDB) in collaboration with training institutions and the South African Committee of Medical and Dental Deans.³ The reason for this adoption and supplementary modification was to align the framework within the South African and wider African context, and to be sufficiently generic to guide the training of all undergraduate health professionals. It can be suggested that the HPCSA intended to "deconstruct" CanMEDS with the purpose of being contextually responsive and relevant. While CanMEDS was originally developed for postgraduate medical training, and globally most medical curricula adopted this, AfriMEDS aimed to be inclusive of all health professions with specific changes to the roles.¹³

There are differences between the CanMEDS and AfriMEDS frameworks. In CanMEDS, the central role is coined as the candidate becoming an "Expert", while in the AfriMEDS context, the candidate becomes a "Healthcare Practitioner". The role of "Manager" in CanMEDS is expanded to include "Leader and Manager" in the AfriMEDS framework. It appears that the deconstruction of the roles "Expert" and "Manager" seemed to destabilise power-relations. Decolonisation acknowledges the inherent power relations in the production and dissemination of knowledge, and seeks to destabilise these, allowing new forms of knowledge which represent marginalised groups.¹³ The principles followed within the key competencies and enabling competencies of a "Healthcare Practitioner" and "Leader and Manager" are comparable to the CanMEDS principles. The AfriMEDS (Figure 1) framework guides the accreditation process of all medical and dental schools in South Africa.³

Biomedical theories of disease and treatment; concepts such as competencies, evidence-based medicine and acceptable professional activities; culturally mediated

notions such as professionalism, communication skills and doctor-patient relationships; and even reflection, are often imposed on learners in or from the Global South.¹⁴ When reflecting on the roles “Communicator” and “Professional” through a decolonial lens, the deconstructing of these roles is necessary.



Figure 1: AfriMEDS¹⁵
(*Adapted from the CanMEDS Physician Competency Framework, with permission of the Royal College of Physicians and Surgeons of Canada).

Of particular interest is that globally the CanMEDS core competency framework guides specialist and medical curricula. In contrast to this, the AfriMEDS core competency framework guides all medical and dental curricula in South Africa. Worldwide dental schools are underpinned by approved competencies or competency statements developed for specific contexts or countries, as referred to previously. As AfriMEDS was adopted from CanMEDS, concerns noted around the “artificial” division of roles as well as the implementation of the CanMEDS framework would need to be evaluated.

CanMEDS core competency framework implementation strategies and challenges

There was agreement that the CanMEDS roles are relevant to clinical practice. However, there were also reports of educators and doctors struggling to implement the roles in the daily practice of specific specialties.⁶ A multifaceted implementation strategy for the CanMEDS included four domains, namely: 1) standards for curriculum, teaching and assessment; 2) faculty development; 3) research and development resources; and 4) outreach.⁵ All of these domains as part of the implementation strategy were essential for supporting the adoption and dissemination of the CanMEDS initiative.⁵

Outcome frameworks such as CanMEDS specify the destination but not the mode of delivery. In addition, no clear guidance on a specific teaching strategy is given for CBME.¹² When translating these competencies to a specific postgraduate course, a tendency to specify these competencies even further will arise. Due to the complexities of the CBE assessment model, some clinicians are challenged.¹⁶

One of the barriers to implementation has been the lack of a common language describing domains of competence in the health professions and the specific competencies that are critical to the formation and continuous development of physicians.¹¹ As long as the competency statements are articulated at an appropriate level of generality at an undergraduate level, they can not only be adapted to the different phases of the undergraduate programme but will also be able to accommodate the integration of emerging topics and content.¹²

The adoption of a competency-based approach implies the need for faculty development in the principles and practice of criterion-based assessment (CBA). CBA is not unique to CBE, but it is integral to the notion of a competency framework.¹² Understanding, execution and interpretation of these assessments demands educational and psychometric expertise.¹⁶ Chou et al¹⁷ concluded that substantial faculty development may be needed to gain proficiency for the evaluation of the “non-medical expert roles” in the CanMEDS competency framework. Difficulties in implementing the CanMEDS competencies in medical education may be addressed by a more comprehensive alignment of the framework with the practice of specific specialties. Such an alignment would require the mapping of specialty-specific competencies and ascertaining their match with the CanMEDS framework.⁶ This improvement of specialty specificity of a programme would enable translation of curriculum outcomes and clinical practice.⁶ Teachers working within a competency-based programme are faced with the increased complexity of not only delivering the “content” of their discipline but also translating the principles of the competency framework into concrete learning tasks.¹²

An overarching outcome framework allows a consistent approach to these challenges highlighted and the alignment of educational activities and objectives through the continuum of medical education.¹² Porter¹⁸ suggested three tools for measuring content and alignment of a curriculum, viz: (1) teacher surveys on instructional content; (2) content analysis of instructional material; and (3) alignment indices to describe the degree of overlap between content and standards or assessment. Teacher surveys on competencies within the curriculum, as well as perceived required competencies, is thus an acceptable source of information.⁶ Hence, the inclusion of knowledge and views of dental educators of the AfriMEDS core competency framework would be able to provide information on the curriculum alignment and competencies required by the dental graduate in the South African context.

AfriMEDS core competency framework in dental education

In response to the adoption of the AfriMEDS competency framework by the HPCSA, all dental schools in South Africa were required to incorporate and implement these core competencies described in AfriMEDS within the undergraduate curricula. Each of the four dental schools in South Africa have autonomy with regard to the core competencies implementation strategies within their undergraduate dental curriculum. Each of the dental schools is required to describe the implementation and translation of these AfriMEDS core competencies in their curriculum through the completion of the self-evaluation questionnaire as part of the accreditation process.

The core competencies were not clearly or consistently described in the curriculum and the implementation thereof was not evident. Evidence from previous accreditation reports suggests the translation of the AfriMEDS core competencies throughout the undergraduate dental curriculum were not explicitly described. Frank and Danoff⁶ suggested that the implementation of CanMEDS required a multifaceted approach, including standards, faculty development, research and development, and outreach. Due to the paucity of literature on how dental schools have implemented the AfriMEDS core competencies framework, an exploration of the latter is invaluable. To this end, the aim of the study was to develop an implementation framework to align the undergraduate dental curriculum at a dental school in South Africa to the AfriMEDS core competency framework.

MATERIALS AND METHODS

Document analysis was used to develop the implementation model to align the AfriMEDS competency framework. Document analysis is the systematic procedure of finding, selecting, reviewing and interpreting documents to uncover meaning and discover insights that are relevant to the research problem.¹⁹ Document analysis yields data – excerpts, quotations or entire passages – which are then organised into major themes, categories and case examples specifically through content analysis.²⁰ The information from the curriculum mapping process, transcripts from the Focus Group Discussions (FGDs) and data extracted from the Systematic Review (SR) were included as data sources for the document analysis for this study. As a research method, document analysis is particularly applicable to qualitative case studies, ie intensive studies producing rich descriptions of a single phenomenon, event, organisation or programme.²⁰

DATA COLLECTION PROCESS AND FRAMEWORK DEVELOPMENT

The process of document analysis involves skimming (superficial examination), reading (thorough examination)

and interpretation. This iterative process combines elements of content analysis and thematic analysis.²⁰

A two-layered approach was used to develop a framework to align and implement the AfriMEDS core competency framework. First, literature suggesting implementation strategies of CanMEDS⁵ assisted with the extraction of themes from the documents selected (best practice), as illustrated in Figure 2. Standards for curriculum, teaching and assessment, faculty development, research and development, and outreach were suggested approaches for implementation of the CanMEDS competency framework.⁵ For the second part of this framework development, document analysis was conducted. Document analysis included results from previous studies conducted, namely information from a curriculum mapping,⁴ FGD²¹ and SR.²¹ As the subjective interpreter of the data contained in the documents, the researcher should make the process of analysis as rigorous and as transparent as possible.²⁰ Following the analysis themes were developed, as illustrated in Table 1 further below.

RESULTS

The following themes/categories emerged from the data: The AfriMEDS core competency framework; institutional framework; dental school/faculty; faculty development; teaching and learning; and curriculum. Table 1 illustrates how the categories aligned with the results, discussion and conclusion of each document source.

THEMES THAT EMERGED FROM THE DOCUMENT ANALYSIS

AfriMEDS core competency framework

From the previously discussed literature, external pressures from the HPCSA created a thrust for change to CBE. In addition, the HPCSA adopted the AfriMEDS core competency framework to provide guidance for the transition to CBE. As the AfriMEDS competency framework

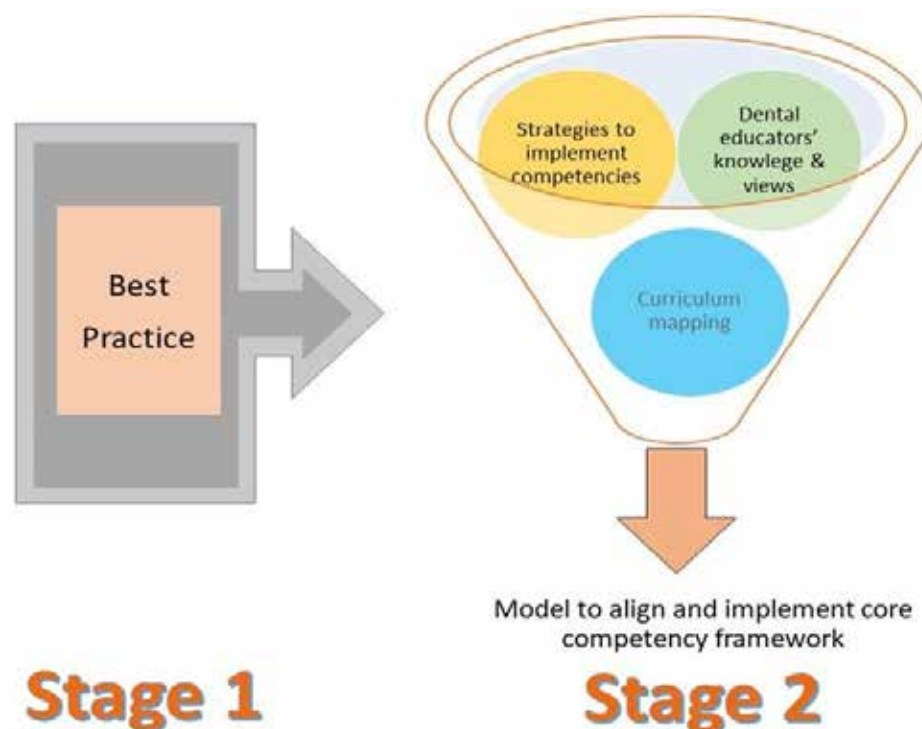


Figure 2: Development of the model to align and implement the core competency framework.

Table 1: Documents selected, analysed and emerged themes

Documents selected	Data analysed	Themes
Curriculum mapping	AfriMEDS core and enabling competencies Undergraduate dental curriculum Undergraduate dental curriculum map	-AfriMEDS competency framework -Curriculum -Core competencies
Focus Group Discussion (FGD)	FGD transcriptions Results and conclusions	-Institutional operation plans (including graduate attributes) -Competencies -Competency framework - Curriculum -Teaching strategies and assessments
Systematic Review (SR)	Articles selected for SR Results and Conclusion of SR	-Leadership support (for curriculum changes) -Faculty development (related to teaching and assessment)

underpins the undergraduate dental curriculum, it needs to be included in the proposed framework for alignment and implementation of the AfriMEDS.

Institutional framework

Dental schools operate within a larger institutional landscape that also requires alignment to institutional specific frameworks. In the case of the University of the Western Cape (UWC), graduate attributes situated within the Institutional Operating Plan (IOP) and decolonisation of the curriculum, etc are external pressures that inform the undergraduate dental curriculum. For this reason, incorporation and alignment of the specific institutional framework is necessary in the dental curriculum.

Dental school/faculty

In response to external pressures, the leadership of the dental faculty needs to support this transition to CBE. For this, appropriate structures or committees are necessary vehicles to support and drive this change process. Support includes human resources, finances, policies and procedures that will govern the change process.

Faculty development

Faculty development related to CBE, as well as teaching, learning and assessment, is essential for dental educators as stakeholders in this successful transition to CBE. This agrees with Frank and Danoff⁵ who suggested faculty development as one of the implementation strategies for the CanMEDS core competency framework. From the results of the FGDs with the dental educators, it emerged that dental educators were not completely familiar with AfriMEDS, although they were able to identify most competencies related to AfriMEDS. Faculty development for AfriMEDS, curriculum development, accreditation processes, teaching, learning and assessment would be valuable to ensure the successful implementation of AfriMEDS.²¹

Teaching and learning

In addition, the results from the FGDs suggest the usefulness of dental educators' views on competencies, with a further recommendation given for dental graduates' competencies to be reviewed frequently.²¹ Teaching and learning also forms part of Frank and Danoff's⁵ multifaceted implementation strategy. Results from the SR highlighted various teaching strategies to incorporate the required core competencies. Teaching and assessment should also be aligned and appropriate to CBE. Dental educators from the FGD were more concerned with the teaching and assessment of the core competencies than discussing the competencies.²¹

Curriculum

Curriculum is the final part of the implementation strategy. With transitioning to CBE learning outcomes, teaching strategies and assessment should be aligned. As CBE focuses on outcomes, learner-centredness and abilities, it influences curriculum design.²² Curriculum mapping is a valuable tool to evaluate the alignment of AfriMEDS, and highlights any overlapping or gaps in an undergraduate curriculum.²¹ Curriculum mapping has the potential to display the entire curriculum so that dental educators, leadership and external stakeholders such as the HPCSA would be able to view alignment to the AfriMEDS core competency framework.²¹ This process will inform curriculum development.

DISCUSSION

Figure 3 diagrammatically represents the proposed AfriMEDS core competency framework implementation model. This framework is dynamic and illustrates how processes, faculty development and curriculum impacts and informs teaching, learning and assessment.

The aim of this study was to develop a framework to align and implement the AfriMEDS core competency framework into an undergraduate dental curriculum. Inclusion of the literature and results from the curriculum mapping, FGD and SR guided the document analysis process to develop the implementation framework (Figure 3) of the AfriMEDS core competency framework. In addition to being dynamic, the proposed model allows the institutional framework of the individual dental schools to impact the dental curriculum where relevant. Due to the urgency of the decolonisation of the curriculum in this institution in South Africa, this strategy needs to be considered in the implementation of the competency framework. In addition, this proposed framework allows seamless integration of the AfriMEDS core competency framework into the undergraduate dental curriculum. The implementation of this framework needs to be underpinned by a common understanding of the AfriMEDS core competency framework by all stakeholders (dental educators, programme directors and dental experts involved in accreditation processes).

An appropriate framework for aligning the AfriMEDS core competency framework was developed. However, the urgency of decoloniality within health professions education and the researchers' reflections added new dimensions to this research. In the first study that explored the setting of research priorities for health professions education in sub-Saharan Africa (SSA), one of the priorities was to

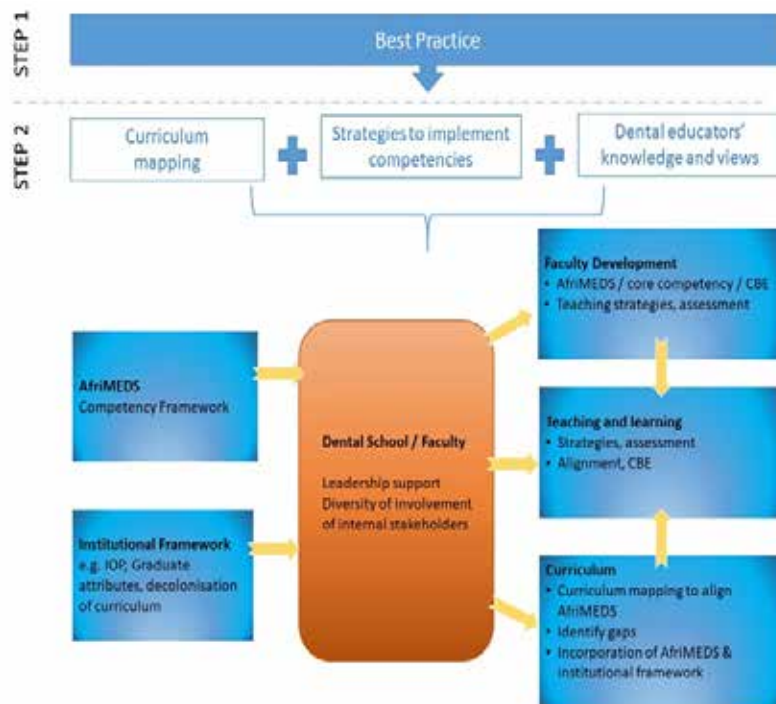


Figure 3: AfriMEDS core competency implementation framework.

determine how to develop and implement curricula that are responsive to the health needs of SSA.²³ In South Africa there are many factors that may impact an undergraduate dental curriculum. As the curriculum (that includes competencies) influences dental schools and the overall implementation of the AfriMEDS core competency framework, it is recommended that the burden of oral health disease, access to oral health care and the higher education landscape be considered when the competencies of dental graduates are reviewed. There appeared to be very little consideration given to oral health in the South African context and its impact on the core competency required for dental graduates in the published literature. Given that oral health is not set as a health priority in South Africa contributes to the complexity of the development and adoption of the AfriMEDS core competency framework for medical and dental schools. In addition, this review of competencies will ensure that the dental graduates are fit for practice in the 21st century. It is important that the dental curriculum is contextually responsive so that dental graduates are trained to be contextually and globally relevant.

CONCLUSION

A dynamic implementation framework was developed to align and implement AfriMEDS core competency framework to an undergraduate dental curriculum. Results from a Delphi follow-up study concluded that this framework was feasible to consider.²⁴ However, as AfriMEDS core competency framework (similar to CanMEDS) was developed for specialist training, a review of the generic “translation” of these core competencies to dental schools and curricula is suggested. It might be valuable to consider the decoloniality strategy when considering African dental graduate competencies. A decolonial strategy in health would reveal the cultural differences in the health care of “peoples with knowledge and ways of life that do not fit into the Western standard”.¹⁴ With this in mind, we should explore whether the adoption of the AfriMEDS from CanMEDS core competency framework is appropriate in the African context.

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Recommended Dental Infection Control Measures Following WHO's Declaration of Monkeypox as a Public Health Emergency

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ABSTRACT

The resurgence of monkeypox, subsequent to its designation as a Public Health Emergency of International Concern by the World Health Organization in 2022, underscores the critical need for rigorous infection control protocols within dental settings. Due to the inherent nature of dental procedures, that involve working in close proximity to patients and potential exposure to infectious bodily fluids, the dental profession faces significant challenges in mitigating the transmission of mpox. This update provides a comprehensive review of the virological characteristics, transmission pathways, and clinical presentation of mpox, with particular emphasis on its oral manifestations and the implications for dental practitioners. It delineates both standard and enhanced infection control measures, including the application of personal protective equipment, stringent hand hygiene practices, meticulous environmental disinfection, and the prudent management of aerosol-generating procedures. Additionally, it addresses the importance of patient screening, isolation of suspected cases, and the education of both dental staff and patients regarding the transmission and prevention of mpox. The necessity for dental professionals to maintain vigilance, remain current with evolving guidelines, and implement comprehensive infection control strategies is emphasized, highlighting the pivotal role of dental practices in the early detection and control of mpox transmission during the ongoing outbreak.

Keywords

Mpox, Infection Control, Dental Settings, Oral Manifestations, Transmission, Personal Protective Equipment

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INTRODUCTION

As emerging infectious diseases continue to shape the global health landscape, the resurgence of monkeypox, now referred to as Mpox, has raised significant concerns, especially in the context of the ongoing COVID-19 pandemic. In July 2022, the World Health Organization (WHO) declared mpox a Public Health Emergency of International Concern (PHEIC)¹, emphasizing the need for stringent infection control measures across all sectors, including the dental setting.² Given the nature of dental procedures, that often involves close contact with patients' faces, mouths and exposure to bodily fluids, rigorous infection prevention and control (IPC) practices are essential to mitigate the risk of mpox transmission. This update provides a comprehensive overview of the recommended dental infection control measures in light of the mpox outbreak, detailing the virus's characteristics, transmission, clinical presentation, and implications for dental professionals.

What is Mpox?

Mpox is a viral zoonotic disease caused by the Mpox virus, a member of the Orthopoxvirus genus within the Poxviridae family, which also includes the variola virus (responsible for smallpox), cowpox virus, and vaccinia virus. The Mpox virus was first identified in 1958 in research monkeys, and the first human case was recorded in 1970 in the Democratic Republic of the Congo.³ There are two genetic clades of the virus: clade I and clade II, with clade II further divided into clade IIa and clade IIb.⁴ The latter was primarily responsible for the global outbreak in 2022–2023. Mpox is endemic in Central and West Africa, where it primarily circulates among wild animals, but recent outbreaks in non-endemic regions have raised global concerns.⁵

According to the WHO, mpox is typically a self-limiting disease, with symptoms lasting from 2 to 4 weeks. However, severe cases can occur, particularly in children, pregnant women, and individuals with compromised immune systems.⁵ As of August 2024, over 20,000 mpox cases have been reported across 13 African Union Member States, with the Democratic Republic of the Congo (DRC) accounting for more than 90% of these cases. The DRC has reported 19,667 cases, including 575 deaths, primarily linked to MPXV subclades Ia and Ib. Neighbouring countries, including the Republic of Congo, Central African Republic, Burundi, Rwanda, and Uganda, have also reported confirmed cases linked to these

subclades. In addition, Kenya and Gabon have reported isolated cases, with the latter linked to travel from Uganda. While the DRC and Burundi are likely experiencing ongoing community transmission, insufficient data from other countries makes it difficult to determine the full extent of the outbreak across the continent.

Transmission and Spread of Mpox

Mpox transmission occurs via multiple pathways, making infection control in dental settings particularly challenging. The virus can spread from person to person through direct contact with infectious skin lesions, respiratory droplets, or contaminated materials such as bedding and clothing. The virus can enter the body through broken skin, mucosal surfaces (e.g., oral, pharyngeal, ocular, genital, anorectal), or the respiratory tract. This mode of transmission is especially relevant for dental professionals due to the potential for aerosolized virus particles during procedures.⁵ Human-to-human transmission is often facilitated by close physical contact, including face-to-face, skin-to-skin, and mouth-to-mouth contact, which are common in settings like dental clinics.³

In addition to human-to-human transmission, mpox can also spread from animals to humans, often through bites, scratches, or activities like hunting and preparing infected animals. The virus has been detected in a range of animals, and the potential for further zoonotic spill over adds complexity to controlling its spread.⁷ This zoonotic aspect underscores the complex nature of mpox outbreaks and the importance of comprehensive infection control measures in various settings.⁵

The WHO also highlights the possibility of transmission via fomites, where the virus can remain viable on surfaces or objects that have been in contact with an infected person. Therefore, there should be routine environmental cleaning and disinfection in all healthcare settings, including dental clinics, to prevent indirect transmission of the virus.⁵

Signs and Symptoms of Mpox

The clinical presentation of mpox usually begins within one to 21 days after exposure, with symptoms lasting two to four weeks. Common symptoms include fever, sore throat, headache, muscle aches, back pain, low energy, and swollen lymph nodes, followed by a rash that progresses through several stages: macules, papules, vesicles, pustules, and scabs. The rash often starts on the face and spreads to other parts of the body, including the palms, soles, mouth, and genital areas.⁵ Oral lesions, which can be particularly painful, are a significant concern in dental settings as they can facilitate viral transmission during procedures.⁸

Oral manifestations of mpox are significant for dental professionals, as they can present as mucosal lesions in the mouth, including ulcers, vesicles, or pustules on the tongue, oral mucosa, or lips.⁹ A systematic review and meta-analysis by Bagde et al. (2024)¹⁰ reported a high prevalence of oral lesions in mpox cases, and oral lesions can therefore be one of the early indicators of the disease. The review and meta-analysis highlight the significant variation in the presentation of oral lesions associated with Mpox, which poses challenges in clinical diagnosis and management. The study documents a spectrum of oral manifestations, ranging from isolated ulcers to multiple vesicular eruptions,

reflecting the diverse pathophysiology of the disease.¹⁰ This variability complicates the identification of Mpox in its early stages, as oral lesions may resemble those of other viral or non-viral infections. The findings underscore the need for heightened clinical awareness and the inclusion of Mpox in differential diagnoses when encountering atypical oral lesions, particularly in areas where the disease is endemic or among patients with relevant exposure histories.

The oral manifestations of mpox can be similar to those observed in other viral and bacterial infections, making diagnosis challenging.¹¹ For example, mpox oral lesions can resemble those of herpes simplex virus (HSV), that is characterized by painful vesicles and ulcers in the mouth. Additionally, they may be similar to aphthous ulcers, which are common in conditions like Behçet's disease or even secondary syphilis, where oral mucosal patches and ulcers are prevalent. This similarity underscores the need for careful differential diagnosis in dental settings to avoid misdiagnosis and ensure appropriate management.¹¹

In response to the Mpox outbreak, it is imperative that dental clinics uphold the stringent infection control protocols initially implemented during the COVID-19 pandemic. The risk to healthcare personnel is significantly elevated when exposed to an infected patient without appropriate personal protective equipment (PPE), a concern substantiated by prior instances of healthcare-associated infections. The WHO is collaborating with healthcare authorities to investigate ways to disrupt the transmission chain by enhancing awareness among at-risk populations and healthcare professionals, including those in laboratory settings. While the likelihood of Mpox transmission in dental practices is relatively low, it is crucial that dentists adopt additional precautions during aerosol-generating procedures, notably by utilizing N95 respirators. Furthermore, dental professionals are integral to curbing the spread of the virus through diligent preventive measures and timely reporting of suspected Mpox cases to local health authorities.¹² Moreover, the identification of oral manifestations can play a crucial role in the early detection of mpox. Dental professionals are often among the first healthcare providers to observe these signs. They should be aware of and trained to recognize the oral symptoms of mpox and take appropriate actions, including isolating the patient, implementing additional IPC measures, and referring the patient for further medical evaluation.¹³ The WHO also notes that the early recognition of these signs is critical in controlling the spread of mpox, particularly in healthcare settings.⁵

Some patients may experience severe complications, such as bacterial skin infections, pneumonia, encephalitis, and even death, particularly in immunocompromised individuals. The distinctiveness of mpox symptoms, particularly the simultaneous occurrence of rash and lymphadenopathy, helps differentiate it from other diseases such as chickenpox or measles.¹⁴ However, due to overlapping symptoms with other illnesses, accurate diagnosis is crucial.

Diagnosis of Mpox

Diagnosing mpox involves a combination of clinical assessment and laboratory testing. Clinicians may suspect mpox based on the characteristic rash and a history of potential exposure. Laboratory confirmation is typically achieved through polymerase chain reaction (PCR) testing of samples from skin lesions, which is the preferred

diagnostic method. In the absence of skin lesions, swabs from oropharyngeal, anal, or rectal sites can be tested. Blood tests are generally not recommended, as they do not effectively distinguish between different Orthopoxvirus infections.⁵

Advanced diagnostic tools, such as next-generation sequencing (NGS), are increasingly being used to detect and characterize the virus, providing critical information for outbreak tracking and management.⁷ NGS offers a more detailed understanding of the virus's genetic makeup, which is vital for monitoring the evolution of mpox and identifying any potential mutations that could impact disease spread or vaccine efficacy.¹⁵ For dental professionals, understanding the diagnostic process is crucial for early identification of symptoms in patients, leading to timely referrals and appropriate management.

Basic Treatment & Vaccination

Currently, there is no specific treatment for mpox, and clinical management primarily focuses on symptomatic relief and supportive care.¹⁶ Patients with mild symptoms require only basic symptomatic treatment, such as antipyretics for fever and analgesics for pain. In severe cases, antiviral agents like tecovirimat, originally developed for smallpox, may be used under compassionate use protocols for mpox.⁷ Supportive care is also critical in managing severe cases, including hydration, pain management, and treatment of secondary bacterial infections.

Vaccination plays a pivotal role in preventing mpox. The smallpox vaccine, which has historically been effective against mpox due to the similarity between the viruses, remains the primary prophylactic measure. The JYNNEOS vaccine (also known as Imvamune or Imvanex) is an attenuated live vaccine that is FDA-approved for mpox prevention and is recommended for individuals at high risk of exposure, such as healthcare workers and laboratory personnel handling orthopoxviruses.⁷ According to the WHO, the JYNNEOS vaccine is also recommended for people who have been in close contact with someone with mpox, as vaccination within four days of exposure can prevent the onset of the disease. If administered between 4 and 14 days after exposure, it can reduce the severity of symptoms, even if it does not completely prevent the disease.⁵

Another vaccine, ACAM2000, is a replication-competent live vaccinia virus vaccine that has also been used against mpox. However, due to its risk profile, including potential side effects, its use is limited to specific groups under particular conditions.¹⁶ The WHO emphasizes that while these vaccines are vital tools in controlling the spread of mpox, their availability and use should be accompanied by robust public health measures, including surveillance, contact tracing, and education to ensure comprehensive prevention and control efforts.⁵

Recent advances in vaccine development have led to the creation of multivalent mRNA vaccines, such as BNT166, which have shown promise in preclinical trials for providing broad protection against orthopoxvirus

There are three active mucosal morphologies typically seen in the mouth: ulcerations/erosions without surrounding induration; papules and nodules resembling chancres; and pseudomembranous (sloughy) plaques mimicking candidiasis. All these lesions heal quickly without crust formation or dyspigmentation.



Source: Hospital Clínic de Barcelona, Spain Atlas of mpox lesions: a tool for clinical researchers.



Source: Hospital Clínic de Barcelona, Spain. Atlas of mpox lesions: a tool for clinical researchers.



Source: Evandro Chagas National Institute of Infectious Diseases-Fiocruz (Brazil)

*reproduced with permission

Source: Atlas of mpox lesions: a tool for clinical researchers, version 1.0, 28 April 2023 WHO/MPX/Clinical/Lesions/2023.1 World Health Organization, 2023



Umbilicated vesicle on Day 4 of MPox infection.



Umbilicated vesicle on Day 4 of MPox infection.

diseases, including mpox. These innovations could offer additional tools for managing future outbreaks. The development of these vaccines is critical as they could provide a more targeted immune response and longer-lasting immunity, which is particularly important for high-risk populations.^{17,18}

Self-Care and Prevention

For individuals diagnosed with mpox, self-care is essential to manage symptoms and prevent further transmission. Patients are advised to isolate until all lesions have healed and scabs have fallen off. During this period, maintaining good hygiene, including frequent handwashing and disinfecting surfaces, is crucial. Infected individuals should avoid close contact with others, particularly those who are immunocompromised, to reduce the risk of spreading the virus.⁵

Public health strategies to prevent mpox include vaccinating high-risk populations, educating the public on recognizing and responding to symptoms, and enforcing robust infection control measures in healthcare settings. For dental professionals, this involves adhering to strict IPC protocols, such as the use of personal protective equipment (PPE), proper sterilization of instruments, and comprehensive environmental cleaning.³ These preventative measures are essential in breaking the chain of transmission, particularly in high-risk environments like dental clinics, where close contact is unavoidable.

Importance to Dental Professionals

Mpox poses unique challenges to dental professionals due to the nature of their work, which involves close contact with patients' faces and mouths. Dental procedures often generate aerosols and droplets, which could potentially carry the mpox virus, increasing the risk of transmission if proper precautions are not taken.¹³ The use of high-speed dental instruments, such as drills, ultrasonic scalers, and air-water syringes, can create a significant aerosol plume that may contain infectious particles, making enhanced protective measures essential.

Additionally, the presence of oral manifestations of mpox complicates infection control efforts in dental settings. Lesions in the oral cavity can act as viral reservoirs, facilitating the spread of the virus during routine dental care. This is particularly concerning given the close proximity required for carrying out dental procedures and the potential for direct exposure to these lesions.¹² The systematic review by Bagde et al. (2023)¹⁰ further underscores the importance of recognizing the oral manifestations, as they not only indicate the presence of mpox but also highlight the potential for significant viral transmission during dental procedures. The review also calls attention to the need for dental professionals to remain vigilant, up-to-date and well-informed about the latest research on mpox and its oral manifestations to ensure effective infection control.

The implications for dental professionals extend beyond the immediate risk of infection. The psychological impact of working in an environment with potential exposure to emerging infectious diseases can lead to increased stress and anxiety among dental staff. It is essential for dental practices to provide adequate training, support, and mental health resources to help staff manage these challenges while maintaining high standards of patient care.⁹

Standard Precautions in Dental Settings

Infection control in dental settings has always been a priority due to the inherent risks associated with aerosol-generating procedures (AGPs). The following standard precautions should be rigorously implemented to prevent the transmission of mpox in dental practices:

1. Hand Hygiene: Hand hygiene is the foundation of infection control in any healthcare setting. Dental

professionals should perform hand hygiene before and after each patient contact, after contact with potentially infectious materials, and after removing PPE. Alcohol-based hand sanitizers or handwashing with soap and water are effective against the mpox virus and should be used consistently.¹⁹

2. **PPE:** The appropriate use of PPE is essential in preventing the spread of mpox in dental settings. This includes wearing gloves, gowns, masks, and eye protection (e.g., goggles or face shields) to protect against contact with infectious materials. N95 respirators or equivalent protection should be worn during AGPs to safeguard against respiratory droplets and potential aerosols that may carry the virus.¹³
3. **Respiratory Hygiene/Cough Etiquette:** Patients should be encouraged to cover their mouths and noses with a tissue or their elbow when coughing or sneezing. Dental practices should ensure that disposable tissues and hand hygiene facilities are readily available in the clinic.²⁰ Patients presenting with symptoms consistent with respiratory infections should be rescheduled if possible, or treated with heightened precautions to prevent potential transmission.¹³
4. **Environmental Cleaning and Disinfection:** Environmental cleaning and disinfection are critical components of infection control in dental practices. Surfaces in dental settings should be cleaned and disinfected using EPA-registered disinfectants that are effective against enveloped viruses, including the mpox virus. High-touch surfaces, such as dental chairs, countertops, and door handles, should be disinfected between patients to minimize the risk of surface-to-person transmission.²¹
5. **Safe Injection Practices:** To prevent cross-contamination, dental practices should use single-dose vials at all times and ensure the safe handling of sharps. Adherence to safe injection practices is essential in reducing the risk of pathogen transmission, particularly in a high-risk environment like a dental clinic.²²

Additional Precautions for Mpox

In addition to standard precautions, dental practices should implement the following additional measures to address the specific risks posed by mpox:

1. **Screening and Triage:** Dental practices should implement screening protocols to identify patients with symptoms of mpox, such as fever, rash, and lymphadenopathy. Patients who present with suspected or confirmed mpox should be rescheduled unless urgent dental care is necessary. In cases where treatment cannot be postponed, strict IPC measures, including enhanced PPE and isolation protocols, should be implemented.⁹
2. **Isolation of Suspected Cases:** If a patient is suspected of having mpox, they should be isolated from other patients and staff immediately. Treatment should be provided in a designated room with adequate ventilation and minimal traffic to reduce the risk of spreading the virus within the clinic.²¹
3. **AGPs:** Given the potential for mpox transmission

through respiratory droplets and aerosols, AGPs should be minimized whenever possible. When AGPs are necessary, enhanced precautions, such as using rubber dams, high-volume evacuators, and pre-procedural mouth rinses with antiviral agents, should be employed to reduce the risk of viral dissemination.²³

4. **Patient and Staff Education:** Educating both patients and dental staff about mpox transmission and prevention is vital to controlling the spread of the virus in dental settings. Staff should be trained on the correct use of PPE, the importance of hand hygiene, and the implementation of IPC measures. Patients should be informed about the signs and symptoms of mpox and advised to notify the clinic if they develop symptoms after their visit.²²

Concluding Remarks

The declaration of mpox as a Public Health Emergency of International Concern by the WHO highlights the urgent need for stringent infection control practices in dental settings. As emerging infectious diseases, like mpox, continue to pose significant public health threats, dental professionals need to be informed and prepared to implement the necessary precautions to protect themselves, their patients, and the broader community. By adhering to recommended guidelines, staying updated on new therapies and developments in mpox research, and conducting thorough oral examinations, dental practices can play a vital role in controlling the spread of the mpox virus during and beyond the current outbreak.

Conflict of Interest

The authors declare that the manuscript was created without any commercial or financial associations that may give rise to a conflict of interest.

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Online CPD in 6 Easy Steps



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The head and neck features of Gardner's Syndrome: A case report and review of the literature

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ABSTRACT

Background

Gardner's Syndrome represents an autosomal dominant variant of Familial Adenomatous Polyposis in which affected individuals have a 100% risk of developing colorectal carcinoma. The extra-intestinal manifestations in the head and neck region allow for the early recognition and diagnosis of this rare syndrome. The defining triad of features includes intestinal polyposis, dento-osseous anomalies and soft tissue lesions.

Methods

A 20-year-old female patient presented with a main complaint of swelling involving the left side of her nose, at which time a panoramic radiograph was obtained.

Results

Radiographic findings showed multiple osteomas, odontomas, missing teeth as well as unerupted and impacted teeth, the features of which are highly suggestive of Gardner's Syndrome.

Conclusion

Early recognition of the extra-intestinal features of Gardner's Syndrome warrants patient referral for further investigation including colonoscopy and genetic testing.

Keywords

Gardner's Syndrome, osteomas, intestinal polyposis, odontomas, supernumerary teeth, epidermoid cysts

INTRODUCTION

Gardner's Syndrome (GS) is a rare condition initially defined as an autosomal dominant (AD) hereditary form of colonic polyposis which occurs in association with osteomas and multiple cutaneous and soft tissue tumours.¹⁻³ Patients with undiagnosed GS are at almost 100% risk of developing colorectal carcinoma in the third to fourth decades of their lives with a reported incidence of death occurring at 41 years of age.^{1,4,5} A spectrum of extra-intestinal manifestations has been documented, all of which precede the intestinal polyposis and its malignant transformation.^{1,3,6,7} The extra-intestinal manifestations, particularly those occurring in the head and neck region, should always be viewed with a high index of suspicion by the oral health care worker (OHCW). For this reason, OHCWs should have at least some basic knowledge regarding the dental and craniofacial features associated with GS.⁸ Furthermore, any extra-oral or skin lesions of the head and neck region as well as the appearance of the oral mucosa should be thoroughly examined in order to document any related lesions or changes. Cutaneous findings associated with GS include epidermoid cysts, desmoid tumours and occasionally other benign skin neoplasms such as lipomas.^{1,2} Some 50%-65% of patients with GS present with multiple asymptomatic epidermoid cysts predominantly involving the face, scalp and occasionally the extremities.^{1,2} The extra-intestinal head and neck manifestations of GS may easily be recognised at dental consultation with plain film panoramic radiography. Dental anomalies linked to GS are found in 30%-75% of patients. These may include impacted and supernumerary teeth, as well as areas of idiopathic osteosclerosis. These signs are important clues for diagnosis and should not be overlooked.⁸ The osteomas in GS are benign bone forming lesions composed of well differentiated mature bone tissue with a predominant laminar structure. Multiple osteomas are usually identified in GS patients with the mandible most often being involved. Skull and maxillary involvement are also frequent. Mandibular osteomas may appear solitary or as lobulated masses of bone. Solitary (central) osteomas are usually located at or near the apices of teeth, while lobulated osteomas tend to be cortical in nature and are frequently encountered in the mandibular angle area. Osteomas are relatively asymptomatic and slow growing, but may reach proportions which cause facial distortion, asymmetry and even result in chewing disorders and limitation of mouth opening. Large osteomas may even compromise adjacent structures to the extent that swallowing and breathing may be compromised. The craniofacial and dental features may thus be some of the most significant indications of the need for care to prevent malignant transformation of intestinal polyposis and may

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Keywords

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Conflict of interest

The authors declare they have no conflict of interest.

indeed be of life-saving importance.^{2,9,10} The vigilant OHCW should thus be prompted to refer the patient for further gastrointestinal and genetic testing.^{8,9,11,12} The pertinent dental findings may indeed serve as a form of colorectal cancer screening in this subset of patients.^{8,13}

The following case report intends to highlight the essential role of the OHCW in identifying cutaneous, dental and osseous features which are suspicious for underlying GS. It further demonstrates that the craniofacial and dental manifestations of the syndrome can be detected as early as the second decade of life and may thus be pertinent in preventing the early mortality documented in undiagnosed patients with GS.

CASE REPORT

A 20-year-old female patient presented to the Department of Oral and Maxillofacial Surgery at the Sefako Makgatho Oral Health Centre with a main complaint of swelling on the left side of her nose which had been present for several years. The patient reported that the lesion was painful and had been swelling and receding for several years. The patient was in good health with no significant medical history and, to her knowledge, no other family members had reported or experienced a similar condition. Intra-oral examination revealed several missing teeth, a bulbous soft tissue protrusion emanating from the buccal mucosa in the second quadrant, and purulent discharge was present in the region of teeth 24 and 25. Extra-oral examination revealed a swelling above the left cheek. No abnormalities were detected on examination of the temporomandibular joints (TMJ). A panoramic radiograph obtained at this appointment showed features in keeping with GS. The radiological features are demonstrated in Figure 1.

Clinical findings were further explained to the patient highlighting the complexity of this case. To alleviate pain and purulent discharge in the second quadrant and after ensuring that informed consent was obtained from the patient, local anaesthesia (2% lignocaine, Xylotox) was administered and teeth 24 and 25 were surgically extracted. A small portion of

bone was removed from within the sockets and submitted for histological evaluation. The patient was prescribed antibiotics (1000mg Augmentin, one tablet twice daily for 5/7 days), analgesics (1000mg Paracetamol and 400mg Ibuprofen, two tablets every 6 hours when necessary for pain for 7/7 days), and mouthrinse (0.2% chlorhexidine digluconate, rinse with 10ml twice daily for 5/7 days). The patient was seen one week later for follow-up, at which time wound healing was proceeding well.

The most striking features on examination of the panoramic radiograph are multiple osteomas located predominantly within the angle and ramus area of the left mandible. Similar smaller lesions are present within the posterior right mandibular body distal to tooth 47. The osteomas located in the left mandibular angle and ramus area form well circumscribed radiopaque lesions of variable size. One of these is located at the angle of the mandible appearing to have formed peripherally as a periosteal lesion. A second osteoma is peculiarly located within soft tissue as an extra-osseous variant and is located within the space between the coronoid process and the condylar head. The remaining osteomas in this region are located within the ramus region, appearing to be extra-osseous in subtype.

Within the first quadrant there is an unerupted tooth 11, missing tooth 12, retained 53 with impaction of teeth 13, 14 and 15. The roots of tooth 16 are indistinct. Tooth 18 is impacted. Within the anterior maxilla in the region of tooth 11 is a circumscribed radiopaque lesion surrounded by a radiolucent halo, the features of which are in keeping with a complex odontome.

Within the second quadrant are impacted teeth 23, 24 and 25. Between the roots of the impacted 24 and 25 is an ill-defined lesion which appears to comprise multiple tooth-like radiopacities in keeping with a compound odontome. Tooth 28 is impacted because of a lack of space.

Within the third quadrant is an impacted and misshapen tooth 32 while both teeth 33 and 34 are impacted and



Figure 1: Panoramic radiograph showing features suggestive of Gardner's Syndrome.

displaced inferiorly towards the lower border of the mandible. Tooth 35 is missing. An endosteal osteoma is located on the mesial aspect of the mesial root of tooth 36 while a similar lesion is present on the mesial aspect of tooth 37. Tooth 38 is missing.

Examination of the fourth quadrant shows an impacted tooth 43. Between the impacted 43 and the dilacerated root of tooth 44 is an indistinct mixed radiolucent/radiopaque lesion which may possibly represent an odontome which is located out of the plane of section. Tooth 45 and tooth 48 are both missing. A possible endosteal osteoma is located on the distal aspect of tooth 47 while an additional smaller periosteal osteoma is identified along the lower border of the right body of the mandible.

This panoramic radiograph shows the presence of more than 3 recognisable osteomas in addition to multiple dental anomalies including impacted and unerupted teeth, odontomas and missing teeth. These features are both highly suggestive and predictive of the diagnosis of Gardner's Syndrome. The age of the patient, considering the possible life-threatening complications of Gardner's Syndrome, is fortuitous as this may allow for timely intervention if diagnostically confirmed. It is exigent that this patient be referred to a gastroenterologist as well as a geneticist for colonoscopy examination and genetic testing for APC gene mutations respectively. Furthermore, this patient will require extensive dental intervention for which prosthodontic, orthodontic and maxillofacial surgical assessment is required. While it appears that the osteomas are asymptomatic at present, surgical excision will be warranted if there is any facial asymmetry on growth or if examination shows any interference with mandibular function or dental occlusion.

DISCUSSION

Gardner's Syndrome (GS) is a clinical variant of Familial Adenomatous Polyposis (FAP) in which there is functional inactivation of the tumour suppressor gene Adenomatous Polyposis Coli (APC). The exact breakpoint at which the mutation occurs on chromosome 5q is unknown but varies from q13 to q31. More than 1400 mutations have been identified. This is responsible for the wide array of clinical manifestations seen in GS.²⁻⁴ The site on chromosome 5q2, however, determines that affected patients develop intestinal polyposis which have the potential to undergo malignant transformation.⁴ GS is inherited in an autosomal dominant (AD) mode.⁴ Truncating mutations of band 5q21-q22 results in the formation of a multidomain, multifunctional protein involved in Wnt signalling and microtubule function. There is no racial or gender predilection for GS.⁴ Familial clustering is seen in most cases of GS; however, in up to one third of patients, GS occurs spontaneously due to *de novo* mutations.^{3,13}

The traditional triad of features which defines Gardner's Syndrome includes intestinal polyposis, dento-osseous lesions and soft tissue lesions.^{1,14} The extra-intestinal manifestations are generally noted earlier than the intestinal pathology which, although largely asymptomatic, would alert the most astute clinician to the possibility of underlying GS.⁴ The most consistent feature in all patients is, of course, the presence of intestinal polyposis which affects the small and large intestines and occasionally the gastric mucosa. The polyposis is initially asymptomatic but develops within

the second to early third decades. Polyps are present in most patients at around the time of puberty. Patients develop hundreds to thousands of benign adenomas – usually tubular, villous and tubulo-villous subtypes, which literally carpet the luminal aspect of the bowel. The polyps slowly enlarge in size and are known to increase in number with an increase in age.^{3,13} Early clinical signs and symptoms attributed to the polyps may include anaemia, constipation, bloody diarrhoea, bowel obstruction, mucous discharge and abdominal pain.⁴ Larger polyps may prolapse through the anus or have the potential to cause bowel obstruction by intussusception or ileus.³ The polyps are initially smaller than 5mm representing benign adenomas which slowly begin to transform via dysplastic change in the classically described adenoma-carcinoma sequence. This illustrates the multistep carcinogenic process which is hastened in patients with pre-existing inflammatory bowel disease, a diet low in fibre and high in fat, in patients with a sedentary lifestyle, obesity and in those who smoke and consume alcohol. Malignant transformation is almost inevitable due to the sheer number of polyps inherently part of GS. Untreated GS has 100% risk of malignant transformation in which the average age of death of a patient with colorectal carcinoma is 41 years. This is more than 25 years earlier than the age recorded for death in patients with isolated colon cancer in the general population.^{4,7}

The dento-osseous manifestations of GS include multiple osteomas which have a predilection for occurrence within the craniofacial bones, particularly within the mandible. They may also be identified within the maxilla, paranasal sinuses and less frequently within long bones.¹¹ Osteomas are benign bone forming lesions which slowly enlarge in size and remain asymptomatic. Surgical excision is only necessary for large lesions which cause facial asymmetry or unesthetic facial outgrowths or rarely if their location interferes with mandibular function or dental occlusion.¹⁵ Osteomas present as circumscribed radiopaque masses. They tend to be quite numerous within the mandible and are easily diagnosed on plain film panoramic radiography as a coincidence at routine dental examination.¹⁵ Osteomas are present in 90% of patients with GS with up to half of all patients presenting with three or more osteomas in the maxilla or mandible.^{11,15} This alone is an indication of possible GS which should indicate that further investigation is required.⁹

There are a multitude of dental anomalies common to GS including supernumerary teeth, unerupted and impacted teeth, missing teeth, hypercementosis, hypodontia, compound odontomas and abnormal tooth morphology, many of which are present in this case. Within the adjacent jawbone there are often multiple areas of idiopathic osteosclerosis. It is interesting to note that the highest number of dental anomalies are usually identified in patients with multiple osteomas; however, the dental abnormalities may be identified in the absence of osseous involvement and do not occur secondary to bone lesions.¹⁰

The soft tissue manifestations of GS include cutaneous lesions and soft tissue neoplasms. The most common cutaneous lesions seen in association with GS are epidermoid cysts which are usually located on the skin of the scalp. These are present in up to 65% of patients with GS. These cysts are easily recognisable clinically and arise pre-pubertally and may also be seen on the skin of the face and

extremities.¹⁰ Unusual skin pigmentation may also be seen. Soft tissue neoplasms are generally of a benign nature and include lipomas, neurofibromas and leiomyomas. Desmoid tumours are rare subcutaneous lesions located within the abdominal and retroperitoneal regions. They are potentially difficult to manage due to their relentless recurrence.^{2,10}

The relatively simplistic method of identifying possible patients with GS by recognising the head and neck manifestations of disease, should be entrenched in the dental education of all OHCWs, thus increasing their vigilance for any signs or symptoms to suggest its presence. This is critical to intervene and to refer for further investigation. Although more than three craniofacial osteomas are highly predictive of the presence of GS, the World Health Organisation has documented specific diagnostic criteria for its formal diagnosis. The three diagnostic criteria which the WHO has identified include 100 or more colorectal polyps; an APC germline mutation; and a family history of FAP and at least one epidermoid cyst, osteoma or desmoid tumour.⁴

Patients who present with suggestive features should be referred for genetic testing and colonoscopy. If the results are confirmatory, all family members should likewise be evaluated for Familial Adenomatous Polyposis.⁷ Patients with GS may have to undergo a prophylactic colectomy if they are recognised as high risk. Furthermore, it is imperative that all cases be documented in order to raise awareness among health care personnel and for epidemiological purposes.¹³

Following extraction of the teeth 24 and 25 in this patient, the patient was fully informed of the underlying risk of possible GS and was therefore referred for colonoscopy and genetic testing. We have yet to receive any feedback with regard to the results of this referral.

CONCLUSION

The patient who presents with suspected GS should be subjected to comprehensive intra- and extra-oral examinations which may reveal any lesions seen in association with GS involving the skin or mucosa. An accurate medical history including a family history should be well documented. It is imperative that such patients be referred for specialist investigation and follow-up including colonoscopy, genetic testing and counselling.

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Online CPD in 6 Easy Steps



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What's new for the clinician – summaries of recently published papers (August 2024)

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Edited and compiled by Prof V Yengopal, Faculty of Dentistry, University of the Western Cape

1. Comparative effectiveness of preemptive administration of ibuprofen and ibuprofen arginine on the anaesthetic success of inferior alveolar nerve block in teeth with symptomatic irreversible pulpitis: a double-blind randomised clinical trial

Millions of patients each year suffer from episodes of acute pain, ranging from mild to severe, as a result of numerous conditions in the fields of trauma, surgery and dental procedures.¹ Acute pain usually lasts for less than 7 days but often extends up to 30 days and, for some conditions, acute pain episodes may recur periodically.¹

Despite the availability of effective pharmacological and non-pharmacological approaches, the management of pain remains inadequate across different treatment settings, with a substantial proportion of patients continuing to experience pain of mild to moderate intensity.¹

Ibuprofen is an NSAID with analgesic, anti-inflammatory and antipyretic properties that has proven to be safe and effective for treating many different types of pain. Currently available in the market are preparations in which bioavailability of ibuprofen is increased by salification with various salts, in particular, L-arginine (ibuprofen arginate).

Managing pain during endodontic treatment for teeth with symptomatic irreversible pulpitis poses challenges – obtaining effective anaesthesia in this condition, especially in lower posterior teeth, is notably more difficult than for healthy pulps due to various factors, including altered resting potentials, heightened excitability thresholds of inflamed fibres, increased sodium channel expression, the presence of anaesthetics-resistant sodium channels, and patient psychological factors.¹

Assessing pain is intricate, as it involves subjective sensations influenced by behavioural, cultural, psychological and environmental factors, along with expectations, fear, anxiety and depression. Changes in dental anxiety from moderate to very severe has been shown to increase the risk of difficult or failed anaesthesia by more than 30 times.¹ Therefore, the level of anxiety is one of the most important predictors of success in dental anaesthesia. De Oliveira and colleagues (2024)¹ reported on a randomised clinical trial (RCT) that sought to assess the pre-emptive use of ibuprofen arginine, considering the influence of anxiety and preoperative pain on inferior alveolar nerve block (IANB) effectiveness in symptomatic irreversible pulpitis-affected teeth.

MATERIAL AND METHODS

This was a randomised, double-blind, placebo-controlled clinical trial conducted at a dental school in Brazil. Patients

aged 18 years or older who had a clinical diagnosis of symptomatic irreversible pulpitis in their lower posterior teeth were selected. The diagnosis was established based on anamnesis and both clinical and radiographic assessments. Inclusion criteria required participants to report spontaneous pain, a positive response to the cold test, and the absence of radiographic evidence of pulp cavity exposure. Patients excluded comprised pregnant women, patients who could not take ibuprofen due to previous sensitivity, allergies or other reasons, who were allergic to local anaesthetics or sulfites, had a significant history of health problems, were sensitive to the post anaesthesia test, absence of reported lower lip numbness following inferior alveolar nerve block (IANB), ingested analgesics or anti-inflammatory drugs 8h prior to treatment, and were unable to give informed consent or to comprehend the anxiety level questionnaire or the pain rating scale. Sample size calculations showed that for an 80% study power, at least 50 patients were needed.

The participants were randomly divided into three groups (n=50) with the following premedication alternative: Group 1. Ibuprofen 600mg; Group 2. Ibuprofen arginine 1155mg (equivalent to 600mg of ibuprofen and 555mg of arginine); Group 3. Placebo. All the medications and anaesthetics used in the IANB belonged to the same manufacturing batch.

In the waiting room, the patient's level of anxiety toward dental treatment was measured by application of the Modified Dental Anxiety Scale (MDAS) questionnaire. The completed questionnaire was kept in a sealed envelope, together with the patient's medical record, and filed as such until the end of the study. The data collection instrument consisted of the anamnesis, the radiographic examination and intraoral physical examination, comprising the palpation, pulp sensitivity and percussion test, as well as the evaluation of periodontal health (absence of mobility, and recession or loss of periodontal insertion). The cold test was performed with refrigerant gas under relative isolation, and applied with a cotton ball at the centre of the buccal surface of the tooth. Preoperative pain intensity (patient's self-reported pain level) was recorded using the Heft-Parker visual analogue scale.

After 30min of administering the medication, the patients were seen by the operating researcher, a specialist in endodontics with six years of experience. All patients received injections of 1.8ml of anaesthetic comprising 2% lidocaine with 1:100,000 epinephrine applied by using the direct technique for IANB. After 15min of anaesthesia application, the patient was asked if his lip was numb. If lip numbness was not achieved, the block was considered unsuccessful and the patient was excluded from the study. If the block was successful, the patient was submitted to the cold test, and the coronal access cavity preparation

was initiated in those with a negative response. Excluded patients received a new anaesthesia protocol, and their treatments continued separate from the study.

The patients were instructed to notify the operator if they felt any pain during the endodontic intervention. After treatment completion, the patients were monitored by telephone every 24h for 2 days for possible side effects or painful symptomatology. In the case of postoperative symptoms or interurrences, medication was prescribed and/or the patient was scheduled to return to resolve the situation. According to the score obtained in the MDAS questionnaire, the patient's anxiety level was classified as: relaxed (+1); kind of uncomfortable (+2); tense (+3); anxious (+4); so anxious that I break out in a sweat or start to feel sick (+5). The final score was obtained by adding the scores corresponding to the answers to the five questions, and yielded a variation that ranged from 5 to 25 points.

The intensity of preoperative pain was indicated by the patient on a 170mm line, and classified according to the Heft-Parker visual analogue scale as absent (point 0mm), mild (from point 1mm to 54mm), moderate (between 55mm and 113mm) and severe (above 113mm). If the patient felt any pain during the treatment, the procedure was interrupted and the patient indicated the intensity of the pain felt using the Heft-Parker visual analogue scale. If access to and preparation of the root canal were performed without pain, or if only mild pain was reported, the anaesthetic blockade was considered efficient; however, if the report was moderate or severe pain, it was considered anaesthetic failure.

RESULTS

Out of a total of 167 potential patients that were screened, 13 were excluded before the experimental procedures because they had ingested other pain relief medication less than 8h before the pre-emptive treatments. Therefore, 154 patients that remained were randomised into experimental (n=51) and placebo (n=52) groups.

A total of 4 patients were excluded from the statistical analysis because they did not experience lip numbness following IANB, which indicated a failure in the anaesthetic. The participants' preoperative pain intensity was scored according to the Heft-Parker scale, and classified as mild (≤ 54 mm) by one patient, moderate (≥ 55 mm ≤ 113 mm) by 46, and severe (≥ 114 mm) by 103. The level of anxiety regarding dental treatment, determined by the MDAS scale, ranged from 6 to 21 points. When comparing the mean scores for preoperative pain, there was no significant difference for pain intensity among the participants in the three groups. When comparing the median values of the anxiety score, no statistical difference was found among the anxiety levels of the participants in the three groups. The IANB was considered efficient for 62% of the patients in the ibuprofen group, 78% in the ibuprofen arginine group, and 34% in the placebo group, pointing out the significant difference observed for the placebo group ($p < 0.001$).

Patients who received the pre-emptive ibuprofen medication had a 1.82 risk ratio (RR) of having an effective IANB over placebo (95% confidence interval of 1.17 to 2.84), and those who received pre-emptive ibuprofen arginine had a 2.29 RR (95% confidence interval of 1.52 to 3.47).

Analysing the patients who had efficient alveolar nerve block compared to those who experienced block failure,

it was observed that the average preoperative pain in the group with efficient alveolar nerve block (n=70) was 118.3, whereas in the group of those who had anaesthetic block failure, it was 132.1 (n=30), with a statistically significant difference between them ($p=0.025$). It was also observed that the median on the MDAS anxiety scale for patients who had efficient inferior alveolar nerve block was 8 (6-10), while for those who did not have a successful block, it was 15 (8-20). Thus, there was a significant difference in anxiety levels between participants with and without efficient block ($p < 0.001$).

CONCLUSION

In cases of symptomatic irreversible pulpitis the pre-emptive medication with ibuprofen arginine effectively increased the efficacy of the inferior alveolar nerve block. The inferior alveolar nerve block efficacy was influenced by preoperative anxiety levels and the intensity of pain.

IMPLICATIONS FOR PRACTICE

This research underscores the potential benefits of oral premedication with ibuprofen and ibuprofen arginine in improving anaesthesia outcomes in cases of symptomatic irreversible pulpitis.

REFERENCE

1. Comparative effectiveness of preemptive administration of ibuprofen and ibuprofen arginine on the anaesthetic success of inferior alveolar nerve block in teeth with symptomatic irreversible pulpitis: a double-blind randomised clinical trial

2. The incidence and intensity of postoperative pain and flare-up following the use of three different intracanal medicaments in teeth with posttreatment apical periodontitis: a randomised clinical trial

Research

Success in endodontic treatment was originally based on the triad of debridement, thorough disinfection, and obturation of root canal system, with each and every procedure equally important. At present, successful root canal treatment is based on much broader principles. This includes diagnosis and treatment planning; knowledge of anatomy and morphology; the traditional concepts of debridement, thorough disinfection and obturation; and the coronal restoration.

There is overwhelming evidence in the literature that most of the root canals contain viable microorganisms even after the completion of the chemo-mechanical preparation; thus, intracanal medicaments have been recommended as an essential step in killing the bacteria in root canals, especially when treatment cannot be completed in one appointment.¹

Calcium hydroxide has been the most used root canal dressing in endodontic practice since the early 1930s.¹ Although it is the most preferred medication, it does not show an equal effect against all the bacterial species in the root canal system. Chlorhexidine, which has been widely used in dentistry since the 1970s, has also been recommended as an intra-canal disinfectant in endodontics. However, chlorhexidine alone cannot form a physical barrier and cannot provide radiopacity, thus its use combined with calcium hydroxide may offer such features.

The synergistic effect of chlorhexidine and calcium hydroxide mixture increases the antimicrobial activity of calcium hydroxide while preserving its barrier function. There is limited knowledge about the effectiveness of this combination on postoperative pain and flare-up incidence in retreatment cases. Angin et al (2024)¹ reported on a trial that sought to evaluate the effect of chlorhexidine, calcium hydroxide, chlorhexidine and calcium hydroxide mixture as intra-canal medicaments on postoperative pain and flare-up incidence and the frequency of analgesic use in teeth with posttreatment apical periodontitis (PTAP). The null hypothesis tested in this study is that the type of intra-canal medicaments used would not affect the incidence and the intensity of post-treatment endodontic pain and flare-up incidence.

MATERIALS AND METHODS

One hundred and twenty systematically healthy patients aged between 20 and 65 years met the criteria and agreed to participate in the study. Patients who had root canal-treated single-rooted incisor or mandibular premolar teeth with a single root canal at least or equal three years ago but still had posttreatment apical periodontitis (PTAP) were included in this study. Failure of the previous root canal treatment was determined by clinical and radiographic examinations. Teeth with clinical signs and symptoms for the requirement of retreatment, except for cases with preoperative swelling, spontaneous pain, severe percussion and palpation, were included in this trial. The volunteers were randomly assigned to three different medicament groups. The allocation was performed according to Consolidated Standards of Reporting Trials (CONSORT, 2010). Stratified randomisation was performed for each group according to gender and age. After patients were divided based on gender and age groups, they were randomly placed in the medicament groups to make an equal distribution of the type of medicament used.

All root canal treatments were performed by the same clinician. During the diagnostic examination, periapical radiographs were obtained using a phosphor plate and using the long-cone paralleling technique under standard exposure conditions and recorded. After the clinical and radiographic evaluations of relevant teeth, the findings – including spontaneous pain, swelling, fistula, restoration type and condition, caries and fractures – were recorded on the case report forms. Tests such as percussion, palpation, mobility and periodontal probing were performed to determine the presence of preoperative pain. All patients received two-visit root canal retreatments.

After administration of local anaesthesia (2ml, 4% articaine hydrochloride containing 1:100 000 adrenalin), a rubber dam was applied for the isolation. No additional local anaesthesia was given since patient comfort was provided with the delivered amount. Following the preparation of the access cavity, ProTaper Universal Retreatment files were used at 500rpm and 3Ncm torque to remove the root canal filling. The working length was determined to be 1mm shorter than the value (0.0) indicated by the electronic apex locator and confirmed radiographically. Apical patency was established with a size 10K file. Next, the shaping procedure was completed at the working length using ProTaper Next rotary files. A 27-gauge notched type irrigation needle (Endo Eze) was placed loosely 2mm shorter of working length while performing 2ml, 5.25% NaOCl irrigation between

each file. After the last used file, shaping for retreatment was considered complete when there was no residual canal filling observed under 2.5x magnification and the irrigation solution was clear from debris. Then, a periapical radiograph was taken to verify the complete removal of the filling materials. After that, final irrigation was done under activation (endoactivator) using 2ml of 17% EDTA followed by 4ml of 5.25% NaOCl. The endoactivator was run for 20sec between 1ml 5.25% NaOCl irrigation. The root canal was rinsed with sterile distilled water and dried with sterile paper points. Finally, to minimise technical variations in medicament placement which could affect postoperative pain, all medicaments applied with a lentulo spiral was used (Dentsply Maillefer) 2mm minus the root canal length as follows:

Group 1: Calcium hydroxide paste (Ultracal XS).

Group 2: 2% chlorhexidine gel.

Group 3: Equal amounts of calcium hydroxide and chlorhexidine gel were placed on a sterile mixing pad. A sterile spatula was then used to stir until a homogeneous mixture was obtained.

After the visual observation of the canals filled with medicament, sterile Teflon tape was placed in the canal orifice and the access cavity was sealed with glass ionomer cement (Kavitan™ Plus).

Postoperative pain levels were evaluated for seven days using a VAS scale. Postoperative pain scores were recorded at 6 and 12 hours and at 1, 2, 3, 4, 5, 6 and 7 days after the medicaments were placed. In the VAS scale given to the patient two opposite limits of the parameter are marked on both ends of a line prepared as 0-100mm. According to the scale, while “no pain” is marked with zero, “unbearable pain” is marked with 100 on the line. The patients were asked to evaluate their own pain status by marking the line on the specified days and times. Patients who could not communicate to submit the evaluation forms were excluded from the study. The patients were prescribed 400mg ibuprofen (Brufen) and instructed to use it only for severe pain. Frequency and time of use of analgesics were recorded. In addition to the documentation, oral examinations were performed on the 48th hour and at 7 days. Sensitivity on percussion, spontaneous pain, swelling of surrounding tissues and antibiotic requirement were also examined and recorded.

Evaluation of the status of primary root canal fillings was performed by two independent endodontists, who were not included in the study and had at least three years of experience, clinically and on the periapical radiographs. Canal fillings terminating at the radiological apex and 2mm within are “acceptable”; canal fillings shorter than 2mm of apex are “short” and gutta-percha seen beyond the radiological apex are considered “overfilled”.

RESULTS

Three patients left the study on their own accord after the first visit. Additionally, a total of nine patients, three per group, were excluded from the study due to various reasons such as apical restriction, anxiety and perforations due to the previous root canal treatment. Thus they were excluded from the final analysis, which included a total of 108 retreatment cases performed on 108 patients. Forty-one of the treated teeth were maxillary incisors, 26 of the

treated teeth were maxillary premolars, 6 were mandibular incisors and 35 were mandibular premolars. All the root canals have a single root canal. There were no statistically significant differences between the distribution of the types of teeth in medicament groups ($p>0.05$).

Eighteen male (50%) and 18 female (50%) patients between the ages of 20-65 were included per group. Patient age groups were divided into three age groups: 20-34, 35-49 and 50-65; and a stratified randomisation was performed. When the correlation between age and postoperative pain is evaluated; at 12h, patients between the ages of 35-49 had significantly greater pain compared to the patients of 20-34 ($p=0.033$) and 50-65 age range ($p=0.017$). There was no statistically significant difference at 3, 4 and 7 days except for patients of 35-49 age group who had significantly more pain compared to patients between the ages of 20-34 ($p<0.05$).

No significant differences were observed in any of the following parameters: gender (exact chi-square test, $p>0.05$), presence of a periapical lesion (exact chi-square test, $p>0.05$), quality of obturation (exact chi-square test, $p>0.05$), type of the coronal restoration (exact chi-square test, $p>0.05$), location of the teeth (exact chi-square test, $p>0.05$) and presence of fistula (exact chi-square test, $p>0.05$).

There were no significant differences among the tested medicament groups at any of the assessed time intervals based on VAS scores ($p>0.05$). Additionally, no statistically significant difference was observed in the tested medicament groups when a periapical lesion was present ($p>0.05$); while patients with no fistula had significantly greater pain values after 24h compared to patients with fistula ($p<0.05$).

When correlation was tested between the presence of coronal restoration and pain, only patients with coronal restoration had more pain postoperatively at 6h ($p<0.05$).

No significant difference was found between the apical extension of the previous canal fillings in different medicament groups ($p>0.05$). When the correlation between the apical extension of the primary root canal fillings and pain was evaluated, significantly greater pain was observed in the short and overextended groups at 24h and 48h compared to the cases with acceptable root canal filling levels ($p<0.05$). There was no statistically significant difference between

the groups in terms of percussion, spontaneous pain and swelling when the level of postoperative pain was compared at 48h and 7 days of clinical examinations ($p>0.05$).

The $\text{Ca}(\text{OH})_2$ group had the lowest VAS scores postoperatively for the first 24h compared to the other medicament groups. After the first 24h, $\text{Ca}(\text{OH})_2$ group VAS scores reflect a fluctuating postoperative pain until day 7 (scores were increased after 24h, started to decrease at the 48th hour, but started to increase again after the third day. The increase was continued until the fifth day and then a decrease occurred). While the $\text{Ca}(\text{OH})_2 + \text{CHX}$ gel group had a high VAS score at the first 12h, it showed a continuous declining trend with the lowest VAS score after 48h compared to the other groups. The VAS score of the CHX gel group was greater compared to the scores of the other groups.

When all the time pain levels observed were evaluated, no statistically significant difference was found between the groups in terms of VAS scores ($p>0.05$).

There was a correlation between frequency of drug use and VAS scores, indicating that VAS score increased when the drug use increased.

CONCLUSIONS

Postoperative pain and flare-ups do not seem to differ when calcium hydroxide, chlorhexidine or their mixture is used as an intracanal medicament. A similar degree of pain relief indicates that calcium hydroxide or chlorhexidine-based medicaments are clinically preferable in retreatment cases to limit post endodontic pain and flare-up incidence.

A greater postoperative pain was associated with elderly patients, patients without fistula and patients with coronal restoration present at time of endodontic access cavity preparation. In addition, patients with short and overextending previous root canal fillings experienced greater postoperative pain when compared to the patients with acceptable root canal filling levels.

IMPLICATIONS FOR PRACTICE

All 3 intracanal medicaments were effective for the outcomes investigated.

REFERENCE

1. Angin AE, Özkan HD, Saral IP, Aydın B. The incidence and intensity of postoperative pain and flare-up following the use of three different intracanal medicaments in teeth with posttreatment apical periodontitis: a randomized clinical trial. *Clinical Oral Investigations*. 2024 Jul;28(7):1-0

CPD questionnaire on page 400

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.



Abandonment of patient

SADJ AUGUST 2024, Vol. 79 No.7 P395-397

By Punkaj Govan, SADA head office

INTRODUCTION

Dentists often encounter situations such as where patients are rude, aggressive, noncompliant, delinquent in paying, do not have their own best interest in mind or believe they have exhausted every option to treat the patient and they need to discontinue the treatment of their patient.

Unfortunately, it is not as easy as merely turning these patients away, cancelling their appointments or closing the doors on them. While it may seem simple to just turn them away, cancel their appointments or close the doors, there are several factors to consider before terminating the dentist-patient relationship. The practitioner needs to make an informed decision and take all necessary actions with complete confidence.

The National Patients' *Rights Charter* provides: "Continuity of care – No one shall be abandoned by a health care professional who or a health facility which initially took responsibility for one's health without appropriate referral or handover".

Section 27 of the Constitution of the Republic of South Africa 1996 affords everyone a right to health care services and guarantees that no one may be refused the right to emergency health care services. Once a healthcare practitioner accepts a patient for treatment, both an ethical and a legal duty of care arise.

Practitioners have a responsibility to ensure that they terminate the practitioner-patient relationship safely and responsibly. This includes taking the necessary precautions to ensure that the patient is not abandoned and has continuity of care. Failing to meet these obligations could result in a complaint being lodged with the Health Professions Council of South Africa (HPCSA) or even a civil claim against the practitioner. Practitioners need to discharge their duty of care properly to avoid any legal or ethical issues.

To end the practitioner-patient relationship, the practitioner must have good cause. The HPCSA's Guidelines state that a practitioner is required to act in the patient's best interest at all times, even if those interests conflict with their own. The purpose of the recommendations is to shield patients from any discrimination and bias stemming from a practitioner's personal beliefs.

To ensure that the termination of a practitioner-patient relationship is just and equitable, the practitioner should consider the unique circumstances of the patient and apply ethical reasoning. To correct the situation and keep providing patient care, he or she should weigh all available options and actions. Certain cases will be simpler to evaluate than others, in which it will be evident that ending the practitioner-patient relationship is the only viable course of action.

A practitioner may end the doctor-practitioner relationship after it is determined that there is no viable alternative or

remedy and, more importantly, that continuing treatment will not jeopardise the quality of care provided to the patient.

Termination of dentist-patient relationship

The following are possible situations, where termination of the practitioner-patient relationship could be justifiable:

- **Aggressive, abusive or violent patients:** Practitioners also enjoy the constitutional right to security and a safe environment. If a patient is abusive, either verbally, physically or sexually, the practitioner may terminate the doctor-patient relationship for his/her own safety and wellbeing, their staff and possibly other patients.
- **Failure to pay fees:** It is not reasonable to expect practitioners to work for free. Unless the patient needs emergency care, the practitioner may refer a patient to a colleague who charges less, a clinic or a state facility if the patient is unable to pay the professional fees of the dentist, even after being offered payment plans and/or discounts.
- **Dealing with noncompliant patients:** When patients fail to comply with recommended treatments, practitioners face potential risks of treatment defects. It's crucial for practitioners to document each instance of noncompliance and assess its impact on the patient's wellbeing. Patients must be informed of the risks linked to noncompliance and warned that continued noncompliance may lead to the cessation of treatment to avoid jeopardising the practitioner. If the patient persists in noncompliance despite warnings, the practitioner may need to consider terminating treatment if the risk is significant.
- **Avoiding inappropriate relationships:** According to the HPCSA Guidelines, healthcare providers should steer clear of inappropriate relationships with their patients. Such relationships could strain the bond between the provider and patient, leading to its breakdown. Alternatively, they could interfere with the provider's ability to make sound decisions for effective care.
- **Religious or personal beliefs:** While the HPCSA Guidelines forbid healthcare providers from declining treatment based on religious beliefs, providers are entitled to uphold their own religious beliefs as per the constitution. If giving treatment would require a provider to do something against their beliefs, they can object to performing that specific treatment. However, providers should avoid judging patients or refusing treatment solely because of differing beliefs.

Ending the patient-practitioner relationship must be recorded in the patient's file and the patient needs to understand that they will not be treated by that practitioner anymore. The patient should still get care, though.

The practitioner can tell the patient about the termination through a letter or a meeting, calmly explaining why treatment can't continue. It is important to suggest other practitioners for the patient to see and help them find further care if possible.

Practitioners cannot just stop treating patients without a good reason. Each patient's situation needs careful consideration and steps should be taken to end the relationship properly if needed. Some patients might be harder to deal with than others, and their situations might be unique.

What constitutes "abandonment"?

Patient abandonment happens when a practitioner stops providing care without the patient recovering fully or ends the patient's treatment without enough notice or helping them find another practitioner.

Abandonment may include the following:

- Ending the relationship without providing a reasonable opportunity for the patient to find a new dentist
- Practitioner closing his/her practice without proper notice or instructing them on how they can retrieve their dental records.
- Practitioner refusing to see a patient previously seen.
- Practitioner failing to visit a hospitalised patient.
- Practitioner failing to provide follow-up care.
- Practitioner failing to provide a competent substitute when away from practice or closing the practice.
- Practitioners verbally expressing to the patient that they will not treat them anymore but do not follow up in writing.
- Practitioner refuses to schedule a follow-up with a noncompliant patient but they have not followed the steps required for termination.
- Practitioner will not schedule a follow-up with a patient who owes back payments but the practitioner has not properly discharged them.
- Practitioners continually "underservice" their patients, so that they must seek healthcare from somebody else, this may amount to "constructive abandonment" because it forces the patients to terminate the practitioner-patient relationship.
- The patient needs ongoing treatment which the practitioner refuses or fails to provide.
- Failing to contact patients who miss appointments to follow up and schedule further treatment.
- Failing to communicate about urgent medical issues with patients.
- Scheduling appointments so far in the future that the patient's condition deteriorates.
- Intentionally refusing to continue treatment of a patient without justification.

When it is not patient abandonment

Although patient abandonment is a serious issue, there are circumstances where doctors and other healthcare providers are allowed to end a relationship. Dentists may stop treatment without it being considered patient abandonment if:

- They do not have the necessary training or knowledge to continue treatment.
- They do not have the supplies or resources to continue treatment.
- A conflict of interest arises.
- Patients violate the policies of the doctor or behave inappropriately, such as verbally abusing the care provider.
- Patients violate the doctor's policies.
- Patients repeatedly miss or cancel appointments.
- Patients do not comply with care recommendations.

How to avoid an unprofessional conduct claim

To avoid ending up before the Health Professions Council for patient abandonment as a form of unprofessional conduct, practitioners must follow certain steps.

To avoid abandoning the patient, dentists may discontinue treatment after reasonable notice has been given to the patient by the dentist of his intention to discontinue treatment and that the patient has had a reasonable time to secure the services of another dentist or after all other dental treatment begun has been completed.

Practitioners are advised to:

- Provide written notice of the termination date.
- Give the patient a reasonable time to get emergency treatment and medication.
- Provide written recommendations of other practices where the patient may seek care.
- Instruct the patient of specific steps they need to take to obtain their medical records.
- Advise what emergency care will be provided until the patient finds another dentist.
- Refer the patient to another practitioner or provide details of other practitioners the patient may consult with or make arrangements for further treatment if he/she is not going to continue with the treatment of the patient.

Process

- You should inform the patient in writing about your concerns and due to a breakdown in the dentist-patient relationship. You should inform patients that this is in the best interests of all concerned. If you have a contract for a long-term treatment, termination must be in accordance with the contract taking into account whether the patient's treatment is likely to be compromised.
- Provide reasons for arriving at your decision and that all options were considered and all other measures exhausted to resolve the issues.
- You will inform the patient that you are willing to assist during transition to another facility, including referral to your colleague, provide copies of records, or it can be sent directly to a practitioner of their choice if the patient has provided details.
- All copies of correspondences must be kept in the patient file and record all conversations with the patient.

Before taking action

It can be useful to discuss the situation with senior colleagues before officially ending the relationship.

The responsibility for ending the doctor-patient relationship rests with the practitioner. Do not delegate it to another staff member.

Communicate openly

When ending the relationship, aim to communicate in person with the patient. You should ensure the patient is adequately informed and understands their decision. Be honest, while still being sensitive to the patient's feelings.

Try to ensure the patient does not interpret the ending of the relationship as a personal rejection. You should explain that the doctor-patient relationship relies on mutual trust. When this has broken down, it can compromise patient care, so it is in the patient's best interest to transfer to another practitioner.

Remember to remain calm and polite during all interactions.

Follow up

Follow your discussion with an email or letter to the patient ensuring you have clearly communicated your decision. If the patient requires a review of their condition or medication within a certain timeframe, highlight this in the letter. Where the patient has not complied with or completed treatment, explain the consequences should they continue to go without appropriate treatment. If the patient is undergoing treatment by a specialist that you referred to, inform the specialist about the termination of your dentist-patient relationship.

The transition

Give the patient a reasonable timeframe to find a new dentist. You may need to assist vulnerable patients such as those with complicated dental issues or patients in a regional setting with limited options.

Reassure the patient that you will, within the agreed timeframe, provide care for any dental problems that arise. Advise them to attend the local emergency department or urgent care centre for immediate care needs.

Transfer the files to the new doctor or practice

To ensure continuity of care, advise the patient that you will provide a copy of their dental records to their new

practitioner after receiving the patient's consent (it may be unwise to charge the patient for this service).

Advise all practice staff

Advise your practice staff that your relationship with the patient has ended and they should not make further appointments for the patient after a specified date.

Make sure all staff at the practice, including other practitioners, are clear about what the termination means for the practice. There may be other practitioners in the practice who are happy to treat the patient, or it may mean that no dentist in the practice will see the patient.

It is a good idea to place an alert on the patient file to ensure all staff members, including new staff unfamiliar with the patient, are aware of the situation.

Initiate steps to collect your fees

Instruct debt collectors or attorneys to take steps to recover your unpaid account.

REFERENCES

1. HPCSA Guidelines for good practice in the health care professions national patients' rights charter, para 2.11, Booklet 3

Online CPD in 6 Easy Steps



The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.



MAXILLOFACIAL RADIOLOGY

Dens Invaginatus

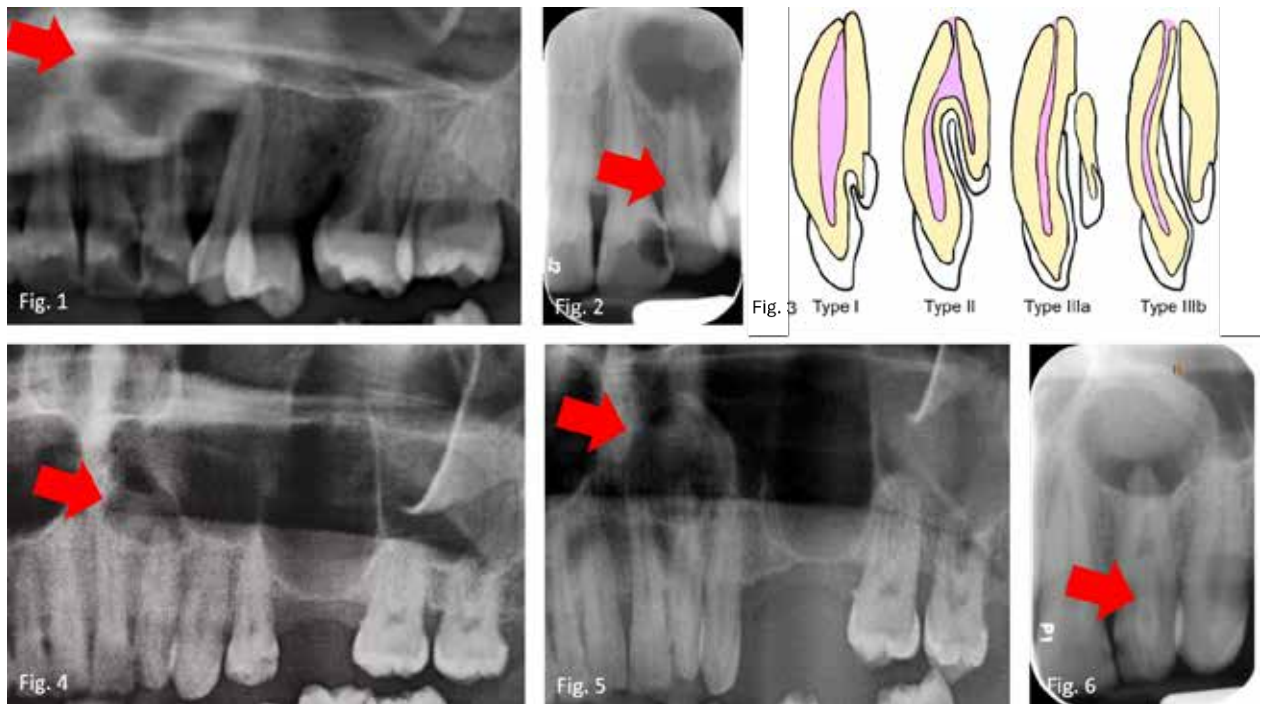
SADJ AUGUST 2024, Vol. 79 No.7 P398-399

Naazia Dawray¹, Leila Ebrahim²

CASES

Case 1: A 21-year-old female presented with a main complaint of pain and swelling associated with the anterior teeth in the second quadrant. Clinically, the patient had a draining sinus in the region of the 22. To identify the specific tooth responsible for the swelling and assess the overall condition of the dentition, a panoramic radiograph was deemed necessary. Additionally, the patient expressed concerns about missing teeth, which necessitates an evaluation for potential crown and bridge treatment options. A periapical radiograph was taken of the offending tooth.

Case 2: A 39-year-old male first presented with a main complaint of pain on the over-erupted 18. Two years later he presented with a main complaint of pain on the 46. Both cases highlight the findings of dens invaginatus. Panoramic radiographs together with a periapical radiograph were taken to assess the patient's main complaint.



INTERPRETATION

The panoramic radiograph (Fig. 1) shows interproximal caries on the 21 and 22, with a periapical radiolucency associated with the 22. A periapical radiograph (Fig. 2) of the

region of interest was taken and a well-defined infolding of the enamel organ is visible, extending beyond the cemento-enamel junction (CEJ). A panoramic radiograph and periapical radiograph of patient two (Fig. 4-6) were taken. Fig. 4 shows an incidental finding of a well-defined, round, corticated, unilocular radiolucency at the apex of the 22. As seen on Fig. 5, this lesion enlarged over a period of two years. On the periapical radiograph (Fig. 6), a well-defined irregular enamel invagination that extends beyond the CEJ about midway down the root was noted. Additionally, there is a well-defined partially corticated, unilocular and circular radiolucency at the apex of 22 with mild external root resorption noted. A diagnosis of dens invaginatus or dens in dente can be made.

Dens invaginatus is a developmental anomaly which was first described by Tomes in 1859.¹ It results in an infolding of enamel and dentine. This thin layer of enamel and dentine, separating an often hypoplastic pulp, predisposes the entry of pathogens causing pulpal necrosis leading to infection.¹

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There are various aetiologies associated with dens invaginatus including focal growth retardation, infection, genetics, rapid proliferation of a part of the inner enamel epithelium into the dental papilla, increased localised external pressure and trauma.^{3,4}

This anomaly occurs most frequently in the permanent maxillary lateral incisors, followed by the maxillary central incisors, premolars and canines.⁴ Dens invaginatus is rarely found on the mandibular and primary teeth. In 50% of cases, this anomaly occurs symmetrically and involvement of both the central and lateral incisors may occur.³

Dental anomalies that have been reported along with dens invaginatus include supernumerary teeth, microdontia, macrodontia, hypodontia, taurodontism, fusion and gemination.⁴ Syndromes associated with dens invaginatus include Ekman-Westborg-Julin syndrome, Williams syndrome and Nance Huran syndrome.⁴

Clinical and radiological presentation vary according to the location and extent of invagination. In 1957, Oehler described a classification with three types.² Type I (Fig. 3A) indicates an invagination, which is enamel lined. It is confined within the crown of the tooth and does not extend beyond the CEJ. In Type II (Fig. 3B) the enamel-lined invagination extends into the pulp chamber, but there is no communication to the periodontal ligament. Type III is subdivided into Type III A (Fig. 3C) and Type III B (Fig. 3D). Type III A is an invagination seen extending into the root, communicating laterally with the periodontal ligament with no pulpal involvement. Type III B folds into the root, communicating with the periodontal ligament at the apical foramen and is usually lined by enamel. Type III dens invaginatus is relatively rare constituting (5%) in comparison to Type I (79%) and Type II (15%).⁴

On conventional radiographs, there could be a simple radiolucent line or fissure outlined by enamel, or an enamel-lined fissure extending variable lengths towards the periodontal ligament, giving an appearance of a

“pseudocanal”.⁴ Cone beam computed tomography (CBCT) allows for superior assessment of the invagination due to its multiplanar functionality, enabling in-depth assessment of the type and extent of the enamel invagination.⁵

Management varies from minor invasive procedures and sealing of the defect with restorative materials to root canal therapy depending on the type of dens invaginatus. In teeth with open apices, the use of calcium hydroxide, mineral trioxide aggregate and gutta percha have been suggested.⁴ The use of CBCT imaging during endodontic treatment of complex dens invaginatus cases is advised as it may aid in ensuring adequate three-dimensional sealing.⁵ In Type III and cases with severe periapical infection, surgical treatments are recommended.⁴ A tooth with dens invaginatus, having severe mobility and periapical infection, may need to be extracted.³

AUTHORS' DECLARATION

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Conflict of interest

The authors declare that they have no conflict of interest.

Ethics approval

In accordance with University of the Western Cape Ethics committee, ethical clearance is not required for this case report.

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CPD questionnaire on page 400

The Continuing Professional Development (CPD) section provides for twenty general questions and five ethics questions. The section provides members with a valuable source of CPD points whilst also achieving the objective of CPD, to assure continuing education. The importance of continuing professional development should not be underestimated, it is a career-long obligation for practicing professionals.



CPD questionnaire



Recognition of the extra-intestinal head and neck features of Gardner's Syndrome: A case report and review of the literature.

1. Which answer is CORRECT: Gardner's Syndrome includes within its definable triad which one of the following:
 - A. Basal cell adenomas
 - B. Sebaceous adenomas
 - C. Epidermoid cysts
 - D. Desmoplastic fibromas
 - E. Pruritic skin lesions
2. Choose the CORRECT option: The diagnostic osseous lesions in Gardner's Syndrome includes which one of the following:
 - A. Osteoblastomas
 - B. Cementoblastoma
 - C. Osteoid Osteomas
 - D. Osteomas
 - E. Osteosarcomas

Recommended Dental Infection Control Measures Following WHO's Declaration of Monkeypox as a Public Health Emergency

3. Choose the CORRECT answer: What was the primary reason for the World Health Organization (WHO) declaring mpox a Public Health Emergency of International Concern in 2022?
 - A. It is a newly discovered virus.
 - B. The ongoing COVID-19 pandemic required additional global attention.
 - C. The resurgence of mpox posed significant public health threats in both endemic and non-endemic regions.
 - D. The virus was causing severe illness exclusively in children and pregnant women.
4. Select the CORRECT option: Which of the following best describes the primary transmission routes of the mpox virus relevant to dental settings?
 - A. Ingestion of contaminated food
 - B. Direct contact with infectious skin lesions and respiratory droplets
 - C. Contaminated water sources
 - D. Vector-borne transmission via insects
5. Which of the following is CORRECT: What type of personal protective equipment (PPE) is recommended for dental professionals during aerosol-generating procedures (AGPs) to prevent the transmission of mpox?
 - A. Surgical masks
 - B. Cloth masks
 - C. N95 respirators
 - D. No special PPE is required
6. Choose the CORRECT option: Oral lesions associated with mpox may resemble which of the following other conditions, making differential diagnosis crucial in dental settings?
 - A. Herpes simplex virus (HSV) and aphthous ulcers
 - B. Chickenpox and influenza
 - C. Gingivitis and periodontitis
 - D. Measles and mumps
7. Select the INCORRECT option: Which of the following measures is NOT mentioned as part of the standard precautions in dental settings to prevent mpox transmission?
 - A. Hand hygiene
 - B. Environmental cleaning and disinfection
 - C. Safe injection practices
 - D. Use of antiviral medications before procedures

Exploring Perceptions of Workplace-based Risks and Hazards: A Study of Dental Assisting Students at a South African University of Technology

8. Select the CORRECT answer: This cross-sectional descriptive study design used the following methods.
 - A. qualitative method only.
 - B. both qualitative and quantitative methods.
 - C. quantitative method only.
 - D. none of the above.
9. Which is the CORRECT percentage: According to the World Health Organisation, a third of the lives of individuals worldwide will be spent at work, and between 30 and 35 percent of those people will face significant occupational risks. In this study, the percentage of participants who had not received orientation regarding occupational hazards was:
 - A. 17%.
 - B. 24%.
 - C. 40%.
 - D. 85%.
10. Which of the options is CORRECT: Literature suggests that many issues, including time constraints, position ambiguity, role conflicts, work overload, social support, and a lack of authority in the workplace, can lead to stress and burnout in dental assistants. The results showed:
 - A. high loadings on items concerning the healthcare and well-being of the students.
 - B. a substantial portion, 28.0%, may not feel overworked or unwilling to acknowledge it as stress.
 - C. all participants did not feel stressed or overworked.
 - D. both a and b are correct
11. Select the CORRECT statement: Overall, the data in this study suggests that students are aware of occupational hazards; however,
 - A. no emphasis needs to be placed during training.
 - B. education and training are not essential components.
 - C. evidence indicates no risks associated with education and training
 - D. none of the above.

12. Choose the **CORRECT** answer: In dentistry, musculoskeletal disorders frequently manifest as follows:
- pain.
 - weakness.
 - itching.
 - all the above.

The orthodontic treatment needs in children aged 12-15 years in a school in Khomas, Namibia: A cross-sectional study

13. Which answer is **CORRECT**: What was the primary aim of the cross-sectional study conducted in Khomas, Namibia?
- To assess the dental hygiene practices of children aged 12-15 years.
 - To determine the orthodontic treatment needs of 12-15-year-old children using the Modified Index of Orthodontic Treatment Need (IOTN).
 - To evaluate the dietary habits of school children in Khomas, Namibia.
 - To compare the academic performance of children with and without orthodontic treatment needs.
14. Select the **CORRECT** answer: According to the study, what percentage of the participants were female?
- 36.2%
 - 42.8%
 - 63.7%
 - 59.8%
15. Choose the **CORRECT** answer. Which component of the IOTN was used to measure the normative need for orthodontic treatment?
- Aesthetic Component (AC)
 - Dental Health Component (DHC)
 - Child-rated Aesthetic Component (CRAC)
 - Examiner-rated Aesthetic Component (ERAC)
16. Which option is **CORRECT**: What percentage of children perceived a need for orthodontic treatment according to the Child-rated Aesthetic Component (CRAC)?
- 17.7%
 - 31.4%
 - 59.8%
 - 63.7%
17. Select the **CORRECT** answer: What significant association was found between the Dental Health Component (DHC) and socio-economic factors?
- Age
 - Gender
 - Employment status of parents
 - Frequency of dental visits

Radiology Corner

18. Select the **CORRECT** answer: Type III Dens invaginatus may be diagnosed and treated effectively using the following treatment options:
- CBCT only
 - Conventional radiographs, advanced imaging (CBCT), microscopic investigation (magnification) and adequate three-dimensional endodontic sealing
 - Conventional imaging and straight-forward endodontic sealing only
 - Magnification only

19. Which option is **CORRECT**: The following may be seen in conjunction with dens in dente involving the 12:
- Cellulitis
 - Ekman-Westborg-Julin syndrome
 - A Dens in dente involving the 22
 - All of the above

20. Select the **CORRECT** option: Which of the following are possible aetiologies of dens in dente:
- Trauma
 - Genetics
 - Infection
 - All of the above

Ethics: Abandonment of patients

21. What is the **CORRECT** answer: What is the primary concern when terminating the dentist-patient relationship?
- Ensuring the practitioner's safety.
 - Protecting the practitioner's interests.
 - Guaranteeing continuity of care for the patient.
 - Avoiding legal repercussions.
22. Choose the **CORRECT** option: According to the National Patients' Rights Charter, what is expected when a healthcare professional decides to discontinue treatment?
- Immediate cessation of care.
 - Provision of adequate referral or hand-over.
 - Patient abandonment without notice.
 - Transfer of patient responsibility to the healthcare facility.
23. Which of the following are **CORRECT**: In which situations may a dentist terminate the practitioner-patient relationship?
- When patients express dissatisfaction with treatment outcomes.
 - When patients fail to comply with treatment recommendations.
 - When patients are unable to pay professional fees.
 - When patients request termination of the relationship.
24. Which is the **CORRECT** answer: What constitutes patient abandonment?
- Continuing treatment without the patient's consent.
 - Ending treatment without adequate notice or assistance finding another practitioner.
 - Refusing treatment based on personal beliefs.
 - Providing follow-up care despite patient non-compliance.
25. Choose the **CORRECT** answer: When can dentists stop treatment without it being considered patient abandonment?
- When they lack the necessary training or knowledge.
 - When they are unwilling to continue treatment.
 - When patients repeatedly cancel appointments.
 - When patients demand a change in treatment plan.

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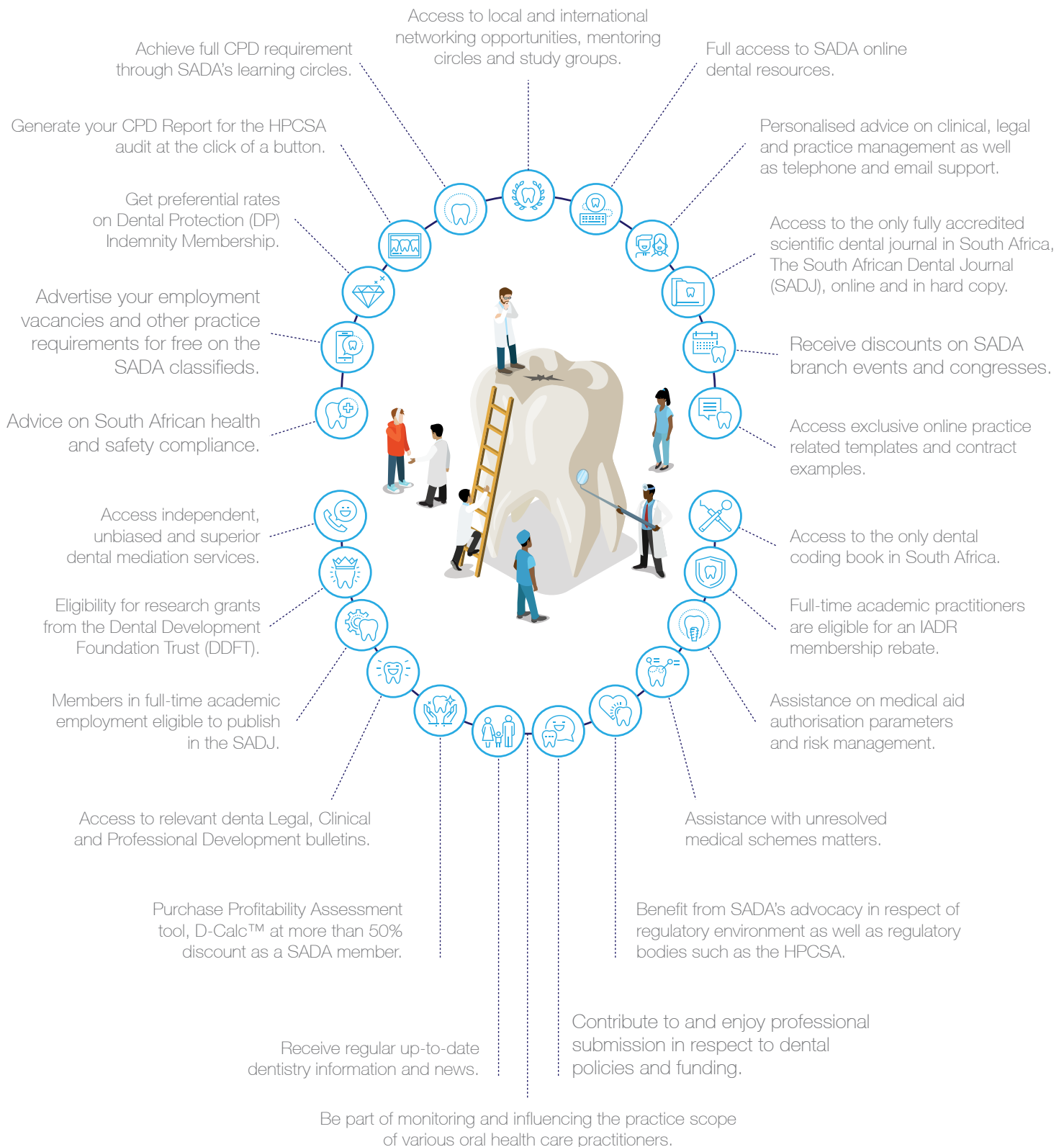
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