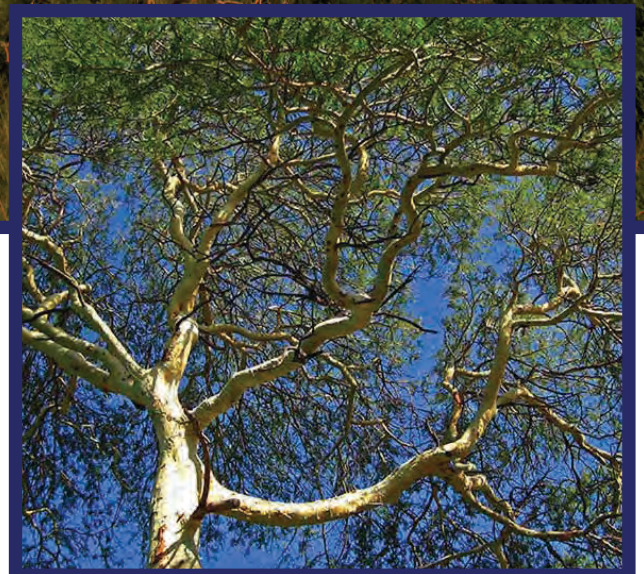




Fever Tree (Vachelliaxanthophloea)

The fever tree, with its smooth lime green trunk, has an almost alien appearance. In spring, bright yellow flower clusters cover its canopy, concealing its thorns. These thorns are used by insect-eating birds to skewer their prey. The tree's name comes from the belief that it caused fevers, as it grows in swampy areas where malaria-carrying mosquitoes thrive. Despite this, animals still lounge near the tree and feed on its seedpods and leaves. Interestingly, the bark of the fever tree can be used to relieve fever and eye problems.



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Managing Editor

Prof NH Wood

Editorial Assistant

Mr Dumi Ngoepe

Email: Sadj@sada.co.za

Sub-editors

Prof N Mohamed

Prof P Owen

Prof L Sykes

Prof J Yengopal

Please direct all correspondence to:

South African Dental Association

Private Bag 1, Houghton 2041

Tel: +27 (0)11 484 5288

Fax: +27 (0)11 642 5718

Email: info@sada.co.za

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Fever Tree (*Vachelliaxanthophloea*)

The fever tree, with its smooth lime green trunk, has an almost alien appearance. In spring, bright yellow flower clusters cover its canopy, concealing its thorns. These thorns are used by insect-eating birds to skewer their prey. The tree's name comes from the belief that it caused fevers, as it grows in swampy areas where malaria-carrying mosquitoes thrive. Despite this, animals still lounge near the tree and feed on its seedpods and leaves. Interestingly, the bark of the fever tree can be used to relieve fever and eye problems.



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PRODUCTION OFFICE

Creative Space Media
 Tel: +27 (11) 467 3341
 Website: www.creativespacemedia.co.za

Publisher and Project manager

Yolandi Badenhorst – yolandi@creativespacemedia.co.za
 Leani Thomson – leani@creativespacemedia.co.za

GENERAL AND ADVERTISING ENQUIRIES

James Chademana
 Email: james@creativespacemedia.co.za
 Tel: +27 (11) 467 3341

Design and Layout

Leani Thomson
 Email: leani@creativespacemedia.co.za

Website smalls advertising / CPD Enquiries and**Member contact detail update**

South African Dental Association
 Tel: +27 (0)11 484 5288
 Email: marketing@sada.co.za

Published by:

On behalf of:

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Professionalism in South African Dental Practice

SADJ JULY 2024, Vol. 79 No.6 p297-299

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

A thriving healthcare system is built on professionalism, which influences the standard of patient treatment and promotes confidence among healthcare professionals. It is based on a holistic approach and includes a dynamic set of values and characteristics that are focused on the patient and the pursuit of excellence. Professionalism, which extends to include the entire field of dentistry, is fundamentally still anchored on the ethical provision of healthcare services.

In the field of dentistry, professionalism refers to a multidimensional strategy centred on patient care, evidence-based procedures and the never-ending pursuit of excellence. Integrity, honesty and transparency are the cornerstones of ethical dental care delivery. Dental practitioners must make judgments that are based on what is best for their patients while also respecting their autonomy and rights. This involves navigating difficult ethical conundrums.

Dentistry is a science that is always changing, and it relies primarily on evidence-based methods to direct treatment decisions. This requires keeping up with new developments in dental technology, research findings and treatment modalities. To give their patients the most effective and efficient care possible, dental professionals must critically analyse the available evidence and incorporate it into their practices. Furthermore, a dedication to ongoing learning and development is essential to professionalism in dentistry. The dentistry industry is always changing as a result of new methods, supplies and technological advancements. To be at the cutting edge of developments and to continuously improve their abilities, dental professionals must adopt an attitude of lifelong learning.

Professionalism goes beyond interactions with patients to include interactions with coworkers and the larger healthcare community. To guarantee seamless and thorough patient care, dental practitioners must promote a culture of respect and collaboration, working side by side with other healthcare professionals, specialists and support workers. Dental professionals can improve patient outcomes and treatment processes by encouraging interdisciplinary collaboration.

In today's diversified healthcare environment, cultural competence increasingly matters in addition to clinical expertise. Dental professionals must accept and appreciate their patients' different backgrounds and beliefs. In addition to enhancing patient-provider communication, culturally competent treatment lowers inequities, ensuring that oral health services are available to everyone in the community, and increases accessibility. Dental professionalism necessitates a strong feeling of responsibility and accountability. Dental professionals must take responsibility for their choices and actions, admitting when they are wrong and growing from their mistakes. Fostering personal and professional growth requires self-reflection as well as taking criticism from patients, co-workers and mentors.

Clinical competence and skill mastery

Clinical competency is a necessary attribute in dental practice, creating the foundation for safe, efficient and patient-centred care. The ability of dental professionals to diagnose, treat and manage a wide variety of oral health disorders has a direct bearing on the health of their patients.

Dentists need to have a broad knowledge base that includes not only dental anatomy but also a profound understanding of disease pathology to be considered clinically competent. This knowledge enables them to precisely identify oral health problems and create personalised treatment regimens that take into account the particular requirements of each patient. The quest for clinical competence requires a mastery of technical abilities just as much. Dental professionals must refine their motor abilities to perform difficult tasks with elegance since dental procedures call for precision and dexterity. Dental procedural proficiency promotes the best patient outcomes, reduces the risk of problems and increases patient happiness.

Clinical competency does not, however, exclusively depend on prior knowledge and abilities. With new developments in technology and research redefining treatment techniques and best practices, dentistry is a discipline that is constantly changing. Therefore, through programmes for continuous professional development (CPD), dental practitioners must embrace a commitment to lifelong learning. By accessing and absorbing the most recent research findings and technology breakthroughs, dentists can maintain their position at the forefront of dental innovation by participating in CPD. Dental professionals are equipped by this continual education to modify their clinical strategies and incorporate evidence-based procedures into their everyday practices, ensuring that patients receive the most modern and efficient care possible.

Keeping up with cutting-edge research and methods not only improves clinical proficiency but also promotes a sense of fulfilment and pride in one's job. Dental professionals who actively seek out more education are better able to handle complex cases, produce superior patient outcomes, and win the respect and trust of both their peers and patients. Dental professionals can use a variety of internet resources, conferences and professional forums in addition to formal CPD to broaden their knowledge and hone their abilities. To develop clinical competence and foster the sharing of insights within the dental community, participating in case discussions and looking for mentorship from more seasoned colleagues can be quite beneficial.

Dental professionalism's fundamental components revolve around clinical competence and skill mastery. Dental professionals must constantly improve their technical skills and knowledge to deliver top-notch patient care. Dentists in South Africa will be well prepared to manage the various oral health needs of their patients with accuracy, confidence and compassion if they adopt a commitment to lifelong

learning and keep up with the most recent developments in dental technology and research.

Dentistry hardly ever works alone. Providing thorough patient care necessitates cooperation with other medical specialists, dentists and support staff. A harmonised interdisciplinary strategy improves treatment results and promotes a climate of respect among healthcare organisations. This includes being aware of and accepting one's own skill and competency limitations, as well as knowing when to refer a patient to a colleague for treatment when a better result is assured.

Ethical decision-making

The moral compass that directs every element of professionalism in dentistry is ethical decision-making. Fundamentally, dental ethics calls for an unrelenting dedication to upholding the greatest standards of honesty and transparency in all interactions with clients, co-workers and the general public. In their line of work, dental professionals frequently face challenging moral quandaries. These conundrums may involve selecting a course of therapy, disclosing information, allocating finite resources or taking patient preferences into account. It takes a conscientious and moral attitude to navigate these difficult situations, putting the patient's welfare and best interests above all else.

The idea of respecting patient autonomy is essential to ethical decision-making. This principle recognises that individuals have the freedom to choose their own oral health treatment in an informed manner. Dental professionals are required to participate in shared decision-making by giving patients pertinent information about their health, available treatments, possible dangers and advantages. Including patients in the decision-making process for their care develops a culture of trust and cooperation which, in turn, improves treatment outcomes and patient satisfaction.

A key component of ethical dental practice is informed consent. Before starting any treatment or procedure, dentists must get the patient's express agreement. Giving patients thorough information regarding the suggested course of action, potential alternatives, risks and anticipated results is necessary for obtaining their informed consent. To make decisions based on their unique beliefs and preferences, patients must be given the chance to clarify their understanding and ask questions. Another crucial component of moral dental practice is confidentiality. Dental professionals are required to protect patient data and regard patients' privacy. In addition to fostering a sense of confidence between dental professionals and their patients, upholding absolute confidentiality guarantees compliance with legal and ethical requirements.

The foundation of moral dental care is the idea of beneficence and nonmaleficence. The term "beneficence" refers to the obligation to act in the patient's best interest while attempting to maximise rewards and advance wellbeing. Contrarily, nonmaleficence places emphasis on the duty to treat the patient with kindness. Dental professionals must carefully consider the potential advantages of a therapy against any potential dangers or harm it may bring to the patient's health to strike a balance between these principles.

Dentistry involves making ethical decisions that go beyond dealing with specific patients. Dental practitioners must also think about how their activities may affect society and the larger community. Respecting moral principles increases



public confidence in the dentistry industry and improves the standing and reputation of the field. Ethical issues develop alongside the development of dentistry. New ethical difficulties are brought about by emerging technologies such as telemedicine and artificial intelligence, which necessitate continual ethical contemplation and adaptation. Dental professionals are better equipped to traverse these changing ethical landscapes with insight and sensitivity if they embrace a culture of ongoing ethical dialogue and participate in ethical education and training.

Consequently, making moral decisions is essential to providing patient-centred care and establishing public confidence in the dentistry industry. Dental professionals in South Africa can uphold the highest ethical standards, guaranteeing the provision of compassionate and ethical care to their patients while preserving the reputation and integrity of the dental profession as a whole, by adhering to the principles of integrity, patient autonomy, informed consent, confidentiality, beneficence and nonmaleficence.

Presentability, approachability, effective communication and empathy

Professionalism encompasses the areas of presentability, approachability and communication in addition to clinical knowledge and moral judgment. These elements are crucial in determining patient experiences, encouraging trust and enhancing the patient-dentist connection. Additionally, the general impression and reputation of the dentist office are influenced by professionalism in contacts with the personnel and the local population. The cultural diversity of South Africa is astounding. Dental practitioners need to be culturally competent and show they value and respect the variety of their patients. Cultural sensitivity promotes inclusive care that respects and takes into account individual variations.

- Presentability:

The term "presentability" describes how dental practitioners dress and act. Maintaining a neat and professional appearance not only gives patients confidence, but it also shows pride in and dedication to the dentistry profession. This entails dressing appropriately, upholding standards of hygiene and keeping a tidy and orderly workspace. A dental professional's appearance sets the tone for a comfortable and reassuring patient encounter by being well-groomed and presentable. When patients regard their dentist as a competent, self-assured person who takes pride in their

appearance and the dental treatments they offer, they are more likely to feel at ease.

- Approachability:

The warmth and openness with which dental practitioners interact with their patients, colleagues and the community is referred to as approachability. An atmosphere that is conducive to good communication and patient rapport is created by having a warm and friendly approach. Being approachable is especially important in dentistry since patients may experience worry and apprehension during dental procedures. Approachable dental professionals make an effort to actively listen to their patients' concerns and allay any worries or doubts they may have. They use compassion and empathy to create a welcoming environment where patients can express their dental needs and preferences.

- Communication:

Patient-centred care is focused on effective communication. Dental professionals need to be effective communicators who can explain complicated dental concepts in a way that is both clear and understandable. To help patients understand, this entails speaking clearly, minimising jargon and utilising visual aids as needed. In addition to aggressively seeking patient input and including them in their treatment planning, clear communication also requires outlining treatment alternatives and procedures. Dental practitioners encourage patients to take an active role in their oral health by participating in shared decision-making, which promotes improved treatment acceptability and adherence.

Professionalism in communication extends beyond contacts with patients to include relationships with staff and the larger community. A happy and collaborative work atmosphere is fostered by respectful and effective communication with coworkers and staff, which develops teamwork and improves overall practice efficiency. To promote oral health across the community, dental practitioners are essential. Dentists can successfully convey the significance of oral health and preventive actions to preserve a healthy smile by participating in outreach programmes, educational efforts and public awareness campaigns.

Professional accountability and responsibility

At the heart of professionalism in dentistry lies professional accountability and responsibility. Dental professionals are entrusted with the wellbeing of their patients and this stewardship demands unwavering commitment to upholding the highest standards of care, ethics and integrity.

In dentistry, accountability means accepting responsibility for one's choices and actions, as well as for the results of those choices. Dental professionals must understand that their patients put their faith and health in their hands and, as a result, they have a sacred duty to put their patients' needs first. Being accountable for patient care entails exercising caution when making decisions and performing clinical tasks. Dental professionals need to stay up to date on the most recent findings, recommendations and developments in the field and incorporate evidence-based methods into their treatment plans. To guarantee patients receive the most recent and efficient care possible, continuous self-evaluation and improvement are essential.

Self-regulation is yet another essential component of accountability. Dental professionals need to evaluate their

performance, skills and potential for growth. Dentists show their dedication to improving patient care and the dental profession by holding themselves to high standards and actively looking for methods to advance their knowledge and abilities. Feedback, whether it comes from peers or patients, is an important tool for development and progress. Dental professionals can find ways to improve their practice and patient interactions by accepting comments with humility and an open mind. Dental professionals can improve their abilities, adjust to shifting patient needs and continuously advance as healthcare professionals by receiving constructive criticism.

Dental professionals must be ready to admit their errors and learn from them because nobody is perfect. For the purpose of preserving patient trust and promoting a culture of continuous improvement, transparency in the handling of errors is essential. Dental professionals show their dedication to patient safety and the pursuit of excellence by taking corrective action when errors are made and by putting plans in place to avoid them in the future.

Professional responsibility includes not only one's own practice but also the larger dental community and society. It is the duty of dental practitioners to promote oral health, equal access to care and the expansion of dental knowledge. Dental professionals can have a greater impact on addressing oral health disparities and societal dental needs if they actively participate in professional organisations and community outreach programmes.

Therefore, professionalism in dentistry must emphasise how crucial it is for professionals to be accountable and responsible. Dental professionals in South Africa can establish themselves as trustworthy and dependable partners in their patients' oral health journeys by accepting accountability for their actions, taking ownership of patient care, engaging in self-regulation and continuous improvement, and being open to criticism.

Conclusion

To ensure the delivery of high-quality care and protect the integrity of the dental profession, professionalism in healthcare, particularly within the field of dentistry, is crucial. A culture of professionalism will be promoted in South African dental practice by embracing the domains of clinical competence, ethical decision-making, effective communication, teamwork, cultural competency and professional accountability. As time goes on, it is our obligation as leaders, educators and dental professionals to address the developing professionalism-related issues and work together to instil a sense of pride and accountability in the upcoming generation of dental professionals.

Professionalism in healthcare, especially dentistry, is a fluid and ever-evolving idea that exceeds established limitations. It embodies a commitment to patient welfare, moral behaviour, research-based treatment, ongoing learning, teamwork, cultural sensitivity and individual responsibility. By embracing these aspects of professionalism, dental practitioners are more equipped to deal with the challenges of contemporary healthcare, ensuring that their patients receive compassionate, efficient and equitable oral care while preserving the highest standards of quality in their field. Professionalism continues to be the guiding principle that drives the success and influence of dentistry in South Africa and abroad, even as the dental community adjusts to the always shifting environment.

Navigating compliance waters: Introduction to POPIA, HIPAA and GDPR for oral health practitioners

SADJ JULY 2024, Vol. 79 No.6 P300

Mr KC Makhubele – CEO, South African Dental Association

In the complex field of oral healthcare, the regulatory landscape is always changing, creating both difficulties and possibilities for dentists and other stakeholders. Understanding and managing the currents of regulatory compliance becomes critical to the success and sustainability of dental offices.

Dental professionals and stakeholders must follow regulations to preserve patient rights, provide excellent care and maintain healthcare systems integrity. These standards cover a wide range of topics, from data protection and patient confidentiality to billing procedures and infection control.

Maintaining compliance in dentistry requires understanding local, national and international regulations. Dentists and oral health stakeholders must constantly modify their practices to meet the ever-changing compliance landscape, addressing not only present rules but also predicting and preparing for future alterations in regulatory requirements.

Key compliance areas for dentists

Among others, the POPIA: The increasing cases of theft and misuse of people's personal information have led to the need to promulgate regulations to protect personal information and one's right to privacy. The POPI Act sets out the minimum standards regarding accessing and "processing" any personal information belonging to another.

For those seeing international patients there is the HIPAA compliance – protecting patient privacy by following the Health Insurance Portability and Accountability Act (HIPAA) laws governing the security and privacy of patient data, as well as the General Data Protection Regulation (GDPR). GDPR is the toughest privacy and security law in the world. Though it was drafted and passed by the European Union (EU), it imposes obligations onto organisations anywhere, so long as they target or collect data related to people in the EU.

Infection control protocols: Ensure strict adherence to infection control procedures, particularly in light of public health concerns and changing guidelines.

Billing and coding accuracy: Reduce the risk of billing errors by staying up to date on coding changes and accurately documenting processes.

Continuing education requirements: Continuing education is required to retain professional competence and licensure.



Navigating the compliance maze

The route to compliance is multifaceted, requiring a proactive approach to remain ahead of regulatory changes. Regularly evaluating and revising practice policies, investing in regular staff training and collaborating with legal and compliance specialists are all critical steps toward successfully navigating the compliance maze.

In the digital age, technology can be a valuable tool for achieving and maintaining compliance. Dental practices can use electronic health record (EHR) systems, encryption tools and secure communication platforms to improve data security and comply with regulatory standards.

The business case for compliance

Beyond legal requirements, compliance is a strategic corporate need. Patient trust is intimately related to the notion that a dental practice is ethical and responsible. Furthermore, compliance with rules reduces the possibility of legal consequences and financial penalties, so protecting the practice's reputation and longevity.

In conclusion, proactive compliance is essential for successful and patient-centred dental healthcare as regulations evolve. Dentists and oral health stakeholders must see compliance not as a burden, but as a road map to excellence, trustworthiness and profitable practice in the dynamic landscape of 2024.

An analysis of complaints against dentists made to the HPCSA: 2009-2023

SADJ JULY 2024, Vol. 79 No.6 P301-304

TA Vedan¹, H Holmes², GP Moodley³

ABSTRACT

Aims and objectives

The study aims to provide an updated description of HPCSA complaints against dentists. The objectives were to analyse the incidence, types and consequences of professional misconduct and unprofessional behaviour complaints against South African dentists from 2009-2023.

Design

A descriptive study design was employed, focusing on a retrospective analysis of publicly accessible complaint records.

Methods

Publicly available online Health Professions Council of South Africa (HPCSA) records from 2009-2023 were analysed (www.hpcsa.co.za), categorising complaints based on ethical violations. Categories included clinical misconduct, fraud, record-keeping lapses, unprofessional conduct, unethical advertising, employing unregistered personnel or laboratories, poor infection control and practicing while suspended. Complaint nature, outcomes and penalties were quantitatively assessed, with qualitative descriptions of complaint types.

Results

From 83 dentists included in HPCSA records, 82 were found guilty. Primary complaints were fraud 33/82 (40%), clinical negligence 32/82 (39%) and employing unregistered personnel or laboratories 8/82 (10%). Forty-four dentists received fines (53%) for clinical and 20/82 (24%) for fraud-related issues, while 15/82 (18%) were suspended and 13/82 (16%) were cautioned.

Conclusion

The findings offer crucial insights into the misconduct in public and private dental practices in South Africa, highlighting areas for improvement.

INTRODUCTION

Recently, there has been an increasing trend of complaints made against health professionals in South Africa. Reasons cited for the rise in complaints include increasing awareness of patient rights and the proliferation of legal firms specialising in medical claims. The Health Professions Council of South Africa (HPCSA) was established through the Health Professions Act 56 of 1974 and serves as a regulatory body for health professions in the country, including dentists.¹ The HPCSA has developed the Ethical Rules of Conduct for health professionals in addition to the General Guidelines for Good Practice. The HPCSA consists of boards established by the Minister of Health that are specific to the various health professions in the country.² These boards are mandated to protect the public from unsafe practices and ensure a high quality of services from health professionals while having the authority to regulate training, register and de-register health professionals or as stipulated by the Minister of Health.^{2,3} Practitioners registered with the HPCSA must adhere to the Ethical Rules of Conduct which stipulate that the practitioner must act in the best interests of patients as part of their primary duty; they must respond appropriately to protect patients from risk or harm due to any reason; and they must report violations in circumstances where there is good reason to believe that the rights of a patient are being violated.⁴ Part of the mandate of the organisation is to regulate and guide healthcare professionals and ensure their professional conduct, while the mission of the Medical and Dental Professionals Board is to ensure appropriate education and training standards. Dentists are obligated to adhere to the core ethical guidelines described by the HPCSA (Table I).

These guidelines are vital for maintaining the integrity, professionalism and ethical standards of healthcare services.⁵ The HPCSA regularly publishes a list of complaints on its websites which contains details of the number, nature and frequency of complaints registered against health professionals. The Complaints Handling and Investigation division of the Legal and Regulatory Affairs Department receives complaints of unprofessional conduct.¹ The function of the division is to receive, peruse, analyse, register and allocate complaints according to how serious the nature of the complaint is.¹ Complaints are received and categorised by the HPCSA, which then undergo an analysis process, including minor transgressions which might be mediated.⁶ Minor complaints are transferred to the Ombudsman for mediation while more serious complaints are transferred for preliminary investigation.¹ Under the Medical and Dental Board, there is a Dental Committee of Preliminary Enquiry which conducts investigations.² The Ombudsman aims to arrive at a resolution while a Charge Office implements penalties stipulated by the preliminary investigation and preliminary committees of inquiry.¹

Authors' information

1. Theesan Ananda Vedan, Department of Oral Medicine and Periodontics, University of the Western Cape, South Africa
ORCID: 0000-0002-8182-6407
2. Haly Holmes, BChD, MChD (Oral Medicine and Periodontics); Associate Professor : Division Oral Medicine and Periodontics Faculty of Dentistry, University of the Western Cape
ORCID: 0000-0001-8297-8536.
2. Gillian Pryadarshini Moodley, Graduate School of Business, University of Cape Town, South Africa
ORCID: 0000-0002-4993-0589

Corresponding author

Name: Theesan Ananda Vedan
Email: theesanvedan@gmail.com

Author's contribution

1. TA Vedan, principal researcher – writing article (70%), data analysis (30%)
2. Haly Holmes – Writing article (15%)
2. GP Moodley, research assistant – writing article (30%), data collection and analysis (70%)

Declaration

The authors declare there are no conflicts of interest.

According to the 2022 annual report, the HPCSA performed 2,727 compliance inspections with 25 operations carried out in conjunction with the South African Police Service (SAPS) and the South African Health Products Regulatory Authority (SAHPRA).¹ The Medical and Dental Board had 58,840 practitioners in the board and recorded 1,276 (82.1%) complaints during the 2021/22 financial year.¹ It is also important to note that of the 1,554 complaints that were registered in the 2021/22 financial year, 95.1% were levelled against private sector practitioners and only 4.89% were levelled against public sector practitioners. Complaints against health professionals range from clinical malpractice, accounts and fraudulent claims, unprofessional behaviour and employing the services of an unregistered health professional or laboratory. The penalties awarded range from fines imposed, acquittals, suspensions, caution and reprimand and admission of guilt fines.

Ethical advertising	Professional registration of health professional employees
Correct practice names	Professional registration of health laboratories
Patient care	No sharing of consulting rooms
Confidentiality	Performance or professional acts
Signing of official documents	Medicines
Certificates and reports	Financial interests
Issuance of prescriptions for medication	Reporting impairment

Table I: Summary of the ethical rules of the HPCSA

Any natural or juristic person, group or professional body can lodge a complaint against a health professional with the HPCSA. However, only members of the public or healthcare practitioners can lodge complaints for unprofessional conduct by a person registered under the Health Professions Act.

Alternatively, for issues specifically related to dental services, the South African Dental Association (SADA) offers an ombudsman service. Complaints can be sent in writing to a designated email address, and complaints are handled via a free complaint resolution process.⁷ The complaints listed with SADA follow a mediation process to identify a

solution that is acceptable for both parties. To streamline the complaints, investigation and mediation processes and lead to a quicker turnaround time for resolution, both the HPCSA and SADA have opted to digitise the process.^{1,7} According to the HPCSA, this has resulted in cost savings generated for the organisation.¹

Aims and objectives

The study aims to provide an updated description of HPCSA complaints against dentists. The objectives were to analyse the incidence, types and consequences of professional misconduct and unprofessional behaviour complaints against South African dentists from 2009-2023.

Methods

Publicly available records of the Health Professions Council of South Africa from the official website (www.hpcsa.co.za) were analysed and classified according to the ethical rules. The search was limited to dentists who received complaints against their names during a period of 14 years.

During the review process, two independent reviewers, experienced in dental public health, assessed the online of complaints published by the HPCSA. Both the nature and outcome of the complaints and penalties were quantified using simple, descriptive statistics. Complaints were categorised into six categories: Clinically Related Fraud, Poor Record Keeping, Rude Behaviour, Unethical Advertising, Employment of Unregistered Persons/Labs, and Practicing While Suspended. This classification was achieved through examination and consensus-building between the reviewers.

The reviewers carefully analysed each case, considering the nature and specifics of the complaints, and mapped them to the most appropriate category. This systematic approach ensured that each complaint was assessed fairly and accurately. Poor record keeping, for instance, was identified based on its impact on professional conduct and patient care, while rude behaviour was evaluated based on its deviation from expected professional and interpersonal standards.

Results

The time period under review was 2009-2023 (14 years). This is the maximum time that judgments are kept online by

Complaint category	Penalty						
	Guilty	Suspended suspension	Removed from Register	Fined	Restitution	Further training	Cautioned/reprimanded
	n	N	n	n	N	n	n
Clinically related	34	5		22			5
Fraud	33	8		20		3	3
Poor record keeping	1	1					
Rude behaviour	2			1			1
Unethical advertising	3			3			
Employed unregistered person/lab	8	1		2			3
Practice while suspended	1						1
Total (N)	82	15	0	48	0	3	13

Table III categorises various fraudulent activities, offering insight into the types of unethical billing practices prevalent in the dental profession.

the HPCSA. There were 82 guilty charges against dentists, 2009-2023. Of the charges 34/82 (41%) were clinically related, 33/82 (40%) were related to fraud and 8/82 (10%) were related to employing an unregistered professional or laboratory. Other charges fell into categories of unethical advertising, rude behaviour, poor record keeping and practicing while under suspension. The penalties were 48/82 (58%) fines, 15/82 (18%) suspensions and 13/82 (16%) cautions or reprimands issued to the dentists found guilty. Table II categorises the nature of the complaints and delineates the disciplinary actions taken.

Overcharging
Claiming for services not rendered
Discrepancies between clinical records and submissions for billing
Submitted claims while under suspension
Claims for procedures that were not performed
Split billing with other parties

Table III: HPCSA dentist claims related to fraud, 2009-2023

Table IV presents a list of clinically-related complaints handled by the HPCSA, 2009-2023. This table categorises various forms of clinical negligence and malpractice, offering a critical insight into common areas of concern in patient treatment and care.

Negligence
Failure to diagnose, manage, treat and refer patient
Inappropriate treatment
Caused further complications during a procedure
Damaging the lingual nerve during dental treatment
Failure to refer to a specialist
Left broken instrument in root canal space
Failure to completely remove the root canal

Table IV: HPCSA clinically-related complaints, 2009-2023

DISCUSSION

The prevalence of professional body claims against dentists varies significantly across the globe, with distinct patterns observed in high-income countries compared to low- and middle-income countries. Globally, dental malpractice is notably prevalent in the private sector, reflecting perhaps the varied standards of care and regulatory oversight across different countries.⁸ In a Taiwanese study, penalties consisted of days of criminal detention to months of imprisonment.⁹ The highest number of dental malpractice cases occurred in implant and oral surgery cases followed by other specialities.⁹ International studies on complaints to dental or health professional bodies about the conduct of dentists reveal some noteworthy statistics. In Australia, dental practitioners had the highest rate of complaints among 14 health professions, with a rate of 42.7 complaints per 1,000 practitioners per year. The study, covering six years, underscores the significant number of concerns raised regarding dental professionals in comparison to other health sectors.¹⁰

Another study in the Netherlands highlighted the personal and professional impact of complaints on dentists.¹¹ It found that 29% of dentists were affected to a large extent or strongly in their personal professional practicing due to facing complaints. These statistics collectively present a global perspective on the challenges and ethical issues in the dental profession.

In South Africa, a more detailed picture emerges. A 2011 paper found that charges were laid against 102/ approximately 4,153 (2%) dentists before 2009. The majority of complaints were also clinically-related followed by complaints of fraud. The penalties incurred include suspended suspensions, reprimands, further training and 1 removal from the health professions register.⁵ Excluding the removal of 1 professional from the register, our findings concurred with the findings of this study.

An analysis of HPCSA rulings, 2006-2017 found that South African dentists predominantly face clinical complaints, constituting 59% of the total malpractice cases. Additionally, a significant proportion of claims in South Africa, specifically 29% of dental cases and 46% of dental therapist cases, are related to fraud.¹² These figures indicate a unique professional climate in South African dental practice, characterised by a high incidence of clinical and fraud-related complaints, which may be reflective of the country's specific healthcare dynamics and regulatory environment.

In the 2009-2023 HPCSA data, fraud-related complaints constitute a substantial 40% of the total cases. This high incidence aligns with global trends,¹³ which suggest that healthcare sector fraud is not uncommon. However, the specific nature of dental fraud in South Africa, involving activities such as overcharging and false billing, might exhibit unique regional characteristics when compared to international data.

When conducting a study on the analysis of complaints, using the HPCSA's publicly available complaints register, several limitations are noteworthy. The HPCSA register may not capture all complaints, especially those resolved informally or not officially reported. This can result in an underestimation of the actual number of complaints.⁵ Complaints may be omitted for privacy concerns, due to the nature of the complaint, or if the case is deemed frivolous or without merit.¹⁴ Therefore, while some information might be accessible, there is no guarantee that all HPCSA complaints and judgments are published online.

There might be a reporting bias, as not all patients or peers are equally likely to file complaints. This can skew the data towards certain types of complaints or demographic groups.¹² The public register may not provide detailed information about the context of each complaint, limiting the depth of analysis regarding the underlying causes of the complaints.¹⁵ This meant that the reviewers had to categorise the nature of complaints and charges based on the summaries provided. The findings might not also be generalisable to other regions or countries due to cultural, regulatory and systemic differences in dental practice and complaint management. These findings underscore the need for continual monitoring and enforcement of ethical practices in dentistry to maintain high standards of care and professionalism.

To decrease HPCSA complaints against dentists in South Africa, several recommendations can be considered. First, enhancing ethical training and continuing professional

development is crucial. A study suggested the need for the HPCSA to re-evaluate the effectiveness of its ethical training programmes, implying that better training could lead to fewer complaints.¹⁶ Additionally, there's a need for increased awareness and understanding among dental professionals regarding the nature and consequences of complaints, as studies have shown that many complaints arise from misunderstandings or lack of communication.⁵ Providing dentists with guidance on managing patient expectations and improving communication skills could help in this regard.

Moreover, the mental health and wellbeing of dental professionals under investigation by the HPCSA should be given attention. The South African Dental Association (SADA) recognises the significant impact that HPCSA investigations can have on dental practitioners' mental health which can, in turn, affect their professional performance.¹⁷ In some cases, complaint resolutions have become protracted processes which results in distress to the health professional and a waste of legal resources.¹⁸ To mitigate complaints, health professionals are advised to communicate with patients transparently, especially when complications arise.¹⁸ Maintaining adequate documentation, signed consent forms, consultation and clinical records is also important for investigating complaints and it is recommended that digital record keeping is maintained to avoid challenges with illegible handwriting.¹⁸ Offering further support systems and counselling services to these professionals could help mitigate the impact of distress.

Finally, the process of lodging and handling complaints itself should be made more transparent and efficient. This includes ensuring that the perusal, analysis and categorisation of complaints are done fairly and in a timely manner, which can prevent the escalation of minor transgressions.⁶ In instances where the complaints are escalated for further investigation and where health practitioners appeal, it is recommended that the HPCSA treat all complaints with consistency and fairness when hearing the health professional's side of the incident.¹⁹ The digitalised process of fielding and investigating complaints at the HPCSA as well as SADA is promising but the gains in efficiency must be established over time. Those laying complaints with the various professional bodies must be given guidance on how to lay complaints and, to prevent abuse of the system, there should be declarations accompanying complaints that declare the nature of the relationship between the complainant and the health provider.² By addressing these key areas, it's possible to create a more conducive environment for both dental professionals and their patients, potentially leading to a decrease in the number of complaints lodged against dentists in South Africa.

CONCLUSION

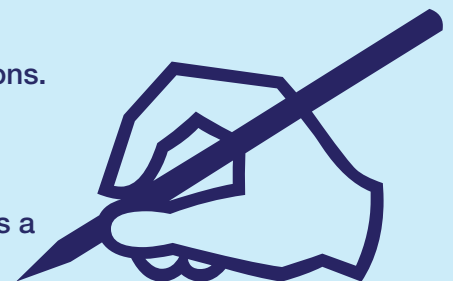
The analysis of complaints against oral health professionals at the HPCSA between 2009 and 2023 reveals significant insights into professional conduct and accountability within the dental profession. The findings underscore the importance of regulatory bodies such as the HPCSA in safeguarding public health and maintaining professional standards.

REFERENCES

1. HPCSA. Annual Report Health Professions Council of South Africa 2023. https://www.hpcsa.co.za/Content/upload/publications/annual_report/HPCSA_AR_2023.pdf
2. Hagemeister DT. Employer-generated complaints to the statutory registration authority: The regulatory framework for the supervision of employed health professionals in the South African public sector. *South African Journal of Bioethics and Law*. 2018;11(1):11-4. <https://www.ajol.info/index.php/sajbl/article/view/175645>
3. Spittal MJ, Studdert DM, Paterson R, Bismark MM. Outcomes of notifications to health practitioner boards: a retrospective cohort study. *BMC Med*. 2016;14(1):198. <https://doi.org/10.1186/s12916-016-0748-6>
4. McQuoid-Mason DJ. Medicine and the Law. *South African Medical Journal*. 2022;513-5. <https://doi.org/10.7196/SAMJ.2022.v112i8.16707>
5. Postma TC, van Wyk PJ, Heymans JH, White JG, Prinsloo PM. An analysis of complaints against oral health professionals charged with misconduct at the HPCSA: 2004-2009. *Sadj*. 2011;66(9):420-2, 4-5. <https://pubmed.ncbi.nlm.nih.gov/23193872/>
6. HPCSA. Legal and Regulatory Affairs - HPCSA 2019 [Available from: <https://www.hpcsa.co.za/?contentId=0&menuSubId=19&actionName=Legal%20and%20Regulatory%20Affairs>]
7. Makhubele K. The SADA dental mediation (free and going online). *South African Dental Journal*. 2020;75(8):413-4. <https://doi.org/10.17159/2519-0105/2020/v75n08a10576>
8. Abomalik AM, Alsanea JA, Alkadi OH. A retrospective assessment of the dental malpractice cases filed in Riyadh from 2009-2015. *Journal of Family Medicine and Primary Care*. 2022;11(6):2729-34. https://doi.org/10.4103/jfmpc.jfmpc_2250_21
9. Wu K-J, Chen Y-W, Chou C-C, Tseng C-F, Su F-Y, Kuo MYP. Court decisions in criminal proceedings for dental malpractice in Taiwan. *Journal of the Formosan Medical Association*. 2022;121(5):903-11. <https://doi.org/10.1016/j.jfma.2021.09.023>
10. Thomas L, Tibble H, Too LS, Hopcraft M, Bismark M. Complaints about dental practitioners: an analysis of 6 years of complaints about dentists, dental prosthetists, oral health therapists, dental therapists and dental hygienists in Australia. *Aust. Dent. J*. 2018;63(3):285-93. <https://doi.org/10.1111/adj.12625>
11. Bruers JJ, van Dam BA, Gorter RC, Eijkman MA. The impact of a formal complaint on Dutch dentists' professional practice: a survey study. *BMC Oral Health*. 2016;16:1-9. <https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-016-0295-8>
12. Makwaka N, Motloba PD. Dental malpractice cases in South Africa (2007-2016). *South African Dental Journal*. 2019;74(6):310-5. <http://dx.doi.org/10.17159/2519-0105/2019/v74n06a5>
13. Dyck I, Morse A, Zingales L. How pervasive is corporate fraud? *Rotman School of Management Working Paper. Review of Accounting Studies*. 2021(2222608). <https://doi.org/10.1007/s11142-022-09738-5>
14. SADA. Dentist bringing malicious prosecution proceedings against patient. *S. Afr. Dent.* 2021;76(4):179-80. <https://journals.assaf.org.za/index.php/sadj/article/view/11472>
15. HPCSA. HPCSA Complaints Process Explained 2023 [Available from: <https://www.hpcsa-blogs.co.za/hpcsa-complaints-process-explained/>]
16. Nortjé N, Hoffmann WA. Professional consequence for dentists involved in unethical decision-making in South Africa. *J. Forensic Odontostomatol*. 2014;32(Suppl 1):22. <https://pubmed.ncbi.nlm.nih.gov/25557412/>
17. Makhubele K. A survey into the impact of HPCSA investigations on health practitioners' mental health. *S. Afr. Dent. J*. 2023;78(6):290-1. <https://journals.assaf.org.za/index.php/sadj/article/view/16903?articlesBySameAuthorPage=2>
18. Vrettos B. Communicate, collaborate and document: the pillars to avoid and manage complaints. *SA Orthop. J*. 2023;22(1):6-8. https://journals.co.za/doi/pdf/10.10520/ejc-mp_saoj-v22-n1-a2
19. Slabbert M, Labuschaigne M, Kwinda M. Inconsistent and Irregular Approaches in the Handling of Complaints by the Health Professions Council of South Africa: Haeck v Health Professions Council of South Africa (2021/11449)[2022] ZAGPJHC 690 (13 September 2022). <https://www.saflii.org/za/cases/ZAGPJHC/2022/690.html>

CPD questionnaire on page 340

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.



Health seeking behaviour of oral cancer patients in Botswana: a qualitative study

SADJ JULY 2024, Vol. 79 No.6 P305-311

PK Motlokwa¹, R Gross², JE Szymczak³

ABSTRACT

Introduction

Lack of improvement in survival of oral cancer patients has been linked to delayed diagnosis. Many studies have viewed this delay as multifactorial with health seeking behaviour as one of them.

Aims and objectives

To explore individuals' experiences with oral cancer lesion and how it influenced their decisions to seek appropriate care.

Design

Cross-sectional qualitative study

Methods

Semi-structured in-depth interviews were conducted from August 2019 to January 2020. Participants were recruited from Princess Marina Hospital in Gaborone, Botswana within a month of histopathology diagnosis of oral cancer. Interviews were audio recorded, transcribed and translated. Data was analysed using framework analysis incorporating Leventhal's self-regulatory model.

Results

Thirty-two patients were approached, with 18 (56%) agreeing to participate. Average age was 43 years with 11 (61%) being male. Fifteen (83%) misattributed their symptoms to a non-threatening illness which delayed them seeking appropriate health care. Majority experienced stigma, low self-esteem and confidence. Almost all consulted with the nurse or general practitioner at their local clinic.

Conclusion

Improved access to information and involvement of other stakeholders who are in the pathway of health seeking such as traditional healers, nurses and general practitioners should be considered to hasten diagnosis at a curable stage.

INTRODUCTION

Oral cancer is the sixth most common cancer worldwide^{1,2} and the seventh most common in Botswana.³ Globally the survival rate of oral cancer has not improved significantly in the past decades.⁴ It is reported to be one of the malignancies with the lowest survival rates⁵ despite improved efficacy of surgery, radiation and chemotherapy, particularly oral cancer when instituted in earlier stages of the disease.^{6,7,8} which encompasses the oral cavity-derived malignancies, is a devastating disease causing substantial morbidity and mortality in both men and women. It is the most common subtype of the head and neck squamous cell carcinoma (HNSCC). Research has shown that more than half of patients with oral cancer present with advanced stage disease (stage 3 and 4).⁹ This could be due to the relatively painless nature of the lesion or delayed recognition by clinicians.⁹ Another contributing factor to late diagnosis is the health care seeking behaviour of oral cancer patients.¹⁰ Patient delay in seeking care for symptoms contributes to delays in diagnosis.¹¹

Health care seeking behaviour ("care seeking") is initiated by those who consider themselves to have a condition in need of medical attention in order to maintain or restore health.¹² Studies on care seeking have shown that factors such as socioeconomic status, gender, age, social status, type of illness, access to care, clinician attitudes towards patients and perceived quality of service influence the decision to pursue medical treatment.^{13,14} Delayed care seeking has been associated with worse health outcomes, high morbidity and mortality.¹³

The self-regulatory model (SRM) by Leventhal et al provides a framework to understand how individual cognitive and emotional experiences during a health threat guides the coping response.^{10,15} This process proceeds in three stages: 1. Symptom interpretation, 2. Coping strategy and 3. Appraisal of coping strategy.¹⁰ Leventhal et al's framework has been applied to understand care seeking for various chronic illnesses.¹⁵ It has been documented that knowledge or raising awareness on its own does not guarantee that a person will seek care at the optimal time.¹⁶ Therefore, it is important to understand factors that encourage oral cancer patients to take action to seek care early on when symptoms arise, at a time when the cancer is more likely curable. The objective of this study was to explore individuals' initial experiences and reaction to developing symptoms of oral cancer and how these experiences have shaped their care seeking behaviour.

Authors' information

1. Dr Precious Kefilwe Motlokwa, BchD, MSCE, MCHD^{1,2,4}
ORCID: 0000-0001-6724-6628
2. Prof Robert Gross, MD, MSCE, Perelman School of Medicine, University of Pennsylvania^{1,2}
3. Associate Prof Julia E Szymczak, PhD, University of Utah School of Medicine³

Corresponding author

Name: Dr Precious Kefilwe Motlokwa
Tel: 0276 4642 6020
Email: precious.motlokwa@gmail.com

Affiliations

1. University of Pennsylvania, Philadelphia, PA, US
2. Princess Marina Hospital, Gaborone, Botswana
3. University of Utah School of Medicine, Salt Lake City, UT, US
4. University of the Western Cape, Cape Town, South Africa

Author's contribution

1. Dr PK Motlokwa, principal researcher (50%) – conception 50%, data collection 100%, data analysis 60%, data interpretation 55%, manuscript write-up 70%, approved submitted version 33%.
2. Prof R Gross, co-author (25%) – conception 25%, data interpretation 45%, manuscript write-up 15%, approved submitted version 33%.
3. Prof JE Szymczak, co-author (25%) – conception 25%, data analysis 40%, manuscript write-up 15%, submitted version 33%.

METHODS

Study design

This was a cross-sectional qualitative study using semi-structured interviews conducted from August 2019 to January 2020 at Princess Marina Hospital (PMH) in Gaborone, Botswana. Interviews were selected as a method to achieve our study objective because they are well-suited to elicit an individual's understanding, interpretation beliefs,¹⁷ values, desires and motivation.¹⁵

Study population and procedure

Participants were recruited from the Princess Marina Hospital Oral Maxillofacial Surgery (OMFS) and Oncology clinics either in person or through their registers. PMH serves as one of two government-funded referral hospitals in the country for complex medical care. Their OMFS clinic operates fully during weekdays (7.30am-4.30pm) for both outpatients and inpatients. On weekends, public holidays and after hours its services are limited to emergency cases and inpatients. In the southern part of Botswana, suspected cases of oral cancer are referred to the OMFS Clinic for biopsy. Histopathology confirmed positive cases are then referred to the Oncology Clinic for treatment. There is only one oncologist specialist in government hospitals, who is based in PMH – therefore, most of the oral cancer cases are managed there. A convenience sampling approach was used, with purposive inclusion of respondents with diverse characteristics (eg age, gender, place of residence) to gain a broad range of experiences with patient care seeking for oral cancer symptoms. Interviews were conducted until sequential interviews failed to identify novel answers on the key domains of the interview guide (18 interviews).¹⁸

Patients 18 years of age and above were included if they had a new histopathology diagnosis of oral cancer in the last month, were able to communicate clearly in Setswana or English and able to provide informed consent. Participants were approached while waiting in the queue for consultation at one of the clinics. At the OMFS Clinic, the interviewer gave a talk summarising the study purpose to the patients as a group followed by a brief question and answer session. Others were approached individually if they had overt lesions. Those interested in taking part were then taken to a separate room to obtain informed consent, to participate in a face-to-face or telephone interview while still maintaining their place in the queue. Other eligible telephone participants were recruited from the OMFS and Oncology registers. Participants had a choice to do the interview same day or at their preferred time.

Data collection

Interviews were conducted by a trained interviewer who was not involved in patient care. Interviews were conducted in Setswana or English, based on participant preference, by fully bilingual interviewers. Participants who did face-to-face interviews gave written consent while those who did telephonically gave verbal consent. Interviews were conducted during weekdays and participants were compensated with BWP30 (+-\$3) for their time.

Semi-structured interviews lasted 30-45 minutes. An interview guide was used to structure the conversation and ensure key topic areas of the study were covered, but participants were allowed to expand on their ideas and

discuss areas that were important to them. The interview guide contained two primary domains:

1. To describe or tell their story of what happened from the moment they first became aware of the lesion to present.
2. Their perception and experience about the lesion and how they shaped their decision to come seek help at the clinic.

See Appendix 1 for interview guide.

The interview guide was piloted on three patients, and the interview guide modified to ensure comprehensibility of questions and that the length was not burdensome to potential respondents.

The study was approved by the Ministry of Health, Botswana (HPDME 13/18/1), Princess Marina Hospital (PMH5/79(463-1-2018) and University of Pennsylvania Committees on Human Subjects Research (IRB# 848379). The study was conducted in accordance with the ethical standards of the Declaration of Helsinki.

Data analysis

Interviews were audio recorded, transcribed verbatim and translated. Demographic data (age, gender, place of residence) were collected from each respondent. Translations were confirmed and quality checked by two people and, if any disagreement arose, a third person was involved to cross-check interpretations. Data analysis was conducted using the framework method to guide analysis of the data, incorporating Leventhal et al's model.¹⁹ First, two authors (PKM and JES) engaged in a process of familiarisation by reading through the interview transcripts to identify emergent concepts. Second, these concepts were reviewed and defined as codes. A priori concepts derived from the Leventhal et al model including symptom interpretation, coping strategies and appraisal of coping strategies were added to the codebook. Once the codebook was finalised, the codes were applied to the interview transcripts by one author (PKM) manually in Microsoft Word. Our study is consistent with standards for reporting qualitative research studies as specified in the consolidated criteria for reporting qualitative research (COREQ).

RESULTS

Demographics of the participants

Participants were aged 21 to 83 years, with a mean age of 43 years (SD 17.17). Out of 32 patients recruited to participate the response rate was 56%. Reasons for no response were incorrect contact number from the registry for 8 participants (57%), 5 (36%) of them the contact number was not available and 1 (7%) participant was deceased. Of the 18 participants, 7 (37%) were women with a median of age of 43 years and 11 (61%) men with a median age of 45 years. Most participants were from the Southern, Kweneng and South East district respectively. There were no participants from the north of Botswana. Our cohort was homogenous in terms of clinical services access with only two participants having started care at a private facility before transferring to government supported care.

Table I: Cognitive symptom interpretation

Symptom interpretation	Verbatim examples
Cold sore, ulcer, benign small lump	"Ah I thought it was a cold sore" (16) "That thing started as a small lump like this, you know a blister" (14) "It was just a small lump, just a little lump then I underestimated it." (2) "Ah that time I took it as in the past it will develop like a cold sore because if I get a headache it would come out" (1) "I just saw an ulcer I didn't know what it was" (17)
Post tooth extraction complication, injury complication	"I had removed my tooth and it swelled up because of that" (15) "It was a little lump that was suspected to have been caused by my tooth which I removed" (11) "Where I was punched on the top of my jaw has multiplied"(19)
Cancer	"I had a sore like this by my ear..., they told me it's cancer I also thought it might be developing here now" (11) "I once thought of cancer coz I even went to the internet checking like the symptoms" (6) "Hey I thought it was cancer because I went to the clinic really fast" (4)
HIV-related	"When I thought about it I said but you know I also take ARVs [antiretroviral for HIV]" (7) "Then I thought maybe HIV. Just from the symptoms that it's like this and this." (8)
Tonsillitis	"Honestly this thing started as tonsillitis, when I woke up my tonsils were swollen" (12) "The pain was similar to tonsillitis, I felt like it my tonsils" (4)

Table I presents illustrative examples of how patients interpreted initial symptoms. Most considered them to be common non-threatening illness like cold sores, tonsillitis, lump, ulcer or complications due to tooth extraction. They

spoke of feeling that these symptoms were not worrisome, with the realm of normal illness that would likely resolve, considering them to be transient. Only a few associated the lesion with cancer.

Table II: Emotional response to symptoms interpretation

Emotion	Verbatim examples
Fear	"I was thinking about things like death, that I might die but my children are still young" (12) "I know that if there is such an issue hey! You know what I am not going to have anything. I am going to be emotionally tormented by this disease" (1)
Shock, wonder	"I didn't know what it was I was just shocked" (14) "Ah I asked myself what it was" (18)
Stigma, low self-esteem, low self confidence	"I was scared of what people will say when they saw me walking around with an ulcer like this" (16) "I'm now afraid of mixing with people thinking that they will treat me in a certain way, I have noticed it has deterred me from people" (1) "It made me not to have confidence, low self-esteem about my image" (15) "This ulcer has done un-pretty things to me because now I am ugly." (14)
Annoyance, reluctance	"When moving my tongue around the mouth I could feel that there is something, so I ignored it thinking it would disappear" (6) "I kept telling my parents that I should go to the doctor because I am swollen but they said I was just fine" (15) "I didn't think about going to the doctors early. I just sat with it because it was not painful" (12) "I didn't think it was anything" (17) "It has been a while, it kept developing and it would go down" (10)

Table II displays examples of respondents' emotional responses to symptom interpretation, varying from annoyance to fear. Some took the symptoms as nuisance because they used to come and go spontaneously, only this time they seemed to have persisted. On the other hand, some thought they were going to die. Others felt embarrassed or stigmatised by their appearance, which lowered their self-esteem, making them uncomfortable to

socialise. For some, the symptoms just left them in shock, wondering what caused it. Those who viewed the symptoms as annoying did not hasten to seek care as they thought it would disappear or resolve eventually – as one said: "Ah! I just thought it was a cold sore as usual. It would itch and I will wait on it thinking it will heal." The other one said: "...it has been a while. It kept developing and it would go down. Then it really worsened now".

Table III: Coping strategies

Coping strategies	Mechanism	Expected outcome	Verbatim example
Local clinic	Warm salty water	Cure the ulcer	"it was only what was prescribed by the doctors... I should use salt water" (15)
	Pain killers	Reduce pain	"It is painful but when I take pills it goes quiet" (13)
	Lotion	Manage the ulcer	"I could go to the clinic and they would give me some lotion. After I apply it stops. When lotion finishes it comes back" (8)
Self-medication	Zambuck, DCT (medicated lip balm), Potassium permanganate	Manage the lesion	"Zambuck was working really well" (3) "I've been rinsing with it daily" (7)
Traditional meds Church prayers	Mosibi	To dry the ulcer	I need to dry it so that it is not wet, because most of time when it is wet I feel some pain" (1)
	Moharasope	To heal the lesion	"Even the experts use it when they want to kill ulcer roots." (16)
	Prayer	To heal the lesion	"I have been going to church to ask for prayers" (6)

Table III displays examples of how participants tried to resolve the symptoms when they realised the lesion was not resolving spontaneously. Several management strategies were identified including consultation with primary health care givers, consultation with traditional healers over the counter and traditional self-medication with expectation of curing or managing the symptoms. For those who went to the local clinics for consultation, most of them were given pain medication, saline rinse and other medications. The cancer lesion was treated as a benign ulcer. Many of them had to go back and forth to the primary care giver who was a nurse or general practitioner before being referred for biopsy. Some ended up losing faith in the modern medicine, resorting to traditional medicine or even just staying at home.

One participant said: "I would only get that blue medicine, when I get home I would use it, then give up and just not use it. Then I would try these other (traditional) ones you see." Another participant said: "I had tried some medicine from the chemist and then after, I tried a Tswana remedy."

Most patients reappraised their coping strategies when their condition was not improving or worsening. One of the participants who went to the local clinic said: "Ah I was of the view that they were only helping me with the blue medicine but it was not working for me. I ended up getting frustrated and I came here (to the OMFS Clinic)." The other participant came because the swelling kept growing.

Table IV: Other factors influencing health seeking behaviour

Factors	Verbatim example
Knowledge/awareness of oral cancer	"I didn't know anything that much. I only knew that apparently it can spread and infect other things that are close to where it is." (15) "What I read for myself in papers is that oral cancer is prone to people who smoke cigarettes and drink alcohol." (16) "I have not heard anything about it and I don't know what kind of disease it is" (7)
Discovery of symptoms by significant other	"My brother noticed that this ulcer will cause a lot of damage and I should go to the hospital" (1) "It is only because... my sister told me to take this thing to the hospital because it is still looking swollen. It should have burst with the other one not for it to still be there." (12)
Perceived quality of service at PMH dental	"I had the hope that I would be healed because it's a big hospital." (18) "Ah Marina I realised that I could get well because my brother had something by his nose here. It wasn't ok. Then he went for an operation then then they put some flesh. He was encouraging me with a testimony that I can get better because he came here." (1) "I have heard that it was good. It has helped many people with the same issue" (15)
Psychological factors and beliefs	"I also asked myself that if have a wound and I take it to the hospital and they poke it there, they make it worse and then tomorrow they tell me go home. Now I am going to die of pain after they make it worse. That issue is what made me fear coming to the hospital." (1)
Lack of funds for private hospital	"I had gone to do the thing, x-ray. I had done it at a private clinic now I did not have money to carry on with the treatment in the private clinic. Then I went to Marina" (15) "Then I went to [the private hospital] and saw [Dr. X] Then he did a biopsy. Then as we continued it got a bit expensive then I came here." (6)

Table IV demonstrated other factors that shaped individuals' decisions to seek health care. Lack of knowledge and awareness on early presentation of oral cancer was evident in patients. There was a mixed response in this issue. All the participants were aware that there is a condition called cancer and have heard of other types of cancer. However, most of the patients were not aware and knew little to nothing about oral cancer. Those who had some knowledge about oral cancer had past experience with those around them. Most patients consulted their primary health care facilities for management and treatment a few times with no improvement to their symptoms before being referred to PMH. The perceived quality of service from the specialty clinic was mostly based on testimonials from those close to them and the magnitude of the infrastructure. Most of those who came to the specialty clinic had a perception that it provides good quality care as one said: "I heard that it was good, it had helped many people with the same issue." While others came just a last resort, example: "I was now going only because I was being sent by doctors. I have no choice to be honest."

DISCUSSION

Oral cancer is a growing public health issue especially in developing countries, including Botswana. Similar to other studies in the literature, we found several themes of barriers and facilitators to early care.^{20,10,11,17} Respondents attributed their early oral cancer symptoms to other conditions which led them to try other alternatives before consulting health care professionals or specialty clinic.

Participants in our study misattributed their symptoms to non-threatening illness, in some cases mimicking symptoms of previous non-serious conditions, in keeping with existing literature.^{21,17,22} This manner of symptoms interpretation seems to be an important reason for patients presenting with an advanced stage oral cancer. Those who had suspicions of cancer showed to be from previous experiences. Others did not think much about the initial symptoms and did not seem bothered by them, possibly because it did not affect their daily lives. This ignorance could be due to the painless, concealing nature of oral cancer^{11,10} or little understanding on early stage presentation of oral cancer.^{23,24} It has been documented that most patients do not actively seek professional help until it starts affecting their daily lives,²⁵ including speech, eating, work or just socialising, as we also observed in the study.

Participants had different emotional responses to their symptoms. Fear emerged as a protective theme for individuals who interpreted their symptoms as something serious and they sought help sooner. This issue was also noted by Anakwenze in the study conducted in Botswana on cancer in general.²⁰ Those who took their symptoms for a less serious illness started by self-observation of their symptoms with the belief and hope that it would resolve spontaneously. Similarly, we found that fear of cancer treatment was a potential reason for delaying presentation.²⁰ This fear was mostly driven by the belief that surgery will worsen their cancer²⁶ or that their efforts would be wasted because there was nothing the doctors could do for them.

Stigma and myths/beliefs about cancer exist in the general public^{27,28,29,20} but there is very limited data on oral cancer

related stigma.³⁰ The current study has highlighted the existence of stigma experienced by oral cancer patients, which is contrary to the low levels of stigma experienced in Anakwenze's study on cancers in Botswana.²⁰ This could be due to the nature of the study as it included all cancers or maybe the stigma of oral cancer specifically was masked by grouping it with other cancers of the head and neck. Oral cancer negatively affects facial aesthetics and speech which, in turn, affects how one interacts with those around them. Due to the disfiguration, one may feel embarrassed or uncomfortable as to how people may see them or their condition. Stigma has shown to contribute to loss of self-esteem, low self-confidence and can progress and cultivate a feeling of isolation.³¹ Studies in psychology, HIV, lung cancer and cancers in general have shown correlation between stigma and reluctance to seek help.^{32,33,34} This could be another overlooked aspect as to why more than 50% of patients with oral cancer present with an advanced disease.³⁵

The cognitive and emotional interpretation of symptoms conformed to the dimensions of illness representation of the SRM which include identification of illness, cause, consequence, control and timeline.³⁶ Participants identified the believed nature and the cause of their illness through interpretation of their symptoms to be a non-threatening lesion caused by common cold or complication of their existing condition. Due to probable initial non-interference of symptoms with their daily lives they believed the condition to be transient and of negligible consequences to life that can be controlled, hence attributing it to a lighter illness with less fear but rather more of annoyance and wonder.

Patients coping mechanisms were influenced by their cognitive and emotional interpretation of the symptoms. Participants consulted with the nurse/general medical doctor as their first or second option regarding their oral condition at the local clinic instead of a dentist. These findings are in keeping with studies on care seeking for oral cancer in India, China and Pakistan.^{11,23,37} This reflected lack of knowledge and awareness on which conditions are best seen by the dentists who can perform a biopsy, thereby playing a critical role in early diagnosis and likely better outcomes. These similarities were also noted in a study in the UK, where respondents exhibited the belief that dentists only deal with teeth.³⁸ Our findings have shown a gap in oral cancer knowledge and awareness. More than half of the participants have never heard of oral cancer, but all of them were aware of other cancers and this poor awareness has also been reported in the literature elsewhere.^{11,24,39,40}

Despite the wide use of modern medicine some participants consulted with traditional doctors, which is an uncommon practice in Botswana. These findings are similar to that of the study conducted by Togarasein et al in Botswana.⁴¹ Most of those who were consulted by nurses and general practitioners were given medications and treatments in more than one visit before being referred/self-referred to PMH OMFS Clinic. This inappropriate management has shown to be a facilitator in delayed diagnosis.^{42,43} This process could have a ripple effect that could lead to mistrust in health care providers due to unresolving symptoms. This lack of trust has been associated with reluctance to health seeking in cancer patients⁴⁴ as we observed.

LIMITATIONS

The incorporation of the SRM framework adds strength to the study as it is widely used in health research and has been used to understand health seeking behaviour of oncology patients.⁴⁵ While the findings of this qualitative study generate rich information about the experiences that oral cancer patients in Botswana have seeking care, the methods used have limitations. The potential for researcher bias to influence recruitment and the interview process was minimised by involving a third party which was not involved in patient care to carry out those processes. Recall bias is a common limitation in self-reported studies;¹³ however, we minimised this threat by recruiting individuals who had a diagnosis of oral cancer in the past month. This cutoff has been used by several researchers in Africa.⁴⁶ Due to the nature of the qualitative approach generalisability cannot be made to a wider context than the one studied with confidence. Participants were only recruited from PMH which serves the south part of Botswana. This might not be representative of the north part of the country. However, we do not expect the discrepancy to be that much as Botswana is more of a homogenous society in terms of beliefs, practices and health care. Another limitation of the study is that we did not engage in member-checking due to feasibility challenges. To minimise misinterpretation of findings two authors performed a cross-check of each translated interview prior to data analysis.

CONCLUSION

The current study has shown that individuals' interpretation of oral cancer symptoms is misguided leading to delayed health seeking behaviour. A general lack of knowledge and awareness about early symptoms of oral cancer by both health care workers and patients may act as a barrier to seeking help. Current findings highlighted oral cancer associated stigma which is an aspect which is sparsely researched.

The study has shown the knowledge gap in oral cancer, and the knowledge gained from it will facilitate to design effective health promotion and awareness campaigns in oral cancer, policies to facilitate incorporation of oral health education at a primary health care level, to nurses and general practitioners. This can also be achieved by improving access of information about oral cancer to the public through mass media and targeted platforms. It might be time to start considering involving traditional healers in cases like these as they have shown to be in the pathway of seeking improved health. Together these will in turn improve health seeking behaviour of oral cancer patients in Botswana.

DECLARATIONS

Ethics approval and consent to participate

The study was approved by the Ministry of Health, Botswana (HPDME 13/18/1), Princess Marina Hospital (PMH5/79(463-1-2018) and University of Pennsylvania Committees on Human Subjects Research (IRB# 848379). Informed consent was obtained from all participants. All methods were conducted in accordance with the ethical standards of the Declaration of Helsinki.

Availability of data and materials

The dataset used and/or analysed during the current study are available from the corresponding author on reasonable request, as we have promised our participants their information will be kept private.

Conflict of interest

Authors have no competing interests or other interests that might be perceived to influence the results and/or discussion reported in this paper.

Funding

The study was funded by the HIV Clinical Epidemiology Training for Botswana, D43TW009781 grant (RG) and supported by the Penn Centre for AIDS Research, an NIH funded programme (P30 AI 045008).

Acknowledgements

The authors would like to thank the following individuals and institutions for their support in the study:

1. Study participants for their time, information and co-operation.
2. Princess Marina Hospital, dental and oncology departments, for patient recruitment and office space for interviews.
3. Botswana Upenn Partnership for administrative support.

REFERENCES

1. de Camargo Cancela M, Voti L, Guerra-Yi M, Chapuis F, Mazuir M, Curado MP. Oral cavity cancer in developed and in developing countries: Population-based incidence. *Head Neck* 2009; <http://doi.wiley.com/10.1002/hed.21193>
2. Iype EM, Pandey M, Mathew A, Thomas G, Sebastian P, Nair MK. Oral cancer among patients under the age of 35 years. *J Postgrad Med*. 2001; 47(3):171-6
3. Globocan. Botswana: Global Cancer Observatory. International Agency for Research on Cancer 2020; <https://gco.iarc.fr/today/data/factsheets/populations/72-botswana-fact-sheets.pdf>
4. Peacock ZS, Pogrel MA, Schmidt BL. Exploring the reasons for delay in treatment of oral cancer. *J Am Dent Assoc* 1939; 139(10):1346-52
5. Basharat S, Shaikh BT, Rashid HU, Rashid M. Health seeking behaviour, delayed presentation and its impact among oral cancer patients in Pakistan: a retrospective qualitative study. *BMC Health Serv Res* 2019; 19(1):715
6. Ord RA, Blancheart RH. Current management of oral cancer. *J Am Dent Assoc* 2001; 132:19S-23S
7. Pignon JP, Maître A le, Maillard E, Bourhis J. Meta-analysis of chemotherapy in head and neck cancer (MACH-NC): An update on 93 randomised trials and 17,346 patients. *Radiother Oncol* 2009; 92(1):4-14
8. Katabat, Pundir, Mohabatpour, Lobanova, Koutsopoulos, Hadjijski, et al. Controlled Drug Delivery Systems for Oral Cancer Treatment – Current Status and Future Perspectives. *Pharmaceutics* 2019; 11(7):302
9. Scott SE, Grunfeld EA, McGurk M. Patient's delay in oral cancer: a systematic review. *Community Dent Oral Epidemiol* 2006; 34(5):337-43
10. Azhar N, Doss JG. Health-Seeking Behaviour and Delayed Presentation of Oral Cancer Patients in a Developing Country: A Qualitative Study based on the Self-Regulatory Model. *Asian Pac J Cancer Prev* 2018; 19(10)
11. Rath H, Shah S, Sharma G, Mishra E. Exploring determinants of care-seeking behaviour of oral cancer patients in India: A qualitative content analysis. *Cancer Epidemiol* 2018; 53:141-8
12. Kasl SV, Cobb S. Health Behavior, Illness Behavior, and Sick-Role Behavior: I. Health and Illness Behavior. *Arch Environ Health Int J* 1966; 12(2):246-66
13. Laturji OO, Akinyemi OO. Factors influencing health-seeking behaviour among civil servants in Ibadan, Nigeria. *Ann Ib Postgrad Med*. 2018; 16(1):52-60
14. Olenja J. Health seeking behaviour in context. *East Afr Med J*. 2003; 80(2):61-2
15. Heffernan E, Coulson NS, Henshaw H, Barry JG, Ferguson MA. Understanding the psychosocial experiences of adults with mild-moderate hearing loss: An application of Leventhal's self-regulatory model. *Int J Audiol* 2016; 55(sup3):S3-12
16. Shaikh BT, Haran D, Hatcher J. Where Do They Go, Whom Do They Consult, and Why? Health-Seeking Behaviors in the Northern Areas of Pakistan. *Qual Health Res* 2008; 18(6):747-55
17. Scott SE, Grunfeld EA, Main J, McGurk M. Patient delay in oral cancer: a qualitative study of patients' experiences. *Psychooncology* 2006; 15(6):474-85
18. Kerr C, Nixon A, Wild D. Assessing and demonstrating data saturation in qualitative inquiry supporting patient-reported outcomes research. *Expert Rev Pharmacoecon Outcomes Res* 2010; 10(3):269-81
19. Gale NK, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 2013; 13(1):117
20. Anakwenze C, Bhatia R, Rate W, Bakwenabatsile L, Ngoni K, Rayne S, et al. Factors Related to Advanced Stage of Cancer Presentation in Botswana. *J Glob Oncol* 2018; (4):1-9
21. Lowry RJ, Craven MA. Smokers and drinkers awareness of oral cancer: a qualitative study using focus groups. *Br Dent J* 1999; 187(12):668-70
22. Hu TW, Cooke M, McCarthy A. A qualitative study of the experience of oral cancer among Taiwanese men. *Int J Nurs Pract* 2009; 15(4):326-33
23. Zhang X, Liu D, Dong H, Li Y, Zhang Y, Wang X, et al. Factors associated with delay in presentation among patients for oral cancer. *J Comp Eff Res* 2019; 8(12):1003-71
24. Jafer M, Crutzen R, Ibrahim A, Moafa I, Zaylaee H, Ajeely M, et al. Using the Exploratory Sequential Mixed Methods Design to Investigate Dental Patients' Perceptions and Needs Concerning Oral Cancer Information, Examination, Prevention and Behavior. *Int J Environ Res Public Health* 2021; 18(14):7562
25. Burgess C, Hunter MS, Ramirez AJ. A qualitative study of delay among women reporting symptoms of breast cancer. *Br J Gen Pract J R Coll Gen Pract*. 2001; 51(473):967-71
26. Daher M. Cultural beliefs and values in cancer patients. *Ann Oncol* 2012; 23:iii66-9

27. Zhang Y, Cui C, Wang Y, Wang L. Effects of stigma, hope and social support on quality of life among Chinese patients diagnosed with oral cancer: a cross-sectional study. *Health Qual Life Outcomes* 2020; 18(1):112
28. Tan C, Zhong C, Mei R, Yang R, Wang D, Deng X, et al. Stigma and related influencing factors in postoperative oral cancer patients in China: a cross-sectional study. *Support Care Cancer* 2022; 30(6):5449-58
29. Squiers L, Siddiqui M, Kataria I, Dhillion PK, Aggarwal A, Bann C, et al. Perceived, Experienced, and Internalized Cancer Stigma: Perspectives of Cancer Patients and Caregivers in India. RTI Press; 2021
30. Akin-Odanye E, Husman A. Impact of stigma and stigma-focused interventions on screening and treatment outcomes in cancer patients. *ecancer* 15(1308)
31. Adimora DE, Aye EN, Akaneme IN, Nwokenna EN, Akubulo FE. Stigmatization and discrimination as predictors of self-esteem of people living with HIV and AIDS in Nigeria. *Afr Health Sci* 1970; 19(4):3160-71
32. Pheko MM, Chilisa R, Balogun SK, Kgathi C. Predicting Intentions to Seek Psychological Help Among Botswana University Students: The Role of Stigma and Help-Seeking Attitudes. *SAGE Open* 2013; 3(3):215824401349465
33. Steward WT, Bharat S, Ramakrishna J, Heylen E, Ekstrand ML. Stigma Is Associated with Delays in Seeking Care among HIV-Infected People in India. *J Int Assoc Provid AIDS Care* 2013; 12(2):103-9
34. Carter-Harris L. Lung cancer stigma as a barrier to medical help-seeking behavior: Practice implications. *J Am Assoc Nurse Pract.* 2015; 27(5):240-5
35. Motlokwa PK, Tsima BM, Martei YM, Ralefala T, Galebole F, Stephens-Shields AJ, et al. Disparities in Oral Cancer Stage at Presentation in a High HIV Prevalence Setting In Sub-Saharan Africa. *JCO Glob Oncol.* 2022; 8:e2100439
36. Reynolds NR, Eller LS, Nicholas PK, Corless IB, Kirksey K, Hamilton MJ, et al. HIV illness representation as a predictor of self-care management and health outcomes: a multi-site, cross-cultural study. *AIDS Behav.* 2009;13(2):258-67
37. Zahid T, Hussain SI, Siddiqui AH, Junaid ST, Ahmed Z, Noorani MM, Shoaib M, Khaliq F. Health seeking behavior of oral cancer patients of low socioeconomic status: a cross sectional study in a tertiary care hospital of Karachi. *J Dow Uni Health Sci* 2014; 8(2): 72-79
38. Zohoori FV, Shah K, Mason J, Shucksmith J. Identifying Factors to Improve Oral Cancer Screening Uptake: A Qualitative Study. Fielding R, editor. *PLoS ONE* 2012; 7(10):e47410
39. Baumann E, Scherer H, Link E, Wiltfang J, Wenz HJ, Koller M, et al. Exploratory Research Focusing on Oral Cancer Prevention: Challenges of Dealing With Informational and Cognitive Barriers. *Qual Health Res* 2019; 29(13):1930-41
40. Panzarella V, Pizzo G, Calvino F, Compilato D, Colella G, Campisi G. Diagnostic delay in oral squamous cell carcinoma: the role of cognitive and psychological variables. *Int J Oral Sci* 2014; 6(1):39-45
41. Togarasei L, Mmolai SK, Kealotswe ON. 'Quinine', 'Ditaola' and the 'Bible': *J Study Relig* 2016; 29(2):95-117
42. Gao W, Guo CB. Factors Related to Delay in Diagnosis of Oral Squamous Cell Carcinoma. *J Oral Maxillofac Surg* 2009; 67(5):1015-20
43. Badri P, Baracos V, Ganatra S, Lai H, Samim F, Amin M. Retrospective study of factors associated with late detection of oral cancer in Alberta: A qualitative study. Sabol I, editor. *PLOS ONE* 2022; 17(4):e0266558
44. Oshiro M, Kamizato M, Jahana S. Factors related to help-seeking for cancer medical care among people living in rural areas: a scoping review. *BMC Health Serv Res* 2022; 22(1):836
45. Browning KK, Wewers ME, Ferketich AK, Otterson GA, Reynolds NR. The Self-Regulation Model of Illness Applied to Smoking Behavior in Lung Cancer. *Cancer Nurs* 2009; 32(4):E15-25
46. Onwujekwe O, Uzochukwu B, Eze S, Obikeze E, Okoli C, Ochonma O. Improving equity in malaria treatment: Relationship of socio-economic status with health seeking as well as with perceptions of ease of using the services of different providers for the treatment of malaria in Nigeria. *Malar J* 2008; 7(1):5

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.



Perceived knowledge, treatment approaches and predictors of referral practices in myofascial pain syndrome of the temporomandibular joint

SADJ JULY 2024, Vol. 79 No.6 P312-318

H Van Der Colff, A Docrat, D Singh, JD Pillay

ABSTRACT

Introduction

Myofascial Pain Syndrome (MFPS) of the head and neck is a frequently misdiagnosed cause of Temporomandibular Disorders (TMDs). In South Africa, literature regarding general dental practitioners' (GDPs) knowledge/management of TMDs associated with MFPS is limited.

Aim

To determine perceived knowledge and treatment practices of GDPs on TMDs associated with MFPS.

Design/Methods

A researcher-developed questionnaire consisting of sections on demographics, education/training, perceived knowledge and treatment/management, including referral practices, was conducted on GDPs registered with the Health Professions Council of South Africa, sampled through this database.

Results

More than three-quarters (n=40; 76.9%) of GDPs received MFPS training at the undergraduate level with 78.8% (n=41) dissatisfied with their knowledge and 57.7% (n=30) having attended postgraduate training. More than two-thirds (69.2%; n=36) referred patients to other healthcare

professionals – mostly dental specialists (83.3%; n=30). Adjusted logistic regression revealed that those with adequate knowledge of MFPS were 6.52 times more likely to refer patients to other health practitioners than those with inadequate knowledge (OR=6.5, p=0.28, B=1.88); 73.1% (n=38) would consider such co-management strategies.

Conclusion

This study highlights the gap in GDPs' perceived knowledge in MFPS and TMDs. Supplementary training and mutual referral between allopathic and alternative medical professions is recommended for a more integrated treatment approach.

Keywords

Dentist, myofascial pain syndrome, trigger points, temporomandibular joint disorders, surveys and questionnaires, referral and consultation.

INTRODUCTION

Disorders arising from the temporomandibular joint (TMJ), a joint between the jawbone and the skull¹⁻³ – collectively referred to as Temporomandibular Joint Disorders (TMDs) – rank among the top three most common chronic pain conditions alongside headaches and back pain.⁴ The prevalence of TMDs, following a recent systemic review, is estimated to be more than 30% in the adult/elderly group.⁵ There is no documented literature on the prevalence of TMDs in South Africa; however, Graff-Radford in 1984 alluded to the importance of recognising and correctly diagnosing myofascial pain syndrome (MFPS) – a categorisation of chronic pain within muscles – as a key indicator of TMDs.⁶ Despite this recommendation, anecdotal information suggests gaps in the effective diagnosis of MFPS and the consequent treatment of TMDs primarily due to limited education and training within this ambit of dental practice in South Africa.

The clinical examination and diagnosis of MFPS involves careful examination of the muscles in reference to specific criteria.⁷ However, these criteria are often not considered in the clinical examination and are frequently overlooked.⁷⁻⁹ Numerous studies conducted internationally on the management of TMDs by dental practitioners confirm that there is a significant gap in dentists' education and training regarding the correct diagnosis and management of MFPS.¹⁰⁻¹⁴ In South Africa, there is a paucity of literature on studies that assess the knowledge of GDPs in MFPS and TMDs, as well as the perceived knowledge and the practices of GDPs in such management. It is therefore important to

Authors' information

1. Hyla Van Der Colff, M:Tech:Chiropractic, student, Department of Chiropractic, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa
ORCID: 0009 0009 7886 2130
2. Aadil Docrat, *MMedSci*, senior lecturer, Department of Chiropractic, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa
ORCID: 0000-0001-7722-6962
3. Deepak Singh, *MSc Physics*, senior lecturer, Department of Physics, Faculty of Applied Sciences, Durban University of Technology, Durban, South Africa
ORCID: 0000-0002-3000-0357
4. Julian David Pillay, *PhD Physiology*, Professor, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa
ORCID: 0000-0001-8502-8878

Corresponding author

Name: Prof JD Pillay
Tel: (+27) 31 373 2398
Cell: (+27) 82 603 9111
Email: pillayjd@dut.ac.za

Author's contribution

1. H Van Der Colff, A Docrat, D Singh and JD Pillay – conceptualisation and design, analysis and interpretation of data (25% each).
2. H Van Der Colff, A Docrat, D Singh and JD Pillay – preparation and final submission of manuscript (25% each).
3. H Van Der Colff – acquisition and recording of data (100%).

understand how GDPs recognise, treat and manage MFPS so that gaps in current knowledge/practice can form the substrate for developing and expanding appropriate training towards improved health care in this domain.¹³⁻¹⁸

The purpose of this study was, therefore, to determine the perceived knowledge of South African GDPs regarding MFPS. The specific aims of the study were to identify the clinical practices applied, including diagnosis, treatment and management of MFPS of the TMJ, and to determine the predictors of referrals by dentists to other healthcare practitioners as part of an integrated healthcare approach.

METHODOLOGY

This study was designed as a questionnaire-based cross-sectional study. It was conducted within a predefined timeframe to obtain selected information from eligible participants and therefore a cross-sectional study was most appropriate. The STROBE guidelines were followed in terms of reporting the methodology of this study.

Dentists practicing privately within the greater eThekweni region of KwaZulu-Natal, South Africa, registered with the Health Professions Council of South Africa (HPCSA) and who signed the informed consent form, were eligible to participate in the study. Dentists who failed to return the questionnaire within the data collection period or those who participated in the expert group and pilot study were not eligible to be included in the main study.

All practitioners identified as practicing in the greater eThekweni region, as per the HPCSA database, were contacted to participate in the study. Of the 76 practitioners identified on the database, three moved away from the sampling area and three participated in the pilot study and were thus excluded from the main study. Therefore, 70 practitioners were eligible for participation in the main study. Eight dentists indicated that they did not wish to participate in the study, while 10 respondents did not complete the questionnaire within the data collection period and were therefore excluded. Consequently, 52 completed questionnaires were returned, which yielded a 74.3% response rate on eligible participants. There is a 10% loss of power using the sample size in the experiment ($n=52$) compared to the original sample size of 70 ($\text{power}=85\%$). This was computed using GPower (version 3.1.9.2) [Effect size: medium ($p=0.3$) at an α of 0.05].¹⁹

A questionnaire was utilised as a tool to obtain data regarding the management strategies with regard to MFPS of the TMJ. The researcher developed a questionnaire validated by both an expert panel and a pilot study group. The questionnaire was then used as the research tool in this cross-sectional study. The questionnaire consisted of five sections (A-E) – these included: the biographical profile of respondents; topic background; perception; knowledge; utilisation and management (including referral patterns) of MFPS. There was a total of 58 questions between these five sections.

The researcher developed a questionnaire validated by an expert panel. To ensure that the questionnaire used in the study would yield the required data, a focus group ($N=6$) comprising dentists, questionnaire design experts, the research supervisors/promoters and a statistician was arranged to critically appraise it.

Based on the HPCSA database, each prospective respondent was contacted telephonically or by electronic mail with an invitation to participate in the study. All respondents who agreed to participate subsequently received a letter of information and an informed consent form via e-mail. To enhance the probability of an adequate return rate, the research included two methods of delivery and return of the questionnaire – hand-delivery and pick-up or via electronic mail.

This research study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was granted by the Durban University of Technology Institutional Research and Ethics Committee (reference number: IREC 019/16). This study was strictly carried out only in accordance with the methodology approved by IREC. Informed consent was obtained from all participants prior to participation in the study.

The data were captured on an Excel spreadsheet and imported into SPSS Statistics 23.0 (SPSS 2014). All categorical variables were presented by using frequency tables, cross tabulations and bar charts, using counts and percentages. Differences in the distributions per variable were identified using the chi-square goodness of fit test to determine if a set of observed data fits a particular theoretical distribution (ie the test compares the observed frequencies to the expected frequencies under the theoretical distribution and calculates a chi-square statistic). Inferential statistics were planned with the purpose of generalising the outcomes from a sample of the entire population of interest. It assisted in determining whether differences between groups (for instance, South African-trained dentists and overseas-trained dentists) are unique to his/her sample or are a result of real differences between the population represented.²⁰ Inferential statistics included the use of chi-square or Fisher's exact tests and the development of a logistic regression model. A confidence interval of 95% was set at $p<0.05$ for statistical significance.

RESULTS

Of a total of 70 eligible study participants, 52 completed questionnaires were returned, yielding a 74.3% response rate.

The ratio of males to females was 3:1 ($n=39$, $n=13$ respectively). The sample predominantly comprised Indians ($n=38$, 73.1%), with whites forming the next largest grouping ($n=10$, 19.2%). African and Coloured (mixed raced) respondents formed a similar but smaller grouping ($n=4$, 7.6%). Most respondents were between the ages of 30-39 years ($n=16$, 30.8%) and 50-59 years ($n=14$, 26.9%). The median age was 45 years (IQR: 34.0-57.0 years). In addition, the median number of years of respondents practicing was 20.5 years (IQR: 10.5-29.5 years). This reflects a more experienced group of respondents which is a useful consideration around the level of reliability of the responses. All respondents had a dental degree, with 5 dentists specialising in the field of orthodontics, aesthetics and/or surgery.

The demographic profiles of the respondents are shown in Table I.

Table I: Demographic profile of respondents (N=52)

	Frequency	Percent	p-value
Gender			
Female	13	25.0	< 0.001*
Male	39	75.0	
Ethnicity			
African	2	3.8	< 0.001*
Coloured (mixed raced)	2	3.8	
Indian	38	73.1	
White	10	19.2	
Age (years)			
20 – 29	7	13.5	0.04*
30 – 39	16	30.8	
40 – 49	7	13.5	
50 – 59	14	26.9	
60 – 69	7	13.5	
70 – 79	1	1.9	
Qualification			
Bachelor of Dental Science/Surgery	29	55.8	< 0.001*
Bachelor of Dentistry	18	34.6	
Bachelor of Dental Science/Surgery & PDD in Aesthetic dentistry	1	1.9	
Bachelor of Dentistry & Community Health	1	1.9	
Bachelor of Dental Science/Surgery & Diploma in Orthodontics and Periodontics	1	1.9	
Bachelor of Dental Science/Surgery & Diploma in Orthodontics	1	1.9	
Bachelor of Dental Science/Surgery & Bachelor of Dentistry	1	1.9	

* Indicates statistical significance (chi-square goodness of fit test)

Perceived knowledge and competence of GDPs in the diagnosis and treatment of TMDs

While a little more than three-quarters (76.9%, p<0.001) of respondents indicated that they received education/training on MFPS, more than 40% had not attended any subsequent training by way of refresher courses, short courses or

similar (collectively referred to as postgraduate courses in this study). Of the 30 respondents who had attended such courses, 90.0% (n=27) indicated that the courses were beneficial. All 22 respondents who had not attended courses indicated that they would find it beneficial to attend such courses. Figure 1 provides a graphical illustration of indicators that relate to education and training.

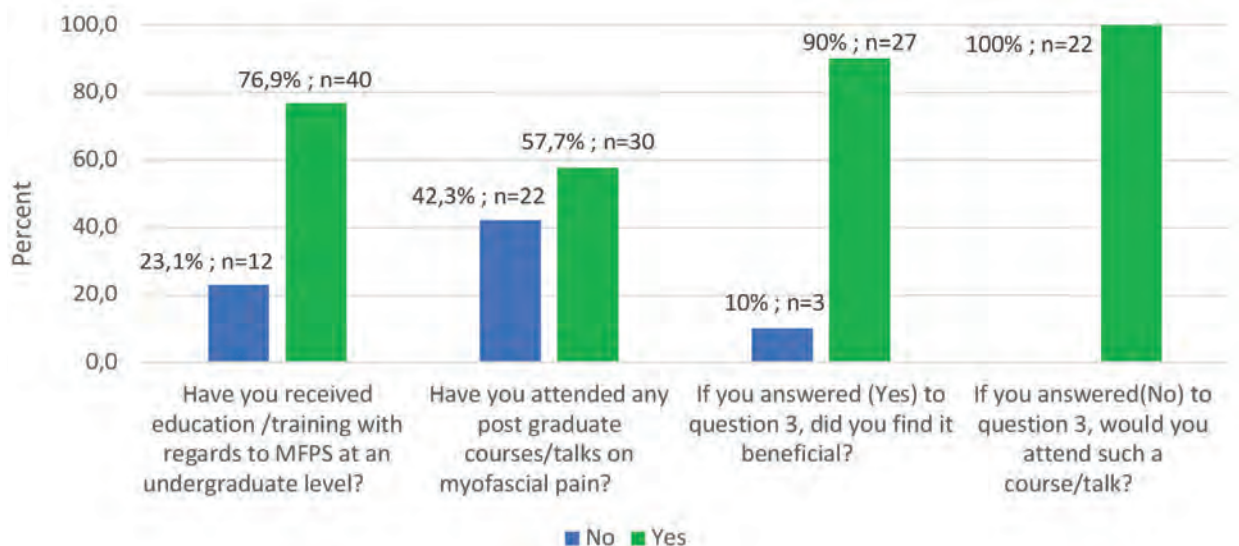


Figure 1: Level of education and training of dental practitioners (N=52)

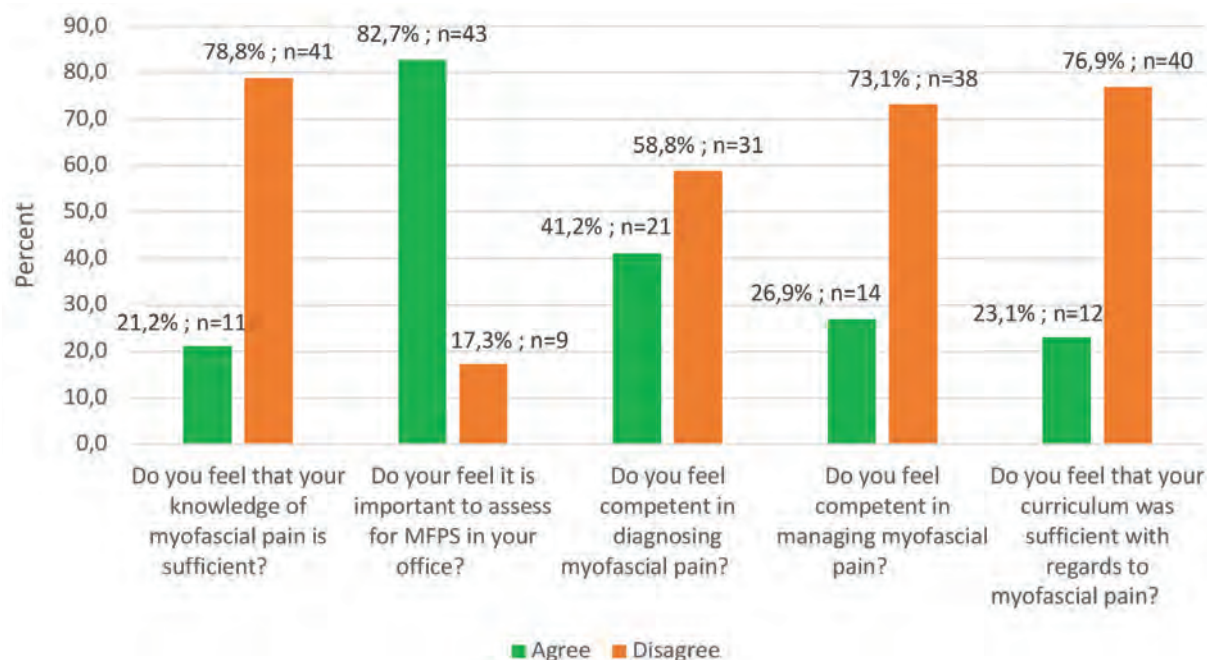


Figure 2: Competence relating to Temporomandibular Joint Disorders (N=52)

Perceived competence of dentists in Myofascial Pain Syndrome and TMDs

Knowledge-based statements were applied to self-rated competence levels (Figure 2).

As illustrated in Figure 2, a large number of respondents (n=41, 78.8%) indicated that they were not satisfied with the level of knowledge relating to MFPS (p<0.001). Similarly, a high number (n=43, 82.7%) of respondents believed that MFPS should be assessed on consultation (p<0.001). Nearly three-quarters of respondents (n=38, 73.1%) believed that they were not competent in diagnosing MFPS (p<0.001). A slightly higher number (n=40, 76.9%) did not believe that the undergraduate curriculum at universities

was comprehensive in teaching about MFPS (p<0.001).

Nearly three-quarters of respondents (n=36, 69.2%) indicated that they did assess or diagnose MFPS (p=0.006), while a similar number of respondents (73.1%; n=38) had also indicated that they were not adequately equipped to do so. The discrepancy between knowledge and practice may be an indication for the higher referral.

Treatment approaches used by dentists in the treatment of Myofascial Pain Syndrome in TMDs.

The treatment approaches used by those dentists who indicated that they have assessed/diagnosed MFPS are presented in Table II.

Table II: Treatment and diagnostic modalities used by dentists in the treatment and diagnosis of Myofascial Pain Syndrome and Temporomandibular Joint Disorders (N=52)

	No n (%)	Yes n (%)	Other n (%)	p-value
Relaxation techniques	4 (11.10%)	32 (88.90%)		<0.001*
Flat/pincher palpitation	9 (25.00%)	27 (75.00%)		0.003*
Pharmaceutical drugs	1 (2.80%)	27 (75.00%)	8 (22.20%)	<0.001*
Heat therapy	10 (27.80%)	26 (72.20%)		0.008*
Mouth guard	6 (16.70%)	22 (61.10%)	8 (22.20%)	0.002*
Stretching	15 (41.70%)	21 (58.30%)		0.317
Signs and symptoms only	16 (44.40%)	20 (55.60%)		0.505
Night splint	8 (22.20%)	20 (55.60%)	8 (22.20%)	0.018*
X-ray imaging	23 (63.90%)	13 (36.10%)		0.096
Ice therapy	26 (72.20%)	10 (27.80%)		0.008*
Myofascial release	22 (61.10%)	6 (16.70%)	8 (22.20%)	0.002*
Trigger point injection	22 (61.10%)	6 (16.70%)	8 (22.20%)	0.002*
Ischaemic compression	30 (83.30%)	6 (16.70%)		<0.001*
Ultrasound imaging	35 (97.20%)	1 (2.80%)		<0.001*
Transcutaneous electrical nerve stimulation	27 (75.00%)	1 (2.80%)	8 (22.20%)	<0.001*

* indicates statistical significance (chi-square goodness of fit test)

Relaxation techniques were used by 88.9% of dentists, followed by pharmaceutical drugs (75%), flat/pincher palpitation (75%) and ice therapy (72.2%). The use of other treatment approaches such as mouth guard, night splint, myofascial release and trigger point injection ranged from 16.7% to 61.1%. The least used treatment approach was ultrasound imaging (2.8%).

Patient referral by dentists to other health care professionals

Nearly 70% (69.2%; n=36) of respondents referred patients to other healthcare professionals. Of these (n=36), the most trusted referral was to another dental specialist (83.3%; n=30), with 25% (n=9) referring patients to physiotherapists, 13.9% (n=5) to chiropractors and 11.1% (n=4) to general practitioners. There was limited access to alternative medical disciplines; however, 73.1% (n=38) indicated they would consider alternative co-management of patients with MFPS and TMDs.

A logistic regression model was developed to test the relationship of perceived knowledge (independent variable) in referring patients with MFPS to other practitioners for treatment (dependent variable), using SmartPLS4. The unadjusted model indicated that the odds of a practitioner with adequate perceived knowledge of MFPS was 1.62 times more likely to refer a patient for treatment than a practitioner with no knowledge ($p=0.74$, Nagelkerke's R-Square=0.004, Wald=0.11, B co-efficient=0.48). After adjusting for gender, age and number of years of practice, the odds increased to 6.52 ($p=0.28$, Nagelkerke's R-Square=0.43, Wald=1.15, B co-efficient=1.88).

The Nagelkerke's R-Square value showed a marked improvement, with the Akaike Information Criterion (AIC) being met after adjustment (decreasing from the null to the estimated value). The p-values were relatively high, which suggests that there is no strong statistical evidence to support the idea that perceived knowledge of MFPS significantly influences the likelihood to refer a patient. Additionally, the differences between the "before adjustment" and "after adjustment" models suggest that some other variables or factors may be at play in the model, potentially influencing the relationship between perceived knowledge of MFPS and patient referrals. Nonetheless, the odds of a practitioner with adequate perceived knowledge of MFPS who will refer patients to others, are four times higher after adjustment.

DISCUSSION

The purpose of this study was to determine the perceived knowledge of South African GDPs regarding MFPS. The specific aims of the study were to identify the clinical practices applied, including diagnosis, treatment and management of MFPS of the TMJ, and to determine the predictors of referrals by dentists to other healthcare practitioners as part of an integrated healthcare approach. The findings of our research are within the range of those findings in other countries with regard to the evident gap in perceived knowledge for the treatment of MFPS and TMDs among GDPs.

Perceived knowledge and competence of GDPs in diagnosis and treatment

Our findings demonstrate that even though a large number of participants indicated that they had received MFPS training at the undergraduate level, a similar number indicated that they were not satisfied with their knowledge levels regarding MFPS as practicing professionals. In addition, a high number of participants believed that they are not competent in diagnosing MFPS and that their undergraduate curriculum at universities was not comprehensive in teaching about MFPS for the diagnosis thereof. Similar findings were observed in other studies globally. Taqi and Mirza,²¹ in a study on third and fourth-year dental students (n=280) in Pakistan, Asia found that 96% and 93% indicated a self-perceived need for more knowledge in TMDs in their training, respectively. Rahmeier and Irineu,²² in a pilot observational cross-sectional study on 20 dental students in their seventh to tenth semesters at a university in Brazil, South America, documented that all evaluated students reported hearing about TMD during the dentistry course, but 70% felt that they had little or no knowledge on the subject.

A study by Ziegeler and Wasiljef²³ assessed the experience of dentists (general dentists and dental specialists, n=533) and the knowledge level of dental students (n=130) on the diagnosis and treatment of non-dental orofacial pain. Ninety-two percent of dental students stated that they felt either "not at all" (56%) or only "somewhat" (36%) prepared for the diagnosis or treatment of non-dental orofacial pain and only 23% of the dentists reported "good" or "very good" confidence for the diagnosis of non-dental orofacial pain. Our findings are therefore not unique to South Africa or Africa as the limited perceived knowledge of dentists and/or dental students appears to be a spread among many continents.

Postgraduate training

Approximately half of the dentists surveyed reported not having attended postgraduate courses/talks on MFPS beyond their formal qualification, with almost all of those respondents who attended training indicating its benefit. More importantly, all respondents indicated their willingness to attend postgraduate courses/talks on MFPS to supplement their knowledge and ability to treat such disorders. Few studies have investigated the benefits of postgraduate training and short courses/refresher courses on MFPS and TMD; however, these studies corroborate closely with our findings. In a Polish study by Osiewicz et al.¹⁴ about half of the respondents (50.2%, n=201) had participated in postgraduate training in diagnosing or treating TMD. In Germany, a slightly lower number (41%) of dentists participating in postgraduate courses was documented by Ziegeler et al.²³ in 533 general dentists and dental specialists. Similarly, Gadotti et al.³ in a study of 256 dentists in Florida, US found that 37% (n=95) of dentists had never taken a continuum education course on TMD. While these studies are significantly larger than ours, the similar results yielded indicate the same view on the benefits and interest by dentists of postgraduate training and/or short courses/refresher courses in this area of training. Consequently, efforts need to be placed on expanding postgraduate training programmes, refresher courses and short courses that can ensure continued

training in this specialised area of care. Such programmes can be facilitated and supported by relevant professional bodies/associations towards continued professional development.

Treatment approaches

Our findings show a diverse range of treatment approaches used by dentists in the treatment of TMD. The more widely used approaches included relaxation techniques, pharmaceutical drugs, flat/pincher palpitation and ice therapy, while other treatment approaches such as mouth guard, night splint, myofascial release and trigger point injection ranged from 16.7% to 61.1%. Similarly, diverse treatment approaches were found to be sought in other studies globally. Postgraduate dental students in India²⁴ used treatment modalities that included physical therapy (63.5%), pharmacological therapy (63.5%), heat application (54.1%), laser therapy (18.9%), trigger point therapy (21.6%) and surgical management (52.7%). Gadotti et al.³ reported bite splints (90%), prescription medication (62%) and occlusion correction (58%) as the most frequent forms of treatment in a study on 256 Floridian (US) dentists. However, nearly one-third (30%; n=69) of the dentists in this group utilised other treatment methods, including ice/heat, arthrocentesis, diet alteration, jaw and neck exercises, botox, trigger point injection, thermotherapy and cryotherapy, and soft tissue massage. We recognise that while it may be beneficial to apply a wide range of treatment options, it would be useful to establish key modalities that are best suited through evidence-based research. This can further guide the development of a standardised treatment protocol that considers an integrated healthcare approach.

Patient referral

More than half of the respondents indicated that they referred patients to other healthcare practitioners. However, referrals were mainly done with professionals in the dental field, with small numbers referring to other types of health professionals. Ziegeler et al.²³ found that the majority of dentists referred patients to ENT (ear, nose and throat) physicians (59%) and to oral and maxillofacial surgeons (54%) and 51% referred patients to TMD specialists. Osiewicz et al.¹⁴ indicates in a study on Polish dentists that the majority of the dentists were reluctant to undertake diagnosis and implement some treatment for patients being suspected of TMD and therefore referred these patients to prosthetics specialists (56.7%), physiotherapists (32.8%), maxillofacial surgeons (2%), dental surgeons (2.5%) and orthodontists (1.5%). Gadotti et al.³ reported referrals most often to oral surgeons (62%), orthodontists (32%) and physiotherapists (31%). The findings of our study evidently display a similar, less integrated treatment approach to TMDs and referrals primarily to professionals in the dental domain. Be that as it may, some study findings,^{3, 15, 23, 25} including that of our study, are receptive to an integrated approach to the treatment of TMD and strategies need to be developed to support and enhance this integration.

Strengths and limitations of the study

The study was, to our knowledge, the first study in South Africa establishing GDPs' knowledge, perceptions and treatment approaches on MFPS and TMDs. The study further evaluated GDPs' awareness and receptiveness of

a multidisciplinary approach in care management.

The small sample size relative to similar international studies is identified as a notable limitation. However, the results presented in this study may serve as a starting point to raise awareness for further development of teaching methods and guidelines relevant to the topic and to highlight the need for referral and interprofessional education towards enhanced patient care.

CONCLUSION

The findings of our study provide new knowledge in the South African context on knowledge perception and practice of dentists in the treatment of TMDs and further supplement the findings to similar studies conducted globally with regard to the evident gap in perceived knowledge for the treatment of MFPS and TMDs among GDPs. Enhancing the knowledge of GDPs on MFPS and TMDs would support more confidence in the diagnosis, treatment and/or referrals of patients appropriately. It is therefore important to design suitable study programmes that would provide undergraduate dentists with the necessary practice and knowledge on TMDs and to supplement this with regular post-curricular training opportunities to keep practitioners updated on current trends in treatment through evidence-based practice. Furthermore, strategies towards enhancing an integrated approach to treatment that encompasses complementary and alternative medicine (CAM) must be explored, as welcomed by GDPs.

Conflict of interest

The authors declare that they have no conflicts of interest.

Funding

The research was funded by the Durban University of Technology.

Acknowledgements

The authors would like to thank Mr Marcel Lee Kistan, Mr Siyabonga Alpheos Cele and Ms Samukelisiwe Busiswa Nkosi for assisting in editing and formatting this manuscript.

List of abbreviations

Myofascial Pain Syndrome (MFPS)
General Dental Practitioners (GDPs)
Temporomandibular Disorders (TMDs)
South Africa (SA)
Myofascial trigger points (MFTPs)
Craniofacial pain (CFP)
Temporomandibular Joint (TMJ)
Trigger points (TPs)
Temporomandibular Joint Disorders (TMJDs).
KwaZulu-Natal (KZN)
Confidence interval (CI)

REFERENCES

1. Klasser GD, Greene CS. The changing field of temporomandibular disorders: what dentists need to know. *Journal of the Canadian Dental Association*. 2009;75(1)
2. Bordoni B, Varacallo M. Anatomy, head and neck, temporomandibular joint. 2019
3. Gadotti IC, Hulse C, Vlassov J, Sanders D, Biasotto-Gonzalez DA. Dentists' awareness of physical therapy in the treatment of temporomandibular disorders: a preliminary study. *Pain Research and Management*. 2018;2018
4. Ghurye S, McMillan R. Pain-related temporomandibular disorder – current perspectives and evidence-based management. *Dental update*. 2015;42(6):533-46
5. Valesan LF, Da-Cas CD, Réus JC, Denardin ACS, Garanhani RR, Bonotto D, et al. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. *Clinical Oral Investigations*. 2021;25:441-53

6. Graff-Radford B. Myofascial trigger points: Their importance and diagnosis in the dental office. The Journal of the Dental Association of South Africa = Die Tydskrif van die Tandheelkundige Vereniging van Suid-Afrika. 1984;39(4):249-53
7. Fernández-de-Las-Peñas C, Dommerholt J. International consensus on diagnostic criteria and clinical considerations of myofascial trigger points: a Delphi study. Pain Medicine. 2018;19(1):142-50
8. Sciotti VM, Mittak VL, DiMarco L, Ford LM, Plezbert J, Santipadri E, et al. Clinical precision of myofascial trigger point location in the trapezius muscle. Pain. 2001;93(3):259-66
9. Mora-Relucio R, Núñez-Nagy S, Gallego-Izquierdo T, Rus A, Plaza-Manzano G, Romero-Franco N, et al. Experienced versus inexperienced interexaminer reliability on location and classification of myofascial trigger point palpation to diagnose lateral epicondylalgia: an observational cross-sectional study. Evidence-Based Complementary and Alternative Medicine. 2016;2016
10. Ayer WA, Machen JB, Getter L. Survey of myofascial pain-dysfunction syndrome and pathologic bruxing habits among dentists. The Journal of the American Dental Association. 1977;94(4):730-2
11. Jamalpour MR, Biglarkhany M, Rabiei A, Mirzaei Z. Knowledge and beliefs of general dental practitioners regarding temporomandibular disorders in Sanandaj, Iran. Avicenna Journal of Dental Research. 2011;3(2):86-92
12. Simm W, Guimaraes AS. The teaching of temporomandibular disorders and orofacial pain at undergraduate level in Brazilian dental schools. Journal of Applied Oral Science. 2013;21:518-24
13. Grosman-Rimon L, Clarke H, Chan AK, Mills PB, Rathbone ATL, Kumbhare D. Clinicians' perspective of the current diagnostic criteria for myofascial pain syndrome. Journal of Back and Musculoskeletal Rehabilitation. 2017;30(3):509-14
14. Osiewicz M, Kojat P, Gut M, Kazibudzka Z, Pytko-Polocznyk J. Self-perceived dentists' knowledge of temporomandibular disorders in Krakow: A pilot study. Pain Research and Management. 2020;2020:1-6
15. Alonso AA, Heima M, Lang LA, Teich ST. Dental students' perceived level of competence in orofacial pain. Journal of Dental Education. 2014;78(10):1379-87
16. Alsafi Z, Michelotti A, Ohrbach R, Nilner M, List T. Achieved competences in temporomandibular disorders/orofacial pain: a comparison between two dental schools in Europe. European Journal of Dental Education. 2015;19(3):161-8
17. Hadlaq E, Khan H, Mubayrik A, Almuflehi N, Mawardi H. Dentists' knowledge of chronic orofacial pain. Nigerian Journal of Clinical Practice. 2019;22(10):1365-71
18. Hadlaq EM. Perceived Practitioner Barriers to the Management of Orofacial Pain in the Kingdom of Saudi Arabia: A Cross-sectional Study. The Open Dentistry Journal. 2020;14(1)
19. Erdfelder E, Faul F, Buchner A. GPOWER: A general power analysis program. Behavior research methods, instruments, & computers. 1996;28:1-11
20. Allua S, Thompson CB. Inferential statistics. Air Medical Journal. 2009;28(4):168-71
21. Taqi M, Mirza AJ, Javed MA, Asghar S, Khadija M, Raza SA. Self-perceived competence of dental students regarding the management of orofacial pain: a cross-sectional study. BMC Oral Health. 2021;21:1-8
22. Rahmeier G, Irineu GL, Maracci LM, Salbego RS, do Nascimento LP, Marfuzan M, et al. Avaliação do conhecimento dos estudantes de Odontologia da UFMSM sobre DTM e bruxismo. Revista da ABENO. 2021;21(1):1253-
23. Ziegeler C, Wasiljeff K, May A. Nondental orofacial pain in dental practices – diagnosis, therapy and self-assessment of German dentists and dental students. European Journal of Pain. 2019;23(1):66-71
24. Ashwin P, Siri P. Assessment of knowledge, attitude and practice on temporomandibular joint disorders among post-graduate dental students. Int J Dent Res. 2018;3(4):59-62
25. Park JS, Page A, Turner E, Li J, Tennant M, Kruger E. Dental students' knowledge of and attitudes towards complementary and alternative medicine in Australia – an exploratory study. Complementary Therapies in Medicine. 2020;52:102489

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.



Educators' and caregivers' perspectives on an implemented oral health promotion event at special needs schools in eThekweni district: a qualitative study

SADJ JULY 2024, Vol. 79 No.6 P319-324

S Gumede¹, S Singh², M Radebe³

ABSTRACT

Introduction

The school setting is critical for supporting oral health self-care practices among learners with special needs. However, not much is known about how educators and caregivers engage with these initiatives.

Aims and objectives

The study aimed to explore educators' and caregivers' perspectives on an implemented oral health promotion event conducted in special schools in the eThekweni district.

Design

An exploratory qualitative research design.

Methods

An oral health promotion event was conducted in 22 special schools; thereafter, purposive sampling was used to select educators and caregivers (7 participants) for a focus group discussion (FGD). One FGD was held per school (22 focus groups). Thematic analysis was used to analyse the data.

Results

The emergent themes included updated oral health self-care practices, perceived improvement in knowledge and oral hygiene skills and challenges in translating perceived

improvements in knowledge into practice. Participants stated that the toothbrushing process and the three-step routine of toothbrushing were the most informative aspect of the event. However, lack of resources, financing and limited available time were cited as potential barriers to implementing such events.

Conclusion

Participants believed that such initiatives were valuable but that they must be implemented consistently and should be sustainable.

INTRODUCTION

Individuals with disabilities often struggle with oral hygiene care, leading to poor oral health, untreated dental caries, missing teeth, and periodontal disease.¹ Factors such as low physical abilities, systemic illness, intellectual capacity, living conditions, age, and impairment severity contribute to these conditions.² Most disabled individuals rely on caregivers for oral hygiene, often lacking knowledge, having negative attitudes and poor practices in relation to proper diet and oral hygiene.³ As a result, this can lead to unhealthy eating habits and consumption of cariogenic snacks.⁴ Despite their challenges, oral health care is often underserved, often due to inadequate dental care or poor public health measurements.^{5,6}

Schools can play a crucial role in promoting oral health, reaching more than one billion scholars globally.⁷ Poor oral health can lead to more than 50 million school hours lost and can negatively impact children's standard of living, school performance and life success.⁷⁻⁹ The World Health Organization (WHO) aims to promote children's health through schools, and health-promoting schools integrate external conditions and internal actions.¹⁰ These schools focus on health education, healthy school environments, health services, community projects, staff promotion programmes, nutrition, physical exercise, mental health and policy development.¹¹ School health policies are essential for implementing these initiatives, and South Africa prioritises school-based preventive programmes.^{8,12,13} A South African study found that policy implementation of school oral health programmes in Tshwane faces challenges due to a lack of planning, resources, infrastructure, stakeholder support and consistent policy interpretation.¹⁴

In KwaZulu-Natal, schools face challenges such as sustainable funding, lack of resources and untrained

Authors' information

1. Sinenhlanhla Gumede, *BDentTher, MMedSc, PGDip* in Public Health, School of Health Sciences, Discipline of Dentistry, University of KwaZulu-Natal
ORCID: 0009-0008-6171-9867
2. Shenuka Singh, *PhD, PhD*, School of Health Sciences, Discipline of Dentistry, University of KwaZulu-Natal
ORCID: 0000-0003-4842-602X
3. Mbuyiselwa Radebe, *PhD*, Faculty of Health Sciences, School of Dental Sciences, Durban University of Technology
ORCID: 0000-0001-7201-1524

Corresponding author

Name: S Gumede
Email: Sinenhlanhla.gumede41@gmail.com

Author's contribution

1. S Gumede – study conceptualisation, data analysis, manuscript preparation, writing and final editing (60%)
2. S Singh – data analysis, manuscript preparation and editing (20%)
3. M Radebe – data analysis, manuscript preparation and editing (20%)

Acknowledgments

None

Conflict of interest

The authors declare that there is no conflict of interest

staff.¹⁴ Access to education is limited in densely populated areas, making it difficult to create a supportive and integrated approach, especially in developing countries.^{15,16} Commercial partners and manufacturers play a crucial role in regulating the price and availability of affordable oral health promotion materials.^{17,18} Educators are expected to teach basic dental and oral health education which could be due to a shortage of trained professionals.^{19,20} However, challenges in promoting oral health may be too great without supportive policies, infrastructure, budgets and dedication from various government departments.²¹ Partnerships with organisations and programmes, assistance from global, regional, national and local HPS unions and funding from multidisciplinary departments are essential.^{8,22}

This paper forms part of a big larger study entitled “Oral health care for children attending schools for special needs in eThekweni district, KwaZulu-Natal, South Africa”. The main findings of this epidemiological study indicated that a high number of dental caries were recorded in primary and permanent dentition with a low number of restored teeth, which led to the need to design an information-sharing event to raise oral health awareness among learners, caregivers and educators in special needs schools in the eThekweni district.

METHODS AND MATERIALS

Study design

An exploratory research design, which is qualitative in nature, was used to conduct this study.

Setting

This study was conducted in 22 out of 33 special schools in the eThekweni district, as they were the only schools that consented to participate.

Study size

The study population included educators and caregivers within the 22 schools participating in the oral health education and promotion event. Only selected educators and caregivers were included in the review of the intervention, with each focus group consisting of 7 participants. This is outlined in the table below. The results are reported per FGD, not per individual participant (1 focus group per school, n=22).

Table 1: Composition of each focus group

Focus group	
Participants	Number of participants
Principal	1
Deputy principal	1
Caregiver/s	3
Grade coordinators: educators (Grade 8-12) or (Grade 1-7)	2
Total	7

The sampling process for the study participants

A whole population approach was used to recruit educators, caregivers, and learners to implement the oral health promotion event. Purposive sampling was used to recruit educators and caregivers to obtain a focus group.

Participation was voluntary for all who were willing to participate and consent. Those who were unwilling to participate and had not given consent were excluded from the study.

Ethical consideration

The study was approved by the University of KwaZulu-Natal's Biomedical Research Ethics Committee (BREC00003814/2022) and ethical procedures were followed to protect study participants. The KZN Department of Education granted gatekeeper permission.

Rights and privacy of the study participants

The researcher ensured that participants' privacy and confidentiality were upheld by not disclosing their names. Informed consent was obtained from all study participants. Participants were fully informed about all study procedures and could withdraw at any time without any negative consequences. Codes were used for data anonymity. Data was only accessible to supervisors and the principal investigator.

Data sources and measurements

The aforementioned oral health promotion event was based on previously collected data in the main study.²³⁻²⁵

A 30-minute once-off oral health promotion information-sharing event was conducted as a presentation in each school assembly in the presence of learners, educators and caregivers (n=22 presentations). This was done to create oral health awareness and to help improve schools' oral health service delivery. All participants were provided with dental kits consisting of toothbrushes and tubes of toothpaste. Demonstrations with visual aids in the form of show-tell-do (pictographic guided support and visual schedules) were then conducted to educate, promote and help improve individual oral health independence during oral hygiene maintenance in learners, educators and caregivers in special schools in KwaZulu-Natal.

Materials that were used in this process of training and demonstration included (1) mouth models, (2) samples of toothbrushes and toothpaste, and (3) oral health educational charts, which the researcher supplied. The intervention activities included:

(1) identification of the functions of healthy teeth; (2) demonstration of correct brushing techniques; (3) identification of nutritious meals; and (4) behaviours to improve general and oral health and the importance of the avoidance of dental and facial injuries. Posters about periodontal disease and dental caries were also shown to the participants. Participants were also given brochures about correct toothbrushing techniques and the effects of oral hygiene habits on oral health. Finally, the implementation of the oral health education and promotion event included information on the reduction of risk factors associated with oral health, the improvement of oral health knowledge and attitudes, as well as the development of skills and behaviours for good oral health. Learners were also made aware of their ability to take control of their health.

The oral health education and promotion event was then reviewed using Focused Group Discussions (FGDs) with the caregivers and educators. Data collection comprised a semi-structured focus group schedule with 22 groups of educators and caregivers who volunteered to participate in the study; one group discussion was conducted per

school. The FGDs included questions such as (i) What was the most interesting part about the oral health education event? (ii) Did you learn new information at the event? (iii) Did this event influence your current oral health knowledge? (iv) Do you think the event had an impact on the learners? (v) Was this oral health education event suitable for your learners' needs? (vi) What challenges do you anticipate encountering when you carry out this oral health education programme on your own? Do you think this educational event is sustainable? (vii) Would you be able to carry out this oral health education event with your learners independently? Is there anything else you would like to say about the event? and (viii) How can this oral health education event be improved in the future?

For the data collection procedure, the group discussions were conducted with the identified school groups of educators and caregivers based on their choice and availability in each group. Informed consent was obtained from all participants before the discussions commenced. The audio recordings were only done when permission was obtained from the groups and after all confidentiality issues were explained. The researcher engaged with participants by impartially presenting questions while paying close attention to participants' responses, which prompted discussion. Each FGD was approximately 30 minutes in duration and data collection occurred from August to September 2022. Field notes were made during the discussions.

Data analysis

Thematic analysis was used to examine qualitative data inductively. The transcripts were transcribed and reviewed for quality, and preliminary codes reflecting meaning and patterns were refined. The codes were organised into topics and reviewed, with the results presented as a narrative. The data analysis procedure consisted of four stages: identifying initial concepts, coding the data, sorting the data by theme and interpreting the data. The codes were first checked. The researcher and the two supervisors analysed the emergent themes that were further interrogated, and an agreement was reached. There were no differences of opinion in the analysis phase.

RESULTS

Three main themes emerged from the focus group discussion. These themes included the following: (1) Updated oral health self-care practices, (2) Perceived improvement in knowledge and oral hygiene (OH) skills, and (3) Challenges in translating perceived improvements in knowledge into practice. The first theme highlighted the current toothbrushing process and toothbrushing routine that should be taught to learners in special schools. The second theme highlighted the event's contributions to caregivers' and educators' oral health knowledge, the perceived impact on learners and the suitability of the oral health educational event for learners with special needs. Finally, the third theme highlighted educators' perceived challenges when implementing the oral health promotion programme in their schools.

Questions	Illustrative quotes	Codes	Subthemes	Themes
<p>Engagement questions</p> <p>1. What was the most interesting part about the event?</p> <p>2. What was new that you learned from the event?</p>	<p><i>"Seeing the proper toothbrushing process demonstrated to us and the students."</i></p> <p><i>"The 3-step routine of brushing teeth was new to me; I didn't know you had to floss. brush and then mouthwash."</i></p>	<ul style="list-style-type: none"> • Toothbrushing process • Tooth brushing routine 	<ul style="list-style-type: none"> • Toothbrushing regimen • 3-step routine 	Updated oral health self-care practices
<p>Exploratory questions</p> <p>3. Did this event influence your knowledge, attitudes and practices?</p> <p>4. Do you think the event had an impact on your students?</p> <p>5. Was this event suitable for your students' needs?</p>	<p><i>"This intervention added and improved my existing information."</i></p> <p>4. <i>"Yes, because I believe most of them were seeing such a demonstration for the first time since what we do with them is not this detailed and precise."</i></p> <p><i>"Yes, because students with special needs learn better by either seeing visuals in forms of demonstration or by feel and touch as it was done in the demonstrations."</i></p>	<ul style="list-style-type: none"> • Added information • First-time demonstrations • Detailed and precise • Visuals with feel and touch 	<ul style="list-style-type: none"> • The value of visual aids • Reflection on current OH education and skills transfer 	Perceived improvement in knowledge and OH skills
<p>8. Would you be able to carry out this event with your students?</p>	<p><i>"Yes, this will be possible to do in our life skills lesson and as part of daily health education lesson."</i></p>	<ul style="list-style-type: none"> • Independent implementation • Life skills lesson • Health education lesson 	<ul style="list-style-type: none"> • Lack of resources • There is a need for ongoing educational support 	Challenges in translating perceived improvements in knowledge into practice
<p>6. What challenges do you anticipate encountering when you carry this out on your own?</p> <p>7. Do you think this event is sustainable?</p>	<p>6. <i>"It is not having all the resources that you had when demonstrating, mainly mouth models, toothpaste and toothbrushes."</i></p> <p>7. <i>"Yes, depending on funding and available time."</i></p>	<ul style="list-style-type: none"> • Resources (toothbrushing kits) • Funding • Time 		
<p>Exit questions</p> <p>9. Is there anything else you would like to say about the event?</p> <p>10. How can this oral health event be improved in the future?</p>	<p><i>"Overall, the intervention is good for our schools but we hope this is not the last of its kind, as we hardly have such initiatives for our students."</i></p> <p><i>"The rollout should target all the special schools, not just a few, and it should be offered regularly."</i></p>	<ul style="list-style-type: none"> • Sustainability • Continuity 		

Theme 1: Updated oral health self-care practices

Many participants and groups stated that the most interesting and informative part of the oral health education and promotion event was the toothbrushing demonstrations. This was done with all the necessary tools and materials, including mouth models, toothbrush samples, toothpaste, oral health education and the toothbrushing technique itself. This was done to promote learners' oral health, including providing oral health education and dietary advice. Most of them also stated that the three-step brushing routine (flossing, toothbrushing and mouthwash) was new information to them.

What was the most interesting part about the oral health event? *Seeing the proper tooth brushing process demonstrated to us and the learners.*

Was there anything new that you learned at the educational event? *The three-step routine of brushing teeth was new to me; I didn't know you had to floss, brush, then mouthwash.*

Would you be able to carry out this oral health education with your learners? *"Yes, it will be possible to do this with the learners in our life skills lesson and as part of daily health education lessons."*

What challenges do you anticipate encountering when you carry out this event on your own? *"It's not having all the resources that you had when demonstrating, mainly mouth models toothpaste and toothbrushes."*

Do you think this oral health education event is sustainable? *"Overall, the intervention is good for our schools, but we hope this is not the last of its kind, as we hardly have such initiatives for our students."*

How can this oral health education event be improved in the future? *"The rollout should target all the special schools, not just a few, and it should be offered regularly."*

Theme 2: Perceived improvement in knowledge and OH skills

The majority of participants in the FGD stated that the oral health education and promotion event helped to improve their existing oral health knowledge. This will also assist them in independently carrying out such events with the learners in schools. They also stated that they believed the oral health event had a positive impact and was suitable for learners with special needs. This is because they believed most learners saw such detailed and precise demonstrations for the first time. The focus on visual and tactile senses during the demonstrations was seen as being more appropriate for the learners.

Did this event influence your KAP? *"This intervention added to and improved my existing knowledge."*

Do you think the event had an impact on your learners? *"Yes, because I believe most of them were seeing such a demonstration for the first time since what we do with them is not this detailed and precise."*

Was this event suitable for your learners' needs? *"Yes, because learners with special needs learn better by either seeing visuals in the form of demonstrations or by feeling and touching, as was done in the demonstrations."*

Theme 3: Challenges in translating perceived improvements in knowledge into practice

Most participants stated that they will be able to carry out this oral health education and promotion event with their learners independently in schools, in their life skills lessons, or as part of health education. However, some participants highlighted potential challenges they foresee when implementing oral health education independently, namely lack of resources (toothpaste, toothbrushes, and mouth models). They also stated that the continuity of the implementation of oral health education would also depend on available time, as other curricula demand limited time for such programmes. Lastly, participants indicated the need for such programmes to be offered regularly.

DISCUSSION

The objectives for the oral health education and promotion event were to educate, raise oral healthcare awareness and enhance programmes for oral health promotion in special schools in KwaZulu-Natal. On the review of the event, the participants in FGD revealed that the provision of personalised oral health care materials and demonstrations with a visual aid in the form of tell-show-do is the best way people with special needs learn. May et al reported similar findings when they investigated using visual aids to improve dental care collaboration in 14 boys with autism and found a beneficial effect.²⁶ The American Academy of Pediatric Dentistry has recommended behaviour guidance approaches for children with autism, including tell-show-do and verbal positive reinforcement.^{26,27} Providing personalized oral health care materials has been shown to lead to higher acceptance ratings from residents with disabilities compared to those who do not.^{27,28}

The current study's oral health education and promotion event provided personalised oral health care materials and used demonstrations with visual aids. This is consistent with a previous study, which stated that oral health programmes for people with special needs should focus on educating patients and parents or caregivers about preventing and treating oral conditions, which should begin in the early stages.²⁹ Another similar study reported that its oral health programme also focused on individualised oral care practices, providing personal dental equipment and encouraging daily oral health routines.²⁸ This will promote and enhance oral health while reducing illness and operative intervention because extractions and surgical operations in particular often produce major problems for individuals with special needs.²⁹

Based on the review of the oral health event on the FGD, most participants (caregivers and educators) expressed high levels of confidence in carrying out their oral health programmes. This is similar to what was stated by Faulks et al, who also found increased caregiver confidence in oral care after the introduction of an oral health programme across a range of centres for people with intellectual disabilities.³⁰ However, participants in the FGD mentioned that their implementation of oral health promotion in schools independently may be

hampered by issues such as a lack of resources, financing and available time. These findings are similar to what is reported by the Integrated School Health Policy, which highlights suboptimal provision of school health services as a result of problems such as unequal resource distribution and competition for limited resources.³¹ Furthermore, research conducted in Tshwane district reported that low finance is one of the issues that affects oral health programmes in South Africa.³² Therefore, it may be crucial to investigate how educators and caregivers carry out oral health promotion independently with their learners in the future.

This study adds to the existing knowledge from Naidoo and Singh's work in the province, which focuses on learners with autism spectrum disorder. However, this study concentrated on learners with different types of disabilities in identified special schools.³³ Poor oral health in individuals with special needs has been linked to caregivers' lack of education, limited access to resources and individuals' reluctance and/or difficulty with independent or supported oral hygiene maintenance.²⁶ In the current study, specific strategies were used to eliminate these barriers using an oral health promotion event. Moreover, the main contribution of this study is that it highlights the need for obtaining and maintaining oral health care of individuals with special needs and raises awareness of oral health care among educators and caregivers in special schools. This study's oral health promotion event is a prelude to an intervention that may be carried out and monitored over time. That can be used to assess behavioural changes in special schools, as it has the potential to improve oral health outcomes and possibly resolve oral health difficulties in this population.

STRENGTHS AND LIMITATIONS

The current study provided a better understanding of how research participants engaged with the implemented oral health awareness programme in special schools in the eThekweni district. The exploratory qualitative study design, information-sharing event and thematic analysis provided descriptive data that helped establish a clear understanding of the educators' and caregivers' perspectives of the event. However, some limitations still exist. Due to the nature of these research instruments, which are focused group discussions, there is no generalisability beyond this population. Furthermore, in a group, peer pressure may influence the respondents' responses and dominant group members can impact the discussions. Pre- and post-intervention assessments were not conducted with learners, which could have demonstrated the event's effectiveness in the target population; nevertheless, the review was conducted with caregivers and educators, as the targeted population depends on them for support in day-to-day activities.

CONCLUSION

Overall, the oral health promotion event was well received by the learners, educators and caregivers in the special schools. However, to ensure improvements in oral health outcomes for students with special needs in the future, such initiatives must be implemented and sustained over time.

REFERENCES

1. Khan MRH, Ahmad M, Islam MM, Ahmed S, Prodhan MRA, Sharminakter. Oral health status of disabled children attending special schools of Dhaka city. *Update Dent Coll J*. 2019;9(2):32-5
2. Chen CY, Chen YW, Tsai TP, Shih WY. Oral health status of children with special health care needs receiving dental treatment under general anesthesia at the dental clinic of Taipei Veterans General Hospital in Taiwan. *J Chinese Med Assoc*. 2014;77(4):198-202
3. Oredugba FA, Akindayomi Y. Oral health status and treatment needs of children and young adults attending a day centre for individuals with special health care needs. *BMC Oral Health*. 2008;8(1):1-8
4. Naseem M. Oral health knowledge and attitude among caregivers of special needs patients at a Comprehensive Rehabilitation Centre: An Analytical Study. *Ann Stomatol (Roma)*. 2017;8(3):110
5. Wilson N, Lin Z, Villarosa A, Lewis P, Philip P, Sumar B, et al. Countering the poor oral health of people with intellectual and developmental disability: A scoping literature review. *BMC Public Health*. 2019;19(1):1-16
6. Akinwommi B, Adekoya-Sofowora C. Oral health characteristics of children and teenagers with special health care needs in Ile-Ife, Nigeria. *African J Oral Health*. 2019;8(2):13
7. Jackson SL, Vann WF, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. *Am J Public Health*. 2011;101(10):1900-6
8. Kwan SYL, Petersen PE, Pine CM, Borutta A. Health-promoting schools: an opportunity for oral health promotion. *Bull World Health Organ*. 2005;83(9):677-85
9. Bingaman J, Feingold RD, Barrett TM, Obey DR. Oral Health. Dental disease is a chronic problem among low-income populations. In: United States General Accounting office. 2000
10. World Health Organization. Making every school a health promoting school [Internet]. World Health Organization. 2021 [cited 2022 Jul 18]. Available from: <https://www.who.int/initiatives/making-every-school-a-health-promoting-school>
11. World Health Organization. Health promoting schools [Internet]. World Health Organization. 2022. Available from: https://www.who.int/health-topics/health-promoting-schools#tab=tab_1
12. National Department of Health. National Oral Health Strategy. Pretoria: NDoH. 2004
13. National Department of Health. National Guidelines For The Development of Health Promoting Schools/Sites in South Africa (Draft 4). 2000;1-42
14. Reddy M. Challenges Implementing Oral Health Promotion at Schools: Perspectives of Teachers and Health Managers. *Early Child Educ J* 47. 2018
15. World Health Organization. Shape healthy environments for children. 2003
16. WHO. WHO | Promoting Oral Health in Africa. Who. 2016. 126 p
17. World Health Organization. WHO Information Series on School Health. *Educ Dev Center, Inc*. 2003;1-65
18. Adyatnaka A, Sutop U, Carlsson P, Bratthall D, Pakhomov P. School-based Primary Preventive Programme for Children.pdf. 1998
19. Nyandindi U, Palin-Palokas T, Milén A, Robison V, Kombe N, Mwakasagule S. Participation, willingness and abilities of school-teachers in oral health education in Tanzania. *Community Dent Heal*. 1994;11(2):101-4
20. Jurgensen N, Petersen PE. Promoting oral health of children through schools – Results from a WHO global survey 2012. *Community Dent Health*. 2013;30(4):204-18
21. World Health Organization, United Nations Educational S and CO. Making every school a health-promoting school Country case studies. 2021
22. Young I, Leger LS, Blanchard C. Commentary Health-promoting schools : working in partnership to address global needs, a collaboration leading to the production of practical tools for practitioners. *Glob Health Promot*. 2013;20(4):122-7
23. Gumede S, Singh S, Radebe M. Educators' and caregivers' oral health knowledge, attitudes and practices in special education schools in the eThekweni District, KwaZulu-Natal. 2024;79(5):246-52
24. Gumede S, Singh S, Radebe M. Prevalence of dental caries among learners with disabilities attending special education schools in the eThekweni District, KwaZulu-Natal. *South African Dent J*. 2023;78(06):292-9
25. Gumede S, Singh S, Radebe M. Oral health care service delivery in schools for special needs in eThekweni District, KwaZulu-Natal. *South African Dent J* 2024;79(1)
26. Mah JWT, Tsang P. Visual schedule system in dental care for patients with autism: A pilot study. *J Clin Pediatr Dent*. 2016;40(5):393-9
27. Dhar V, Gosnell E, Jayaraman J, Law C, Majstorovic M, Marghalani AA, et al. Nonpharmacological Behavior Guidance for the Pediatric Dental Patient. *Pediatr Dent*. 2023;45(5):385-410
28. Rojo BL, Brown S, Barnes H, Allen J, Miles A. Home-based oral health program for adults with intellectual disabilities: An intervention study. *Disabil Health J*. 2024;17(1):101516
29. Davies R, Bedi R, Scully C. Oral health care for patients with special needs. *Br Med J*. 2000;321(7259):495-8
30. Faulks D, Hennequin M. Evaluation of a long-term oral health program by carers of children and adults with intellectual disabilities. *Spec Care Dent*. 2000;20(5):199-208
31. Department of Health and Basic Education. Integrated school health policy. 2012 p. 140-4
32. Molete M, Stewart A, Bosire E, Igumbor J. The policy implementation gap of school oral health programmes in Tshwane, South Africa: A qualitative case study. *BMC Health Serv Res*. 2020;20(1):1-11
33. Naidoo M, Singh S. The oral health status of children with autism spectrum disorder in KwaZulu-Natal, South Africa. *BMC Oral Health*. 2018;18(1):1-9



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Oral Presentation of Haematological Disease: Part II – Iron Deficiency Anaemia

SADJ JULY 2024, Vol. 79 No.6 P325-332

J Fourie¹, JG Nel²

ABSTRACT

Introduction

Iron deficiency anaemia may be responsible for diverse oral mucosa changes due to the reduced oxygen-carrying capacity of red blood cells, but also due to changes in the oral mucosal structure and defence mechanisms.

Aims and objectives

This study aims to report on three patients with iron deficiency anaemia who presented with distinct oral mucosal clinical features.

Design/Methods

The oral mucosal features of three patients who presented at the University of Pretoria Oral Health Centre with iron deficiency anaemia, of variable causes, were recorded. Special investigations were performed and reflected their degree of iron deficiency. The patients were managed collaboratively with their respective physicians to address the underlying cause of anaemia.

Results

These cases demonstrate that dentists should explore the presence of anaemia to explain oral mucosal changes. Anaemia may present with wide-ranging clinical features, from recurrent to persistent oral ulcers, mucosal pallor, and *Candida* infection. Collaboration with attending physicians may help establish the cause of anaemia as a nutritional deficiency, gastric ulceration, or infective and inflammatory disease.

Conclusions

Dentists are pivotal in diagnosing haematological diseases such as iron deficiency anaemia. The oral features of ulceration, glossitis, *Candida* infection and mucosal pallor are important diagnostic indicators of iron deficiency anaemia.

ABBREVIATIONS

CD:	Coeliac disease
CRP:	C-reactive protein
DMT-1:	divalent metal transporter
EPO:	erythropoietin
FBC:	full blood count
GIT:	gastrointestinal tract
Hb:	haemoglobin
HCP1:	haem carrier protein
HPI:	<i>Helicobacter pylori</i> infection
HP:	<i>Helicobacter pylori</i>
IBD:	inflammatory bowel disease
ID:	iron deficiency
IDA:	iron deficiency anaemia
IRT:	iron replacement therapy
LF:	lactoferrin
MCH:	mean cell/corpuscular haemoglobin
MCHC:	mean cell/corpuscular haemoglobin concentration
MCV:	mean cell/corpuscular volume
OMC:	oral medicine clinic
PPI:	proton-pump inhibitor
RAU:	recurrent aphthous ulceration
RBC:	red blood cell
RCC:	red cell count
RDW:	red cell distribution width
RES:	reticuloendothelial system
SAT:	stool antigen test
SF:	serum ferritin
TfR:	transferrin receptor
UBT:	urea breath test
WCC:	white cell count
WHO:	World Health Organisation

INTRODUCTION

Anaemia, characterized by either reduced numbers of circulating red blood cells (RBC) or reduced haemoglobin (Hb) concentration, results in an impaired means of carrying oxygen.¹ Anaemia affects one-quarter of the world's population, with iron deficiency (ID) being the predominant cause.^{1,2} Anaemia implies ID until proven otherwise.¹ Africa shoulders the highest anaemia burden, with women and preschool children at greatest risk, regardless of geography or socioeconomic status.¹

The average person contains 3 grams of iron, 2 grams in erythrocyte Hb, and the remainder in storage (ferritin and hemosiderin) and enzymes.³⁻⁵ The bone marrow uses most circulating iron to produce Hb for RBC, while muscle fibres use the remainder to produce myoglobin.^{4,6} Daily iron requirements are met by iron bound to tissue ferritin, predominantly found in the liver, spleen and bone marrow.⁴

Because of continuous losses that occurs, mostly from the gastrointestinal tract (GIT) (1-2 mg/day),⁵ and despite significant recycling processes by the reticuloendothelial

Authors' information

1. Dr. Jeanine Fourie. Affiliation: Department of Periodontics and Oral Medicine, School of Dentistry, Faculty of Health Sciences, University of Pretoria. Tel: 012 319 2312. Email: jeanine.fourie@up.ac.za. ORCID: 0000-0002-8674-81452.
2. Prof. Jan Gert Nel. Affiliation: Department of Haematology, Faculty of Health Sciences, University of Pretoria. Tel: 012 319 2641. Email: jan.nel@up.ac.za. ORCID: 0000-0002-4693-1092

Corresponding author

Name: Dr. Jeanine Fourie
Tel: 012 319 2312
Email: jeanine.fourie@up.ac.za

Contribution:

Dr Jeanine Fourie: manuscript preparation (90%)
Prof Jan Gert Nel: manuscript review (10%)

Keywords

anaemia, iron deficiency, candida, recurrent aphthous ulceration, gastrointestinal, nutrition, oral presentation, *Helicobacter pylori*

macrophages which break old RBC down (20 mg/day), 10mg of iron has to be obtained daily from the diet.³⁻⁷

Regulation of iron levels

A fine balance of iron levels is required because excess iron is toxic, generates damaging reactive oxygen species, and supports the growth of pathogens.⁴ Accordingly, iron is not efficiently absorbed, transported by transferrin in the plasma, and stored by ferritin in the liver, so that the body is protected from free iron.⁴

Our diets contain approximately 5–15mg of elemental iron and 1–5mg of haem iron, yet only 1–2mg is absorbed daily, mostly from the duodenum and the proximal jejunum.^{4, 8} Haem iron, found in animal products, is the most bioavailable form. While the absorption of non-haem iron from plant sources is limited because it is present as insoluble ferric iron.^{4, 5, 9} Reducing agents, like ascorbic acid, and gastric acid, reduce ferric iron to ferrous iron, making it soluble and easier to absorb.^{4, 5, 10} Ascorbic acid also facilitates other pathways of iron release, binding and intestinal barrier function, making it the most effective enhancer of dietary iron absorption.⁴ On the other hand, dietary phytate, found in cereals, bran, legumes, nuts and seeds, reduces iron absorption by binding tightly to iron.^{4, 5, 11} And polyphenols found in tea, fruits and vegetables reduce non-haem iron absorption by forming insoluble iron-tannate complexes.^{12, 13} Mineral supplementation also decreases iron absorption because zinc and manganese bind competitively with the DMT-1 transporter, and calcium alters the function of the transporter.⁴

Haem and non-haem iron also follow different absorption paths from the lumen of the gut into the enterocyte. Haem iron is absorbed directly through a haem carrier protein (HCP1) while, non-haem iron has to be reduced from ferric iron to ferrous iron by the duodenal cytochrome B enzyme⁷ before passing into the enterocyte through a divalent metal transporter (DMT-1).⁴ Iron is then either stored in the enterocyte as ferritin⁴ or leaves the basolateral membrane of the enterocyte through the ferroportin export protein or the FLVCR1 receptor¹⁴ to be immediately bound by transferrin in the plasma and carried in the circulation to cells with transferrin receptors.^{4-6, 15} Transferrin usually carries 0.1% of total body iron in plasma.⁵

Hepcidin tightly regulates iron absorption because excess iron cannot be excreted.^{5, 16} When sufficient iron is present, hepatocytes produce hepcidin to sequester iron intracellularly by blocking and destroying the iron-loaded ferroportin molecule^{4, 5, 17} so that iron cannot be released into the circulation from enterocytes, macrophages and hepatocytes.⁵ The intracellular accumulation of iron further reduces the expression of the DMT-1 transporter so that less dietary iron is absorbed.⁴

Inflammation and infection also upregulate hepcidin production to sequester iron intracellularly, to keep this nutrient away from pathogens, resulting in a 'relative' or 'functional' IDA.¹⁷

When iron demand increases, DMT-1 expression is upregulated to absorb more iron in the gut, and hepcidin production is reduced to release more iron from the enterocytes and macrophages.^{4, 5}

Role of iron

Iron is an essential nutrient, it cannot be substituted, nor self-generated.⁹

Because iron readily donates and accepts electrons, it participates in complex biological redox reactions, such as the functioning of haemoproteins for oxygen transport and cytochrome enzymes for energy production.⁴ Iron-containing metalloproteins are involved in DNA synthesis, gene regulation, cell proliferation and differentiation, drug metabolism, steroid hormone synthesis and neutrophil phagocytosis.⁴

In ID, erythropoiesis is prioritized at the expense of other functions, such as the functioning of the central nervous system and the immune system.⁴ Therefore, depression, reduced endurance and work performance, and impaired cognitive functions may become evident before the classic features of IDA appear.⁴

Permission was obtained from the University of Pretoria, Faculty of Health Sciences, Research Ethics Committee clearance number 20/2024, following informed consent from the participants.

CASE 1

Clinical case presentation

A 79-year-old woman presented to the Oral Medicine Clinic (OMC) of the University of Pretoria Oral Health Centre (UPOHC), complaining of a burning sensation in her mouth, aggravated by spicy foods and toothpaste. The patient suffers from hypertension, hypercholesterolemia, irritable bowel syndrome, osteoporosis, multiple sclerosis, and anaemia. She uses enalapril and hydrochlorothiazide for hypertension and paracetamol and tramadol for headaches. Due to financial constraints, she consumes limited quantities of red meat.

The patient is partially edentulous and wears an acrylic denture to replace her missing teeth. The physical examination revealed a tongue that is smooth, pale and fissured, and red crusting of the corners of her mouth, suspicious of angular cheilitis (Figure 1).



Figure 1: Smooth, pale tongue with fissuring and red crusting of the corners of the mouth.

Special investigations

Her full blood count (FBC) displayed hypochromic microcytic anaemia as evidenced by a low red cell count (RCC) (3.88

$\times 10^{12}/L$), Hb (6.6 g/dL), mean corpuscular volume (MCV) (63.7fL), and mean corpuscular haemoglobin concentration (MCHC) (26.7 g/dL). (See Table I). Serum iron studies confirmed the diagnosis of IDA (low serum iron (2.8 $\mu\text{mol}/L$), transferrin saturation (3%) and ferritin levels (4 $\mu\text{g}/L$), and increased transferrin levels (4.08g/L)). (See Table II). The patient provided no history of gastrointestinal or vaginal bleeding.

Table I: Red blood cell indices

Test	Result	Unit	Reference
Red cell count	3.88	$\times 10^{12}/L$	3.93 – 5.40
Haemoglobin	6.6	g/dL	11.6 – 16.4
Haematocrit	0.247	L/L	0.340 – 0.480
MCV	63.7	fL	78.9 – 98.5
MCH	17.0	pg	26.1 – 33.5
MCHC	26.7	g/dL	32.7 – 34.9
Red cell distribution width	20.7	%	12.4 – 17.3

Table II: Haematinics

Test	Result	Unit	Reference
Iron	2.8	$\mu\text{mol}/L$	9.0 – 30.4
Transferrin	4.08	g/L	1.73 – 3.60
% Saturation	3	%	15 – 50
Ferritin	4	$\mu\text{g}/L$	5 - 204
Vitamin B12	329	pmol/L	138 - 652
Serum folate	41.8	Nmol/L	7.0 – 46.4

Management

The patient was managed with topical antifungals (miconazole oral gel), which she applied to the corners of her mouth and dorsum of the tongue, 3-4 times a day for 14 days. She was also instructed on denture and oral hygiene. The patient was referred to internal medicine, where the diagnosis of IDA due to malnutrition was confirmed and corrected through iron supplementation.

Outcome

Effective management of the *Candida* infection and the underlying nutritional deficiency resolved the patient's symptoms.

CASE 2

Clinical case presentation

A 55-year-old man presented to the OMC of the UPOHC with a complaint of oral ulcers that started seven months earlier but had recently become unbearable. The ulcers developed soon after undergoing multiple dental extractions, during which the patient self-medicated with aspirin. The patient continues to take high doses of aspirin to manage pain from the oral ulcers. The patient suffers from high blood pressure, anaemia and a gastric ulcer, for which he uses sucralfate suspension but does not know which other medications he is taking. Two years earlier, he had received surgery for a bleeding gastric ulcer. The patient has a 60-pack-year history of cigarette smoking and used to consume ten units of alcohol per day. Upon extra-oral examination, the patient appeared very pale. Intra-oral examination revealed ulcers of the dorsum of the tongue: centrally, a deep ulcer with irregular margins covered by a grey, necrotic slough, and, more anteriorly, a superficial ulcer (Figure 2). The lower labial mucosal was covered by

an ulcer to the depth of the vestibule. (see Figure 3). Given the chronic history of the ulcers, deep fungal infection, EBV-associated mucocutaneous ulcer, or CMV-induced ulceration, was considered as differential diagnoses.



Figure 2: Ulcers of the tongue dorsum



Figure 3: Ulcers of the lower labial mucosa

Special investigations

The patient was instructed to discontinue aspirin use before an incisional biopsy was performed at the edge of the central ulcer of the tongue and labial mucosa. The histopathological examination revealed a non-specific ulceration devoid of any infective aetiology. A FBC and differential white cell count (WCC) was obtained (see Table III and Table IV), which revealed a low RCC ($3.51 \times 10^{12}/L$), Hb (6.0g/dL), haematocrit (0.240 L/L), MCV (68.4 fL), MCH (17.1 pg), and MCHC (25.0 g/dL). The red cell distribution width (RDW) was elevated (26.5%). The WCC was elevated, mostly due to an increase in neutrophils ($10.01 \times 10^9/L$), likely due to the oral ulcers.

Table III: Full blood count

Test	Result	Unit	Reference range
Red cell count	3.51	$\times 10^{12}/L$	4.19 – 5.85
Haemoglobin	6.01	g/dL	13.4 – 17.5
Haematocrit	0.240	L/L	0.390 – 0.510
MCV	68.4	fL	83.1 – 101.6
MCH	17.1	pg	27.8 – 34.8
MCHC	25.0	g/dL	33.0 – 35.0
Red cell distribution width	26.5	%	12.1 – 16.3
Platelet count	683	$\times 10^9/L$	171 - 388

The RBCs were stacked in aggregations (Rouleaux formation).

Table IV: Differential white cell count

Test	Result	Unit	Reference range
White cell count	13.44	$\times 10^9/L$	3.92 – 10.40
Neutrophils	10.01 (74.50 %)	$\times 10^9/L$	1.60 – 6.98
Lymphocytes	1.90 (14.10 %)	$\times 10^9/L$	1.40 – 4.20
Monocytes	0.91 (6.80 %)	$\times 10^9/L$	0.30 – 0.80

The results demonstrated a hypochromic microcytic anaemia, indicative of ID.

Management

A 5-day course of prednisone (30mg/day) and a course of topical glucocorticoids was prescribed to manage the oral ulcers, but gastric discomfort necessitated the discontinuation of prednisone. The patient subsequently admitted that he was not being treated for anaemia. He was given Ferrimed (folic acid with iron poly-maltose) and referred back to the gastro-enterology department for assessment of his gastric ulcer.

Outcome

Two weeks later, the ulcer of the lower labial mucosa had healed completely, and the remaining ulcer appeared more superficial and continued to heal completely.

CASE 3

Clinical case presentation

A 60-year-old woman was referred to the OMC of the UPOHC, complaining of multiple recurrent oral ulcers, which started 12 months earlier and left her unable to eat solid foods. Previous treatment attempts included prednisolone oral rinse, antifungal therapy (fluconazole and nystatin), antibiotics (amoxicillin) and a topical anaesthetic (tetracaine hydrochloride).

The patient suffered from rheumatic fever as a child and retained a cardiac lesion. She also suffers from hypertension, diabetes mellitus, hypothyroidism, and chronic pain following a motor vehicle accident. She was taking sufentanil, lamotrigine, donepezil, carvedilol, levothyroxine, sertraline, calciferol, vildagliptin and sitagliptin with metformin.

Upon extra-oral examination, it was noted that her lower lip and cheeks were swollen. Tender submandibular lymph nodes were palpable on the right. The intra-oral examination was limited due to pain. Still, multiple discrete oral ulcers could be seen on the labial and buccal mucosa. Some ulcers were confluent, covered by a yellow fibrinopurulent membrane, and appeared on a bed of erythema (Figure 4, and Figure 5).

Given the recurrent nature of the ulcers and the location on non-keratinized mucosa, a differential diagnosis of recurrent aphthous ulceration (RAU) was made.



Figure 4: Multiple ulcers of the labial mucosa.



Figure 5: Multiple ulcers of the buccal and labial mucosa

Special investigations

The complex presentation of RAU required an assessment of the underlying cause.

The FBC demonstrated an elevated WCC ($15.09 \times 10^9/L$), mostly attributed to an increase in neutrophils ($12.38 \times 10^9/L$) (see Table V). Although the RCC and haematocrit were normal, the Hb (11.6 g/dL), MCH (25.3 pg) and MCHC (30.9 g/dL) were low. The erythrocyte sedimentation rate (ESR) (33 mm/hr) and C-reactive protein (CRP) (73 mg/L) values were elevated.

Table V: Full blood count

Test	Result	Unit	Reference range
White cell count	15.09	$\times 10^9/L$	3.92 – 9.88
Neutrophils Abs	12.38 (82%)	$\times 10^9/L$	2.00 – 7.50
Red cell count	4.59	$\times 10^{12}/L$	4.13 – 5.67
Haemoglobin	11.6	g/dL	12.1 – 16.3
Haematocrit	37.5	%	37.0 – 49.0
MCV	81.7	fL	79.9 – 89.1
MCH	25.3	pg	27.8 – 32.0
MCHC	30.9	g/dL	31.0 – 37.0
Red cell distribution width	14.5	%	10.0 – 17.3
Platelet count	412	$\times 10^9/L$	150 - 450
ESR	33	0 - 20	mm/hr
C-reactive protein	73	< 5	mg/L

Table VI: Haematinics

Test	Results according to date				Unit	Reference range
	12/08/15	19/01/21	20/01/21	21/04/19		
Iron	13.6	11.7	7.7	4.1	µmol/L	9.0 – 30.4
Transferrin	3.5	3.6	3.6	4.2	g/L	2.5 – 3.8
% Saturation	16	13	9	4	%	15 – 50
Ferritin	13	51	16	31	ng/mL	10 - 120
Vitamin B12				329	pmol/L	107 - 443
Serum folate				41.8	nmol/L	10.0 – 45.1

A cumulative report on the patient's iron values revealed a progressive decline in iron levels (4.1 µmol/L) and saturation percentage (4%) (see Table VI), while her transferrin was elevated (4.2 g/L), and ferritin stores were normal (31ng/L). Previous ANA and ENA screening tests were negative.

This was interpreted as depleted iron stores in the presence of an acute phase response/non-specific tissue damage.

Management

The oral ulcers were diagnosed as complex aphthosis or aphthous-like lesions due to relative iron deficiency and treated with topical and systemic glucocorticosteroids (Betamethasone mouth rinse, Clobetasol ointment, and prednisone 50mg/day for five days).

Outcome

The patient was referred to her physician to determine the cause of her relative iron deficiency. Bone marrow aspirate and colonoscopy revealed no abnormalities, but gastroscopy and endoscopic biopsy identified *H pylori* infection (HPI). Treatment of the infection resulted in the resolution of the oral ulcers.

DISCUSSION

Definition of IDA

According to the World Health Organization (WHO), anaemia is defined as a haemoglobin (Hb) concentration of less than 13 g/dl in males and less than 12 g/dl in females,¹⁸ which qualifies all three presented patients with anaemia (6.6, 6.01 and 11.6 g/dL for patients 1, 2 and 3 respectively). In addition, a Hb concentration of less than 8 g/dL, regardless of gender, is considered severe anaemia, which would be consistent with the first two patients.¹⁸

Pathophysiology of IDA

Absolute ID reflects a negative iron balance due to excessive blood loss (patient 2), inadequate dietary iron intake (patient 1), or absorption that fails to meet physiological requirements.⁵ A relative, or functional, ID occurs during inflammation when iron is sequestered from the plasma, resulting in iron-deficient erythropoiesis and anaemia despite adequate body iron stores (patient 3).⁵

A comprehensive history should search for clues as to the cause of IDA, such as patient 1's acknowledgment of inadequate dietary intake, and patient 2's history of a gastric ulceration,^{2, 4} but the identification of any of these factors should not preclude further assessment of the GIT.²

Blood loss

One milligram of iron is usually lost daily due to the sloughing of epithelial cells and their iron-containing cytochromes. Still,

GIT micro-erosions and other forms of occult blood loss may add another 1-2 mg to daily iron losses, while acute loss of 2 L of blood can deplete iron stores.⁶ Gastrointestinal blood loss is the most important and common cause of ID in men and postmenopausal women^{5, 6, 19} while menstruation is often to blame among premenopausal women.² Common upper GIT causes of bleeding include erosions or ulcers related to aspirin and non-steroidal anti-inflammatory drugs (NSAIDs) use and peptic ulcer disease.⁵ The second patient had both a history of gastric ulceration, and aspirin use. A thorough assessment of the GIT is essential in all adults with a new diagnosis of IDA without an obvious explanation.^{2, 6, 19, 20} Initial investigations should include urinalysis or urine microscopy, screening for Coeliac disease (CD) through serology or biopsy, and endoscopic examination of the upper and lower GIT to rule out neoplastic disease (colonic adenocarcinoma), inflammatory (peptic ulceration), and infective (parasitic/hookworm) causes of chronic blood loss.² Inflammatory bowel diseases (IBD) are common culprits in ID because they may be associated with chronic bleeding, iron-deficient dietary patterns, poor absorption,^{6, 20} bowel resection, and be further complicated by a relative IDA as well.^{4, 6} Chronic blood loss may also occur from the genito-urinary and respiratory tract.²

Inadequate dietary intake

Pre-adolescents and younger children have high iron requirements due to the growth spurt, which is often compounded with poor dietary quality, and a reluctance to comply with oral iron therapy.²¹

An iron-deficient diet (less than 1-2 mg of dietary iron/day), which may be seen in strict vegans, can deplete iron stores within three years.³

The different types of iron found in the diet, and dietary and other influences on absorption, have already been discussed.

Malabsorption

Hypochlorhydria, caused by atrophic glossitis, HPI, gastrectomy or gastric bypass, and long-term proton-pump inhibitor (PPI) use,^{22, 23} reduces iron absorption.² The risk of IDA progressively worsens following Roux-en-Y gastric bypass (RYGB) surgery because it also bypasses the duodenum, the primary site for iron absorption.^{6, 24}

The chelation of iron by tea, coffee, calcium, flavonoids, oxalates, phytates and antacids reduce iron uptake.² Iron absorption is also impaired in Coeliac and Crohn's disease, NSAID enteropathy, and genetic disorders, such as iron-refractory IDA, and Divalent metal transporter one mutation.²

Helicobacter pylori infection (HPI)

IDA, unexplained and unresponsive to oral iron therapy, may be associated with HPI,^{19, 21, 25, 26} and therefore, in patients with normal gastroscopy and colonoscopy results, HPI should be sought and eradicated.¹⁹ Eradication of HPI, with or without iron replacement, improves IDA.^{4, 25-29}

HPI causes persistent gastric inflammation, which is rarely associated with gastrointestinal symptoms.^{21, 25, 26} The IDA in HPI seems unrelated to intestinal blood loss, diet, malabsorption or diversion in the reticuloendothelial system (RES).^{25, 30} Instead, iron is likely diverted to an extramedullary focus, such as the HP-infected antrum.²⁵

Low tissue iron levels are usually maintained to prevent bacterial infection, but in the presence of infection, the liver produces more ferritin, and neutrophils release lactoferrin (LF) (which captures iron from transferrin) to reduce extracellular iron further.²⁵ Macrophages capture the LF-iron complex and are eliminated from the circulation by the RES.²⁵ However, HP uses LF as an iron source and sequesters iron by producing a ferritin molecule that stores iron in the bacterial cytoplasm.²⁵ As the bacterium rapidly multiplies, the dead bacteria and accompanying iron stores are quickly lost in the stools.²⁵

HPI is normally diagnosed through endoscopic biopsy and histopathological examination using conventional histochemical staining³¹ but should be supplemented with immunohistochemistry if histochemical staining is negative in a patient with chronic gastritis.³²

Non-invasive tests, such as urea breath tests (UBT), stool antigen tests (SAT) and serology, can be used in patients without a history of PPI or antibiotic use and in young patients with dyspepsia only.^{31, 32} But, when IDA is present, or there is a high risk of gastric cancer, an endoscopic examination is required.³²

HPI should be managed despite the relative absence of symptoms.³² Treatment relies on clarithromycin-based strategies, which are supplemented with bismuth quadruple or non-bismuth quadruple therapies, with the addition of a PPI, amoxicillin, and a nitroimidazole, according to the resistance profile of the individual and population.^{32, 33}

Oral and systemic findings of IDA

ID, with or without anaemia, may result in symptoms of fatigue, lethargy, reduced concentration, dizziness, tinnitus, pallor, or headache and physical signs such as alopecia, dry hair and skin, koilonychia (spoon-shaped nails), blue sclera, atrophic glossitis, and angular cheilitis.^{3, 5, 15} Pica, the appetite for ice, clay, soil or paper, may also be seen.³ In the most severe presentation of IDA, known as Plummer-Vinson syndrome, oesophageal webs result in dysphagia.^{3, 34}

The dental practitioner should recognise that the oral mucosal changes may be the first manifestation and serve as a sensitive indicator of ID and IDA, which may even precede fatigue.^{35, 36} Oral mucosal pallor is particularly common, may be seen in 30 to 97% of patients with IDA,³⁵⁻³⁷ and correlates with Hb and ferritin levels in some,³⁸ but not all studies.³⁹ The Hb and ferritin levels also correlate with the experience of a sore mouth,³⁸ which is the most common complaint of patients.^{35, 40} This burning sensation is largely attributed to *Candida* infection, which is prevalent

among 85% of patients, presenting as angular cheilitis (63%), atrophic glossitis (59%) and pseudomembranous candidiasis (44%).³⁵ *Candida* infection is more severe in the presence of IDA.⁴¹ Rarely, angular cheilitis may appear independently of infectious aetiologies in ID.³⁷

Atrophic glossitis, which presents with loss of filiform papillae, redness and tenderness of the tongue, is another common finding^{36, 37, 39} and may involve the entire tongue dorsum or occur in patches.³⁶ This is likely another clinical presentation of *Candida* infection.^{34, 42} Antifungal treatment successfully improves the burning sensation of the tongue, and is followed by regeneration of the tongue papillae.³⁵ Correction of the ID may resolve the *Candida* infection on its own,³⁵ while relapses are likely if the IDA is not corrected.⁴¹ Therefore, patients with persistent or recurrent *Candida* infection should be screened for IDA.⁴¹

Recurrent aphthous ulceration is also seen in patients with IDA^{35, 40} and occurs in 6-15% of IDA patients.^{35-37, 39} Some authors found that RAU correlates with the duration of IDA but not with the severity of IDA^{37, 43}, and it may even be seen in ID only.⁴⁴

Other hematinic deficiencies may also be seen in patients with RAU,⁴⁵ but iron deficiency is the most prevalent.⁴⁴⁻⁴⁸ Because hematinic deficiencies are more common than anaemia per se, and correction of these deficiencies reduces ulcer experience,^{41, 46, 48, 49} patients should routinely be screened for iron, folic acid, and vitamin B12 deficiency.^{35, 45, 49}

Explanation of the oral manifestations of IDA

IDA results in immunologic dysfunction and structural changes to the oral mucosa, which may predispose patients to *Candida* infection and RAU, as seen in the patients presented here.

Iron is essential for proper cell differentiation and growth and is a critical component of peroxide- and nitrous oxide-generating enzymes that ensure the proper enzymatic functioning of immune cells.^{15, 41} Cell-mediated immunity is impaired in ID because iron regulates cytokine production and function; the number of T-lymphocytes, their protein kinase C activity, and IL-2 production are all reduced in ID.^{15, 41} The innate immune system is also impaired because macrophages and neutrophils are unable to produce adequate amounts of the bactericidal, iron-containing enzyme, myeloperoxidase.^{15, 41}

ID also affects various structural, histochemical, and clinical features of the oral mucosal epithelium, which may occur before significant alterations in red cell morphology or Hb levels are noted.⁴¹ The epithelium is characterized by atrophy due to a reduced cytoplasmic diameter of cells in the middle cell layers, increased basal cell replication, hyperkeratinization and a pronounced lymphocytic infiltrate.⁴¹ The structural changes correlate with the duration of IDA and low ferritin levels, independent of anaemia, and can be reversed by iron therapy Rennie 1984.⁴¹ In addition, decreased levels of the iron-containing enzyme, cytochrome C, have been found in the buccal mucosa from anaemic patients.⁴¹ Experimentally, these changes may increase the risk of squamous cell carcinomas.⁴¹

Evaluation of IDA

The assessment of IDA may be fairly complex. A normal Hb value does not exclude ID since Hb levels only decline

after a significant amount of iron has been lost,^{4, 50} because Hb production is maintained at the expense of other iron needs.⁴ In the presence of normal Hb, the diagnosis of IDA requires a ferritin level below 15µg/L.^{9, 20}

Table VII Discriminatory characteristics of IDA and anaemia of chronic disease (51)

	IDA	Anaemia of chronic disease
Serum ferritin (SF)	↓	N or ↑
Serum iron	↓	↓
Transferrin	↑	↓ or N
Transferrin saturation	↓	↓
Mean corpuscular volume (MCV)	↓	↓ or N
Iron-binding capacity	↑	↓
Serum transferrin receptor (TfR)	↑	N
Serum transferrin receptor index	High (>2)	Low (<1)
C-reactive protein (CRP)	N	↑
Erythropoietin (EPO)	↑	N or slightly ↑
Cytokine levels	N	↑

N: normal

Standard investigations of IDA include an FBC with film to demonstrate a reduced number of RBC (anaemia), which are small (microcytic) and pale (hypochromic) but with an increased RDW (anisocytosis), and elongated (pencil-shaped) cells.^{5, 9, 20, 50} However, an increase in RDW indicates other nutritional deficiencies, such as vitamin B12 and folate, and is not specific to iron deficiency.⁴

The decreased availability of transferrin-bound iron delivered to erythroid precursors results in reduced Hb production, seen as a reduced RBC count and, subsequently, a reduced MCV once the Hb levels reach 10 g/dL.³ Therefore, pale RBC (with reduced MCH) precedes small RBC (with reduced MCV) and is an important first sign of ID.^{2, 9, 20, 50} and may even be seen in the presence of a normal Hb.⁵⁰

Serum ferritin (SF) is the most specific test for ID. Still, because SF is also an acute phase protein, specific thresholds should be justified relative to the evidence of concurrent inflammation.^{2, 4-6} As an acute phase protein, ferritin levels appear normal in the presence of inflammation. Therefore, simultaneous measures of inflammation (C-reactive protein) are necessary.⁴ (See Table 7) Similarly, obesity, malignancy, liver disease and chronic alcohol consumption are marked by inflammation and subsequently increase hepcidin secretion.⁴ Without inflammation, SF of < 15 µg/L indicates absent iron stores, and < 30 µg/L suggests low body iron stores, but anything < 45 µg/L is a good trade-off between sensitivity and specificity in clinical practice.² Yet, in the presence of inflammation, this cut-off may be extended to 150 µg/L.²

Therefore, the 3rd patient, with apparent normal SF (31 ng/mL) should still be considered to have IDA, because of the concurrent evidence of inflammation (CRP 73 mg/L).

Transferrin transports iron from tissue stores, but when iron stores are depleted, transferrin saturation drops and insufficient iron is delivered to essential body iron proteins.^{5, 15} Serum transferrin levels are usually elevated in ID, but because it is a negative acute-phase protein, it may be normal or even reduced in inflammation.²⁰ In addition, both serum iron concentration and transferrin saturation (< 20%) are reduced in ID and inflammation.^{2, 4, 5, 20} An increase in serum transferrin receptor (TfR), which reflects an increase in iron demand, may be a better marker of ID because it increases with ID even before IDA becomes evident and is not subject to the influence of inflammation.^{4, 52}

However, if there is still any uncertainty in interpreting the results of iron studies, a good response to iron therapy (a Hb rise ≥ 10 g/L within two weeks) will confirm absolute ID.²

Other serum markers used in the assessment of ID include raised total iron-binding capacity, raised red cell zinc protoporphyrin, and low reticulocyte Hb (Retic-Hb).^{2, 20}

Treatment of IDA

The treatment of IDA should first and foremost address the cause of ID before iron replacement therapy (IRT), or rarely, red blood cell transfusion is initiated.^{2, 9}

Therapy aims to replenish iron stores and normalize Hb levels.⁹ Dietary interventions are rarely sufficient, yet advice should be given to favour iron-rich foods.³ Vitamin C-rich foods should be taken concurrently, while tea should be avoided for at least 1-2 hours.³

Oral ferrous salts (such as ferrous sulphate, ferrous gluconate and ferrous fumarate) are preferred as first-line therapy because of their safety, bioavailability, cost, and efficacy.^{2, 53} The preparations are equally efficacious and have the same side-effect profile, although they differ in elemental iron content.^{2, 5} The bioavailability of iron salts is significantly (75%) reduced if taken with food and should therefore be taken between meals.² The ferrous salts may cause severe GI symptoms,⁵ such as constipation, nausea, and diarrhoea,² which may limit compliance.^{2, 5}

The current recommendation by the British Society of Gastroenterology is to administer a single daily dose of 50 – 100 mg of elemental iron, which, if not well tolerated, may be given on alternate days,^{5, 9} or replaced by ferric maltol.^{2, 9} In elderly patients, an elemental iron dose of 15 mg daily may be sufficient and well-tolerated.² Alternate-day therapy and lower dosages reap the same benefits because of reduced hepcidin activation.^{2, 5, 9}

The response to IRT should be monitored to identify non-responders due to non-compliance, malabsorption, continued bleeding or other comorbidities.² An Hb increase of at least 10 g/L should be seen after two weeks of daily oral IRT or four weeks of alternate-day therapy.² If treatment failure occurs on daily dosing, the patient should be switched to alternate-day therapy, ferric maltol, or parenteral iron.² Monitoring should continue at monthly intervals until the Hb levels have normalized, and IRT should continue for 2-3 months thereafter to ensure the repletion of iron stores.²

However, because of the risk of recurrent IDA and the prevalence of persistent anaemia, long term monitoring is advised. Serum ferritin is normally not routinely monitored.²

Parenteral iron should be considered in patients with moderate or severe anaemia, severe clinical symptoms, poor response, malabsorption, significant ongoing bleeding, intolerable adverse effects, or non-compliance because of better Hb improvement and quicker replenishment of body iron stores.^{2, 5, 9, 20} Parenteral iron is particularly preferred among patients with IBD or malabsorption syndromes because it bypasses the GIT, where oral preparations may further aggravate the symptoms of IBD.^{2, 20, 24}

The choice of parenteral preparations is determined by cost, preference and availability.⁵⁴ Ferric derisolate, ferric carboxymaltose, and iron sucrose have different infusion times, number of required infusions, and restoration time of Hb levels.^{2, 9} The carbohydrate shell of these iron preparations allows for the slow release of iron.⁵ Low molecular weight dextran preparations have a reduced risk of anaphylactoid reactions compared to the older preparations but are still greater than newer, non-dextran preparations.⁵⁴ Parenteral iron therapy may rarely be associated with infusion or hypersensitivity reactions, hypophosphataemia or the extravasation of iron, which results in a tattoo-like skin discolouring.^{2, 9}

RBC transfusion should be a last resort for patients with severe anaemia who are haemodynamically unstable or have comorbidities and should be further supplemented to ensure success.⁹ However, transfusion is seldom warranted because parenteral therapy gives a clinically meaningful Hb improvement in only one week.²

CONCLUSION

These three clinical cases demonstrate that it is critical for dentists to recognize oral mucosal disease, such as oral ulceration and *Candida* infection, as a feature of IDA. Only the successful treatment of IDA and its associated cause will successfully manage oral mucosal disease. Recognition of the oral features of IDA and its appropriate investigation allows for the successful multidisciplinary management of the patient with IDA.

REFERENCES

- McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anaemia. WHO Vitamin and Mineral Nutrition Information System, 1993-2005. *Public Health Nutr.* 2009;12(4):444-54.
- Snook J, Bhala N, Beales ILP, Cannings D, Kightley C, Logan RP, et al. British Society of Gastroenterology guidelines for the management of iron deficiency anaemia in adults. *Gut.* 2021;70(11):2030-51.
- Alleyne M, Horne MK, Miller JL. Individualized treatment for iron-deficiency anemia in adults. *Am J Med.* 2008;121(11):943-8.
- Coad J, Pedley K. Iron deficiency and iron deficiency anemia in women. *Scand J Clin Lab Invest Suppl.* 2014;244:82-9; discussion 9.
- Pasricha SR, Tye-Din J, Muckenthaler MU, Swinkels DW. Iron deficiency. *Lancet.* 2021;397(10270):233-48.
- Zhu A, Kaneshiro M, Kauritz JD. Evaluation and treatment of iron deficiency anemia: a gastroenterological perspective. *Dig Dis Sci.* 2010;55(3):548-59.
- Kumar A, Brookes MJ. Iron Therapy in Inflammatory Bowel Disease. *Nutrients.* 2020;12(11).
- Monsen ER, Hallberg L, Layrisse M, Hegsted DM, Cook JD, Mertz W, et al. Estimation of available dietary iron. *Am J Clin Nutr.* 1978;31(1):134-41.
- Kumar A, Sharma E, Marley A, Samaan MA, Brookes MJ. Iron deficiency anaemia: pathophysiology, assessment, practical management. *BMJ Open Gastroenterol.* 2022;9(1).
- Gulec S, Anderson GJ, Collins JF. Mechanistic and regulatory aspects of intestinal iron absorption. *Am J Physiol Gastrointest Liver Physiol.* 2014;307(4):G397-409.
- Hallberg L, Rossander L, Skånberg AB. Phytates and the inhibitory effect of bran on iron absorption in man. *Am J Clin Nutr.* 1987;45(5):988-96.
- Disler PB, Lynch SR, Charlton RW, Torrance JD, Bothwell TH, Walker RB, et al. The effect of tea on iron absorption. *Gut.* 1975;16(3):193-200.
- Perron NR, Brumaghim JL. A review of the antioxidant mechanisms of polyphenol compounds related to iron binding. *Cell Biochem Biophys.* 2009;53(2):75-100.
- Ganz T. Cellular iron: ferroportin is the only way out. *Cell Metab.* 2005;1(3):155-7.
- Beard JL. Iron biology in immune function, muscle metabolism and neuronal functioning. *J Nutr.* 2001;131(2s-2):568S-79S; discussion 80S.
- Ganz T. Systemic iron homeostasis. *Physiol Rev.* 2013;93(4):1721-41.

- Ganz T, Nemeth E. Iron sequestration and anemia of inflammation. *Semin Hematol.* 2009;46(4):387-93.
- Organisation WH. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity; 2011.
- Goddard AF, James MW, McIntyre AS, Scott BB. Guidelines for the management of iron deficiency anaemia. *Gut.* 2011;60(10):1309-16.
- Akpınar H, Çetiner M, Keshav S, Örmeci N, Törüner M. Diagnosis and treatment of iron deficiency anemia in patients with inflammatory bowel disease and gastrointestinal bleeding: iron deficiency anemia working group consensus report. *Turk J Gastroenterol.* 2017;28(2):81-7.
- Ferrara M, Capozzi L, Russo R. Influence of *Helicobacter pylori* infection associated with iron deficiency anaemia on growth in pre-adolescent children. *Hematology.* 2009;14(3):173-6.
- Sharma VR, Brannon MA, Carlsson EA. Effect of omeprazole on oral iron replacement in patients with iron deficiency anemia. *South Med J.* 2004;97(9):887-9.
- Tempel M, Chawla A, Messina C, Celiker MY. Effects of omeprazole on iron absorption: preliminary study. *Turk J Haematol.* 2013;30(3):307-10.
- McCracken E, Wood GC, Prichard W, Bistrain B, Still C, Gerhard G, et al. Severe anemia after Roux-en-Y gastric bypass: a cause for concern. *Surg Obes Relat Dis.* 2018;14(7):902-9.
- Barabino A. *Helicobacter pylori*-related iron deficiency anemia: a review. *Helicobacter.* 2002;7(2):71-5.
- Hershko C, Ianculovich M, Souroujon M. A hematologist's view of unexplained iron deficiency anemia in males: impact of *Helicobacter pylori* eradication. *Blood Cells Mol Dis.* 2007;38(1):45-53.
- Choe YH, Kim SK, Son BK, Lee DH, Hong YC, Pai SH. Randomized placebo-controlled trial of *Helicobacter pylori* eradication for iron-deficiency anemia in preadolescent children and adolescents. *Helicobacter.* 1999;4(2):135-9.
- Yuan W, Li Y, Yang K, Ma B, Guan Q, Wang D, et al. Iron deficiency anemia in *Helicobacter pylori* infection: meta-analysis of randomized controlled trials. *Scand J Gastroenterol.* 2010;45(6):665-76.
- Qu XH, Huang XL, Xiong P, Zhu CY, Huang YL, Lu LG, et al. Does *Helicobacter pylori* infection play a role in iron deficiency anemia? A meta-analysis. *World J Gastroenterol.* 2010;16(7):886-96.
- Santos MLC, de Brito BB, da Silva FAF, Sampaio MM, Marques HS, Oliveira ESN, et al. *Helicobacter pylori* infection: Beyond gastric manifestations. *World J Gastroenterol.* 2020;26(28):4076-93.
- Best LM, Takwoingi Y, Siddique S, Selladurai A, Gandhi A, Low B, et al. Non-invasive diagnostic tests for *Helicobacter pylori* infection. *Cochrane Database Syst Rev.* 2018;3(3):Cd012080.
- Malfertheiner P, Megraud F, O'Morain CA, Gisbert JP, Kuipers EJ, Axon AT, et al. Management of *Helicobacter pylori* infection-the Maastricht V/Florence Consensus Report. *Gut.* 2017;66(1):6-30.
- Wang J, Zhang G, Hu X, Liu Y, Bao Z, Huang Y. Two-week triple therapy has a higher *Helicobacter pylori* eradication rate than 1-week therapy: A single-center randomized study. *Saudi J Gastroenterol.* 2015;21(6):355-9.
- Elad S, Zadik Y, Caton JG, Epstein JB. Oral mucosal changes associated with primary diseases in other body systems. *Periodontol.* 2000. 2019;80(1):28-48.
- Lu S-Y. Perception of iron deficiency from oral mucosa alterations that show a high prevalence of *Candida* infection. *Journal of the Formosan Medical Association.* 2016;115(8):619-27.
- Lu SY, Wu HC. Initial diagnosis of anemia from sore mouth and improved classification of anemias by MCV and RDW in 30 patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2004;98(6):679-85.
- Alsheikh E, Amr E, Zahran F. Prevalence of Oral Manifestations of Iron Deficiency Anemia in a Sample of Egyptian Population, Hospital-Based Cross-Sectional Study. *Advanced Dental Journal.* 2019;1(3):64-71.
- Shrotriya Anuj SA. Correlation between Oral Manifestations with their Hematologic values in Iron Deficiency Anemia. *Journal of Advanced Medical and Dental Sciences Research.* 2018;6(9):80-3.
- Jaber HKJ, Hussein HA, Hashim AI Qudsi G. The prevalence of oral manifestations of Iron Deficiency Anemia in patients attending to College of Dentistry. *Journal of Pakistan Association of Dermatologists.* 2023;33(4):1342-5.
- Wu Y-C, Wang Y-P, Chang J-Y-F, Cheng S-J, Chen H-M, Sun A. Oral manifestations and blood profile in patients with iron deficiency anemia. *Journal of the Formosan Medical Association.* 2014;113(2):83-7.
- Rennie JS, MacDonald DG, Dagg JH. Iron and the oral epithelium: a review. *J R Soc Med.* 1984;77(7):602-7.
- Chi AC, Neville BW, Krayner JW, Gonsalves WC. Oral manifestations of systemic disease. *Am Fam Physician.* 2010;82(11):1381-8.
- Nayak P, Nayak S, Donoghue M. Prevalence and oral manifestations of iron deficiency anemia: A short study. *Medico-legal update.* 2011;11:35-7.
- Wu YC, Wu YH, Wang YP, Chang JY, Chen HM, Sun A. Hematinic deficiencies and anemia statuses in recurrent aphthous stomatitis patients with or without atrophic glossitis. *J Formos Med Assoc.* 2016;115(12):1061-8.
- Lopez-Jornet P, Camacho-Alonso F, Martos N. Hematological study of patients with aphthous stomatitis. *Int J Dermatol.* 2014;53(2):159-63.
- Wray D, Ferguson MM, Mason DK, Hutcheon AW, Dagg JH. Recurrent aphthae: treatment with vitamin B12, folic acid, and iron. *Br Med J.* 1975;2(5969):490-3.
- Chiang CP, Yu-Fong Chang J, Wang YP, Wu YH, Wu YC, Sun A. Recurrent aphthous stomatitis - Etiology, serum autoantibodies, anemia, hematinic deficiencies, and management. *J Formos Med Assoc.* 2019;118(9):1279-89.
- Wray D, Ferguson MM, Hutcheon WA, Dagg JH. Nutritional deficiencies in recurrent aphthae. *J Oral Pathol.* 1978;7(6):418-23.
- Compilato D, Carroccio A, Calvino F, Di Fede G, Campisi G. Hematological deficiencies in patients with recurrent aphthosis. *J Eur Acad Dermatol Venereol.* 2010;24(6):667-73.
- Reinisch W, Staun M, Bhandari S, Muñoz M. State of the iron: how to diagnose and efficiently treat iron deficiency anemia in inflammatory bowel disease. *J Crohns Colitis.* 2013;7(6):429-40.
- Goldberg ND. Iron deficiency anemia in patients with inflammatory bowel disease. *Clin Exp Gastroenterol.* 2013;6:61-70.
- Koulouzidis A, Said E, Cottier R, Saeed AA. Soluble transferrin receptors and iron deficiency, a step beyond ferritin. A systematic review. *J Gastrointest Liver Dis.* 2009;18(3):345-52.
- Camaschella C. Iron deficiency. *Blood.* 2019;133(1):30-9.
- Wang C, Graham DJ, Kane FC, Xie D, Werneck M, Levenson M, et al. Comparative Risk of Anaphylactoid Reactions Associated With Intravenous Iron Products. *Jama.* 2015;314(19):2062-8.

Dentigerous cyst of inflammatory origin: a case report

SADJ JULY 2024, Vol. 79 No.6 P333-336

BK Bunn,¹ P Gwengu,² S Mudau³

ABSTRACT

Background

To document a case of a dentigerous cyst of inflammatory origin which developed due to periapical infection from a grossly carious deciduous tooth.

Methods

An 11-year-old male patient presented with a 4-month history of swelling within the right mandible. Radiological examination showed a cystic lesion in association with an impacted, displaced tooth 44 with an overlying carious 85. Marked expansion of the buccal bone was noted.

Results

Due to the special needs of this patient, radical treatment including extraction of tooth 85, enucleation of the cystic lesion as well as extraction of the impacted tooth 44 was performed.

Authors' information

1. BK Bunn, BDS, MDent, FC Path (SA) Oral Path, Department of Operative Dentistry, School of Oral Health Sciences, Sefako Makgatho Health Sciences University, Pretoria, South Africa
2. P Gwengu, DipOH, BDS, MPH, MDent (Com Dent), Department of Operative Dentistry, School of Oral Health Sciences, Sefako Makgatho Health Sciences University, Pretoria, South Africa
3. S Mudau, BDS, Department of Operative Dentistry, School of Oral Health Sciences, Sefako Makgatho Health Sciences University, Pretoria, South Africa

Corresponding author

Name: Dr Belinda Bunn
Tel: +27 82 708 5868
Email: belindabunn@gmail.com

Keywords

Dentigerous cyst, dentigerous cyst of inflammatory origin, follicular cyst, developmental odontogenic cyst

Conflict of interest

The authors declare they have no conflict of interest.

Conclusion

Careful clinicopathological and radiological correlation of a large cystic lesion associated with an impacted tooth in the setting of an overlying grossly carious primary tooth will yield the diagnosis of a dentigerous cyst of inflammatory origin.

CASE REPORT

An 11-year-old male patient presented with a main complaint of swelling within the posterior right mandible. The patient stated he had been aware of the swelling for approximately four months. He was seen at a local clinic which provided him with antibiotics but no further treatment. The patient was referred to the Department of Operative Dentistry at Sefako Makgatho Health Sciences University after being on antibiotic therapy for more than a month with no resolution of the swelling. The patient provided a medical history of spastic cerebral palsy and autism for which he is being treated in the Department of Neurology. He is currently on Risperdal therapy.

On intra-oral examination, a grossly carious tooth 85 was noted with associated swelling that extended to involve the buccal cortical bone from tooth 84 to the mesial aspect of tooth 46. On palpation, the lesion was hard and rubbery. The patient exhibited marked drooling, the cause of which could not be distinguished between mental nerve impingement or due to the special needs condition of the patient. The initial clinical impression was that of a dental abscess due to the carious tooth 85. A panoramic radiograph subsequently showed a large cystic lesion on the lateral aspect of an impacted tooth 44. The 44 was displaced towards the inferior border of the mandible. The remaining dentition was crowded. There was distinct buccal expansion in association with the lesion which was discernible on panoramic radiograph in the lower right quadrant. The cyst had a well demarcated margin close to the impacted lateral surface of tooth 44 with blurring to an indistinct margin in the periapical region of tooth 85 (Figure 1).

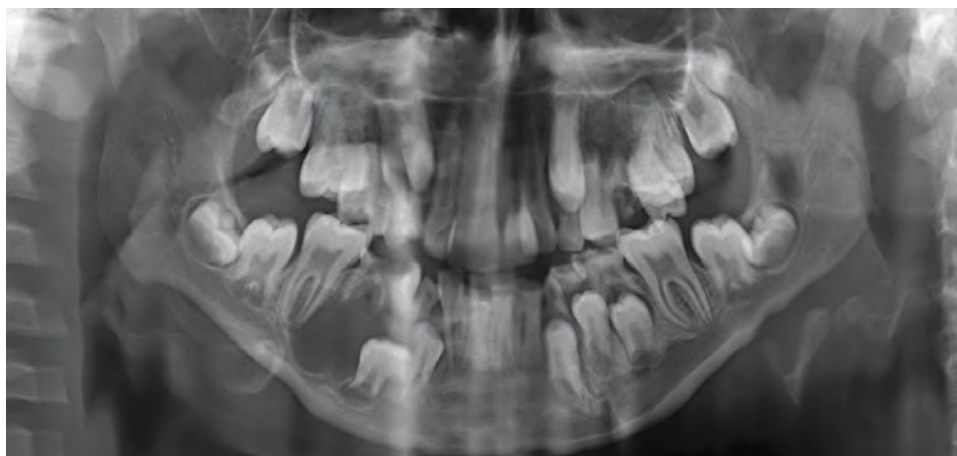


Figure 1: The panoramic radiograph obtained in this case depicts a grossly carious tooth 85 in association with a large lateral cystic lesion which is attached at the cemento-enamel junction of the impacted and displaced tooth 44. Generalised crowding of the remaining dentition is noted.

DISCUSSION

Oral health care workers need to be able to distinguish between a wide variety of cystic lesions which occur in association with the crowns of teeth, some of which may represent neoplasms. A clinical differential diagnosis is formulated by intra-oral examination as well as inspection and evaluation of an appropriate radiographic image. Biopsy is advocated in many cases for histopathological analysis to reach the best diagnosis which directs treatment. The oral health care worker thus needs to have comprehensive knowledge of pathological lesions to reach a diagnosis and develop a treatment plan.

Dentigerous cysts (DCs) are common developmental odontogenic cysts which are attached to the tooth at the cemento-enamel junction (CEJ) (Figure 2). Any cystic lesion developing around the crown of an unerupted tooth may be termed a "follicular" cyst.¹ DCs develop as the erupting tooth applies pressure on the dental follicle which is often impeded by impacted teeth or where there is lack of intra-oral space. An unusual, unique variant of dentigerous cyst develops due to peri-apical infection from a carious deciduous tooth overlying the follicle. The inflammation stimulates the development of a cyst through induced replication of the reduced enamel epithelium (REE) which allows for fluid ingress and cyst development. These cysts often show hyperplastic epithelium in association with an inflammatory infiltrate.² The histopathological features of a typical dentigerous cyst include a low lining of stratified epithelium comprising cuboidal cells which resemble the REE surrounded by a fibrous cyst wall in which myxoid connective tissue changes are observed in association with inactive odontogenic cell rests.³



Figure 2: A gross morphological view of a dentigerous cyst which can be seen to attach at the cemento-enamel junction of the involved tooth. There are no luminal cyst contents.

Alternative theories as to the origin of a dentigerous cyst of inflammatory origin have been proposed by Altini and Benn. First, they suggest that a cyst forms within the follicle of the permanent tooth in the usual manner and then becomes secondarily infected by the periapical infection from the overlying carious deciduous tooth. Second, they propose that, on rare occasions, there may possibly be fusion of a radicular cyst located at the apices of the decayed

deciduous tooth with the follicle of the unerupted permanent tooth. Last, it is suggested that the inflammatory exudate from the periapical infection associated with the apex of the carious deciduous tooth causes separation of the REE from the enamel with resultant cyst formation.⁴

Three radiographic varieties of dentigerous cyst have been documented. The most common is the central variety which presents as a well demarcated unilocular radiolucency surrounding the crown of an impacted tooth with attachment at the CEJ. The so-called lateral variant is most often seen in impacted third molar teeth where the cyst extends laterally along the root surface. This is commonly seen in mesio-angularly impacted teeth. The circumferential variant presents with the cyst surrounding the crown and roots of the tooth such that the tooth appears to be floating within the cystic space.¹ Although the majority of DCs are asymptomatic lesions which are usually identified coincidentally at check-up, it must be remembered that large DCs may often be multilocular and therefore may mimic a plethora of pathological lesions. DCs of the inflamed type present as radiolucent cystic lesions in association with an impacted tooth while above the lesion is a grossly necrotic retained deciduous tooth. In the event of large destructive lesions, incisional biopsy is advocated to exclude more sinister lesions and to confirm the diagnosis.⁵

DCs are common and are the second most frequently encountered odontogenic cyst after the radicular cyst.^{6,7} The DC is, however, regarded as being developmental in nature while the radicular cyst is of inflammatory origin. DCs are estimated to comprise up to 20% of all odontogenic cysts.² Teeth most affected by DCs are the third molars and maxillary canines, followed by the second mandibular premolars, as these teeth are the last to erupt and most often the ones to encounter intra-oral space limitations.⁶ A DC of inflammatory origin tends to show an overall predilection for occurrence within the mandible, generally in the premolar site and often in association with a grossly carious preceding primary molar tooth. They are also more frequent in male patients.⁴ As a result, several clinical and radiological features are considered supportive of the diagnosis of a DC of inflammatory origin. These include younger age, location, symptoms, dental caries, cystic size, delayed eruption and impaction of permanent teeth.⁶

The treatment in most cases is radical and involves enucleation of the cyst together with extraction of the associated tooth. Other conservative strategies require a meticulous and accurate diagnosis and involve marsupialisation or decompression of the cyst with orthodontic movement of the associated tooth into place. This form of treatment is difficult, and success is best attained in children under the age of 10 years and where there is favourable depth of inclusion and germ angulation is less than 25°. Extreme conservative management in such a case would include marsupialisation or decompression of the cyst wall in order to prevent neural fallout and the save the associated unerupted tooth which is then orthodontically moved into its normal position.^{7,8} Such conservative management requires regular dental follow-up, daily local care and considerable co-operation from the patients and their parents.⁵ Meticulous conservative therapy is not ideal in a patient with special needs. Although the definitive diagnosis of most cystic lesions requires histopathological analysis, clinical and radiological examinations have been shown to

be of paramount importance in establishing a differential diagnosis and, in this case alone, was sufficient to dictate the immediate therapeutic intervention through enucleation and extraction of the two associated teeth, given the special needs of the patient.⁸

DCs, particularly in association with third molar teeth, should always be distinguished from hyperplastic follicles to avoid extraction of teeth which have the potential to erupt into their normal positions. A hyperplastic follicle and a DC may be distinguished from each other by means of radiology where the former measures up to 8mm, while a radiolucent lesion attached at the CEJ of the affected tooth measuring more than 8mm would be considered a DC.⁸ On histology, a hyperplastic follicle and a DC are indistinguishable. Both will show a cystic lesion which is lined by a layer of uninfamed, uniform cuboidal cells of the REE (Figure 3A). Myxoid changes are frequent within the adjacent cyst wall as are occasional scattered quiescent odontogenic cell rests. Inflammation of an enlarging cyst may occur when there is breach of the lining or if a large cyst is biopsied which may introduce inflammation. Inflammatory changes may then alter the normal cyst lining which may become stratified and resemble that of a radicular cyst. The attachment of the cyst to the CEJ of the associated tooth will, however, assist with confirmation of DC.

The pathogenesis of a DC has been alluded to. As the dental follicle enlarges to form a cyst, it becomes visible on radiograph as a well demarcated cystic lesion attached at the CEJ of the affected tooth.² There is often a need to distinguish this lesion from an early developing adenomatoid odontogenic tumour (AOT), a follicular odontogenic keratocyst (OKC) and a follicular ameloblastoma.⁹⁻¹¹

An AOT in its earliest phases of development may mimic a DC; however, it should be noted that the cystic component often attaches lower than the CEJ on the root surface. Furthermore, if the AOT is more developed, the radiolucency surrounding the affected tooth may be seen to contain “snowflake radiopacities” within the lumen.⁹ There is a high incidence of AOTs affecting the second mandibular premolar teeth as well as maxillary canines. Microscopically, an AOT is characterised by a large cystic space lined by a thick fibrous capsule. The odontogenic epithelial lining is arranged in sheets with duct-like spaces within whorls/rosettes.⁹ (Figure 3B)

The follicular variants of the OKC and of ameloblastoma are virtually indistinguishable from a DC on radiology alone. Both an OKC and an ameloblastoma may develop from the dental follicle of any developing, erupting tooth resulting in the formation of

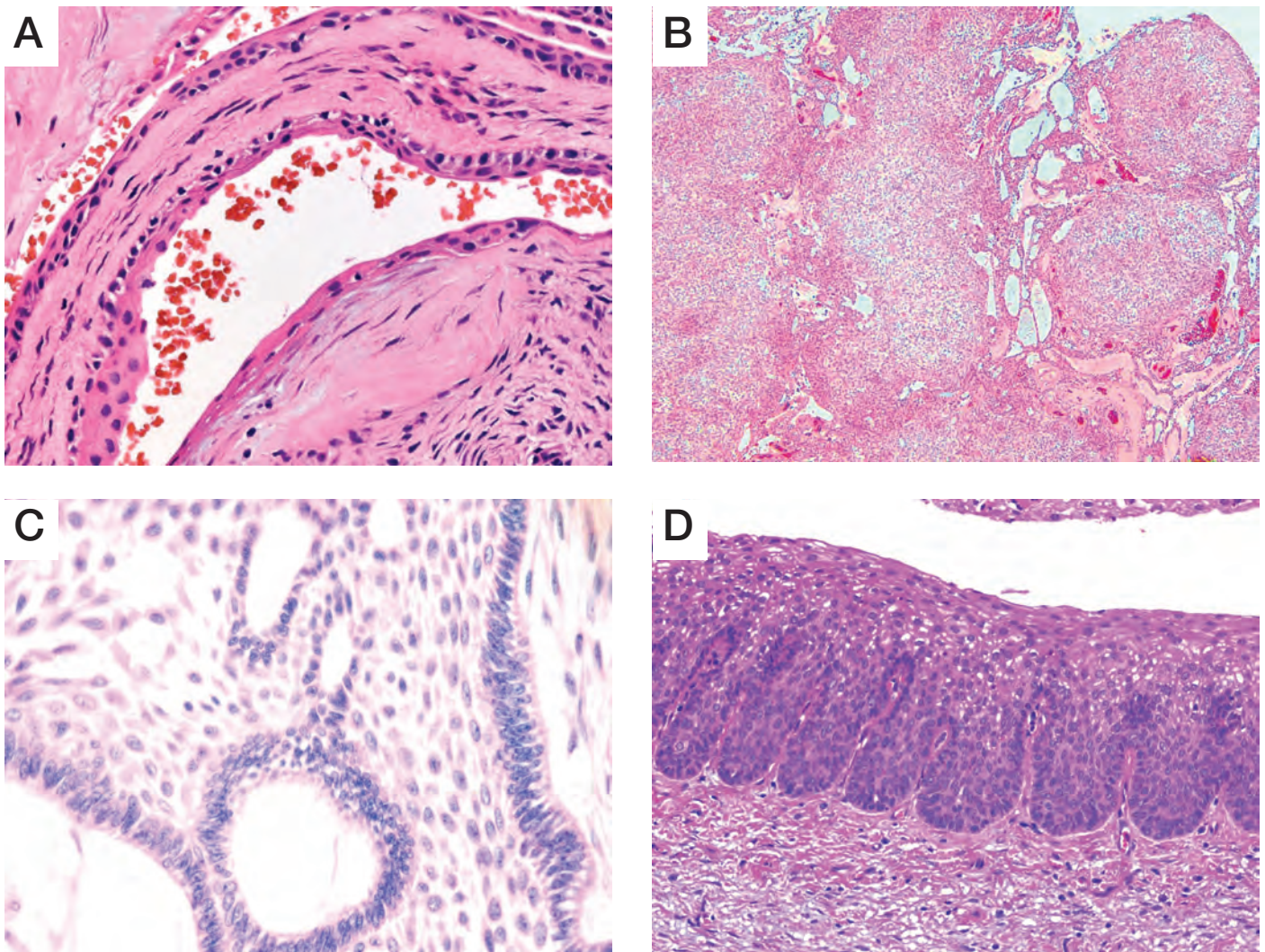


Figure 3A: The micrograph shows the histological features of an uninfamed dentigerous cyst in which the lining comprises a low stratified epithelium with many cuboidal cells which resemble the REE (Haematoxylin & Eosin; x20). Figure 3B: The micrograph shows a low-power image from part of an adenomatoid odontogenic tumour in which the epithelium is arranged in sheets with distinct peripheral whorls (Haematoxylin & Eosin; x10). Figure 3C: The characteristic features of an ameloblastoma are demonstrated in this micrograph. The basal cells are columnar with reverse nuclear polarisation, infranuclear vacuolation and subepithelial hyalinisation. A loosely textured luminal layer of stellate-like reticulum is prominently featured (Haematoxylin and Eosin; x40). Figure 3D: This micrograph shows part of an odontogenic keratocyst in which vague undulation of the surface epithelium is seen. This lesion shows pronounced basal budding (Haematoxylin & Eosin, x40).

a radiolucent lesion surrounding the crown of the tooth resembling a DC. These lesions have the potential to increase to large sizes at which time there may be associated cortical expansion or even destruction. Most DCs are slow-growing, asymptomatic lesions detected as incidental findings at check-up on a routine panoramic radiograph. Cysts that enlarge and go on to cause cortical bone expansion or breakthrough may be felt as fluctuant lesions. Large DCs have the potential to cause bone destruction and displacement of neighbouring teeth. They may even prevent the eruption of adjacent teeth.⁵

It is always advised to biopsy large cysts to rule out diagnoses such as OKCs and ameloblastomas for the most appropriate therapeutic intervention. An ameloblastoma on histology will show a lining of distinct columnar basal cells with reverse nuclear polarisation and infranuclear vacuolation. Prominent underlying hyalinisation is a frequent feature. The more luminal cells are loosely textured and resemble the stellate reticulum of the dental organ (Figure 3C). An OKC, by contrast, is histologically characterised by a uniform layer of stratified squamous cells, usually six to eight cells in thickness. The surface of the cells has a corrugated, undulated appearance. The junction of the lining epithelium with the underlying cyst wall is flat, allowing for easy separation. Basal budding or daughter cyst formation may be seen, all of which increase the probability of recurrence (Figure 3D). It is thus the accepted treatment of choice of large follicular cystic lesions to be enucleated together with extraction of the associated tooth. Depending on the diagnosis, curettage, resection or the use of Carnoy's solution is proposed.

Patients with spastic cerebral palsy and autism tend to have poor oral hygiene. As a result of damage to the brain before, during or after birth, patients with spastic cerebral palsy often exhibit jerky, uncoordinated movements, muscle tightness and joint stiffness.¹²⁻¹⁴ Children with these disorders may be exceptionally difficult to treat in the dental chair. The treatment as was performed in this case is thus appropriate and careful clinical follow-up is advised, particularly with regard to the maintenance of oral hygiene. The side effects of Risperdal as prescribed for this patient includes enhanced difficulty and control of joint movements as well as excessive drooling, which further hinders more conservative management.¹⁵

CONCLUSION

Most dentigerous cysts are developmental in origin. In young children, however, there may be a unique situation in which a dentigerous cyst develops because of periapical infection from a necrotic overlying deciduous tooth, as demonstrated in this case report. Furthermore, the patient in this case is afflicted with both autism and spastic cerebral palsy and has been prescribed a psychotropic drug which limits the clinical management. The pathogenesis of a dentigerous cyst because of adjacent inflammation remains a point of interest.

REFERENCES

- Hasan S, Ahmed SA, Reddy LB. Dentigerous cyst in association with impacted inverted mesiodens: Report of a rare case with a brief review of literature. *Int J Appl Basic Med Res.* Sep 2014;4(Suppl 1):S61-64
- McKinney SL, Lukes SM. Dentigerous cyst in a young child: a case report. *Can J Dent Hyg.* Oct 2021;55(3):177-181
- Sohn C RJ, Nam I, Shin S, Lee J. Cystic lesion between a deciduous tooth and the succeeding permanent tooth: a retrospective analysis of 87 cases. *J Korean Assoc Oral Maxillofac Surg.* 2022;48(6):342-347
- Benn A, Altini M. Dentigerous cysts of inflammatory origin. A clinicopathologic study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* Feb 1996;81(2):203-209
- Khalifa C, Garma M, Mabrouk R, Slim A, Bouguezzi A, Selmi J. Conservative management of dentigerous cyst in children: Report of two clinical cases. *Clin Case Rep.* Apr 2023;11(4):e7051
- Hye Joo Son YJJ, Jin Sook Jeong, Do-Young Kang. An inflammatory dentigerous cyst shows rim uptake on bone scan: a case report. *Nucl Med Mol Imaging.* 2014;48(1):79-81
- Antunes D, Albisetti A, Fricain M, Cherqui A, Derruau S. Management of Permanent Teeth in Dentigerous Cysts in Children: A Case Report. *Cureus.* Aug 2023;15(8):e44062
- Perez A, Lenoir V, Lombardi T. Dentigerous Cysts with Diverse Radiological Presentation Highlighting Diagnostic Challenges. *Diagnostics (Basel).* Aug 19 2022;12(8)
- Sethi S KM, Aggarwal P, Indra Kumar HS, Sugandhi CD, Singh S. A case report and short review of changing trends in the site of occurrence of adenomatoid odontogenic tumour: Unravelling the past 15 years. *Dent Res J.* 2016;13:462-471
- Hadziabdic N, Dzinovic E, Udovicic-Gagula D, et al. Nonsyndromic Examples of Odontogenic Keratocysts: Presentation of Interesting Cases with a Literature Review. *Case Rep Dent.* 2019;2019:9498202
- Meshram M SL, Dhuvad J, Anchlia S, Vyas S, Shah H. Conservative Management of Unicystic Ameloblastoma in Young Patients: A Prospective Single-Center Trial and Review of Literature. *J Maxillofac Oral Surg.* 2017;16(3):333-341
- Delli K, Reichart PA, Bornstein MM, Livas C. Management of children with autism spectrum disorder in the dental setting: concerns, behavioural approaches and recommendations. *Med Oral Patol Oral Cir Bucal.* Nov 1 2013;18(6):e862-868
- Jan BM, Jan MM. Dental health of children with cerebral palsy. *Neurosciences (Riyadh).* Oct 2016;21(4):314-318
- Zerman N ZF, Chirumbolo S, Zangani A, Mauro G, Zocante L. Insights on dental care management and prevention in children with autism spectrum disorder (ASD). What is new? *Front Oral Health.* 2022;27(3):998831
- Becker DE. Psychotropic drugs: implications for dental practice. *Anesth Prog.* Fall 2008;55(3):89-99

CPD questionnaire on page 346

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.



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

SADJ JULY 2024, Vol. 79 No.6 P337-340

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

1. THE EFFECTS OF DENTURE CLEANERS ON THE SURFACE, OPTICAL AND MECHANICAL PROPERTIES OF RESINS FOR CONVENTIONAL, MILLED AND 3D-PRINTED DENTURE BASES

Conventional techniques or digital computer-aided design and computer-aided manufacturing (CAD/CAM) by milling or three-dimensional (3D) printing are currently used for denture processing. CAD/CAM-milled discs are pre-polymerised by the manufacturer under heat and pressure, which minimises their porosity and residual monomers; therefore, they exhibit improved mechanical properties and reduced bacterial adhesion. In contrast, resins for denture bases manufactured by 3D printing are polymerised by light, resulting in increased residual monomer concentrations and porosity.¹ Hygiene and the disinfection of removable prostheses is essential to remove biofilm, increase longevity and maintain good oral health.¹ Stomatitis has been reported to be the main cause of superinfection in patients with prostheses, especially infection with *Candida* spp. Poor denture hygiene has not only been associated with problems in the oral cavity but also with a 2.4 times higher risk of severe pneumonia.¹ The ideal hygiene product or system would achieve an optimal level of disinfection of the dentures, be nontoxic and avoid alterations in the physical and mechanical properties, such as colour and dimension. In addition, it should be affordable.⁴ Among the mechanical methods for cleaning dentures, brushing is the most used because of its simplicity, effectiveness and low cost.¹

Chemical methods for denture cleansing include immersing the prosthesis in solutions with solvent, detergent and antibacterial and antifungal actions, which can be used alone or in combination with brushing or ultrasonic devices.¹ These chemical agents are broadly divided into diluted acids, alkaline solution and alkaline peroxide.¹ Alkaline solutions, which include sodium hypochlorite (NaOCl) and diluted acids such as mouthwashes, are effective denture cleaning agents that act on the organic matrix of the biofilm, possess bactericidal and fungicidal action, and remove stains from dentures.¹ Alkaline peroxides comprise oxidising, effervescent, tension-reducing and chelating agents in powder or tablet form, that become hydrogen peroxide solutions on contact with water.¹ Chelates, or chelating agents, remove heavy metals by binding with metal ions to form two or more bonds with their ring-shaped structure and build a stable, water-soluble structure. Common chelating agents include ethylenediamine tetra acetic acid (EDTA), ethylene glycol tetra acetic acid (EGTA) and ethylenediamine.¹ Various effervescent cleaners are available in the market – such as Corega tabs[®] and Efferdente[®] in tablet form – are commonly used, which are effective in reducing the adhesion of *Candida albicans* and removing light stains and debris on denture bases.¹ Although CAD/CAM methods have been employed for denture manufacturing since the 1990s,

owing to limited scientific evidence they are still considered a relatively new approach. Furthermore, existing evidence on the best chemical protocol for disinfection and biofilm removal in dentures processed using CAD/CAM, 3D-printed dentures in particular, and its effects on their properties, is limited.¹ Bento and colleagues (2024)¹ reported on an *in vitro* study that sought to evaluate the efficacy of denture cleaners on the adhesion of *Candida albicans* and their effects on the surface, optical and mechanical properties of resins for conventional, milled and 3D-printed denture bases. The null hypothesis postulated that there would be no significant differences between the different types of resins and different types of cleaning agents.

Materials and methods

This was a lab based *in vitro* study. A total of 240 resin samples were made: 120 with a thickness of $10 \times 3.0 \pm 0.03$ mm for testing *Candida albicans* adhesion, optical stability, roughness, hydrophilicity and surface free energy, and the remaining samples with dimensions of $15 \times 5.0 \times 3.0 \pm 0.03$ mm were used for evaluating *Candida albicans* adhesion, surface microhardness, flexural strength and modulus of elasticity. Based on the denture resin type and manufacturing method, these samples were divided into three groups of 40 each: G1, G2 and G3. Depending on the type of denture cleanser, the samples were further subdivided into five groups: S1, S2, S3, S4 and S5 ($n=8$).

The samples for the conventional group (G1) were prepared using metal moulds cut to the appropriate dimensions, which were placed in plastic muffles positioned between glass plates on a special type IV plaster. The conventional medium-pink method (Classic) resin was handled according to the manufacturer's instructions, inserted into the moulds, kept under a load of 14.71 kN for 2 min in a hydraulic press, and bench-cured for 30 min. The samples were polymerised in a boiling water bath (100°C) for 60 min. After polymerisation, the edge irregularities and excess resin were removed using a Maxicut drill.

The samples fabricated using the milled (G2) and 3D printed (G3) method were first designed in CAD software in accordance with the specified dimensions. Standard CAD mosaic language files were sent to the CAM software of the milling machine and 3D printer. Blocks of medium-pink were milled in a 5-axis milling machine to obtain the milled samples, and a medium-pink liquid resin was used in a stereolithographic printer with digital light processing technology to obtain the 3D printed samples.

All samples were subjected to a standardised finish and polishing using sanding discs of different roughness (grit), coupled to an automatic polishing machine under constant water irrigation at 300 rpm for 30 sec on each face. All samples were randomised and placed in 24 plates

with 2ml wells, packed with surgical grade and sterilised using ethylene oxide gas (Oximed®) according to the ISO9001:2015 standard protocols for microbiological tests.

An isolated *Candida albicans* ATCC#90,028 strain was placed on Sabouraud dextrose agar (SDA) plates for 24hr in an oven at 37°C. The colonies formed on the plate were transferred to a test tube with brain heart infusion (BHI) broth and kept in an oven at 37°C for 24hr. A positive control of the strain was performed, recording a growth of 2.23×10^6 CFU/ml (Colony Forming Unit). The samples, after sterilisation, were immersed in sterile human saliva for 2hr in an oven at 37°C with 5% CO₂ to form an acquired film.

The colonies formed in the tube with BHI were transferred to a petri dish with SDA using an inoculation loop and kept in an oven at 37°C with 5% CO₂ for 24hr. Subsequently, the colonies formed on the plate were transferred to yeast malt broth until cloudy, and the absorbance was measured using a spectrophotometer at a wavelength of 625nm until reaching an optical density compatible with the oral biofilm (absorbance at 350 ABS). Next, 2ml of broth was distributed in each well for each sample, which was kept in an oven at 37°C with 5% CO₂ for 48hr. The samples were then washed with sterilised distilled water and immersed in 2ml of denture cleansers according to randomisation (Corega Tabs, Efferdent, 1.0% NaOCl or Listerine cool mint) for 20min in a standard electric shaker.

The samples were then transferred to test tubes with 5ml of 0.9% NaCl for vortex processing for 1min and ultrasonicated for 6min to segregate the biofilm from the sample. Six serial dilutions were made 1:9 μ L (10^{-1} , 10^{-2} , 10^{-3} , 10^{-4} , 10^{-5} and 10^{-6}). For each sample, a plate with SDA divided into six quadrants was prepared, and three drops of 25 μ L were placed in each quadrant, depending on its dilution. The plates were incubated in an oven at 37°C with 5% CO₂ for 24hr. After this period, counting was performed using a digital colony counter, choosing the quadrant with 3-30 colonies per drop. The average number of *Candida albicans* colonies (10 CFU/ml) was calculated by averaging three drops of each sample and multiplying by the dilution exponents.

The optical stabilities of the samples were evaluated using a spectrophotometer and measured using the CIE L*a*b* colour scale. With the data collected before and after contamination with *Candida albicans*, the chromatic difference was calculated using the CIEDE 2000 system (ΔE_{00}). The higher the ΔE_{00} value, the greater the colour change of the material, resulting in lower optical stability.

Surface roughness was analysed by contact profilometry using an SJ-401 surface roughness profilometer featuring a diamond with a diameter of 2mm. Three measurements were performed on each sample by a single operator and the average of these measurements was defined as the roughness value Ra (μ m).

Hydrophilicity and surface free energy were analysed using a Drop Shape Analysis System DSA100E automatic dispenser digital goniometer. To determine the surface free energy (mJ/m^2), additional measurements of the contact angle were performed using a 20 μ L drop of diiodomethane. The surface microhardness was evaluated using a microhardness tester (HMV-2T; Shimadzu Corp.) equipped with a Knoop diamond, according to the standard guidelines.

Three measurements were taken and the average of three measurements was defined as the Knoop microhardness value (KNH, Kg/mm²) of the sample.

The flexural strength and modulus of elasticity were tested using a 3-point bending test on a universal testing machine, in accordance with the ISO 20795-1 guidelines: (2013) for denture base polymers.

Results

In this study, all denture cleansers significantly reduced the quantity of *Candida albicans*, with Listerine and 1% NaOCl reducing 100% of the microorganisms in both sample formats. Furthermore, chromatic changes and surface roughness values were considerably higher for 1% NaOCl. In contrast, 1% NaOCl presented higher free surface free energy values and greater hydrophilicity than the other cleansers, mainly in 3D-printed resin, which is favourable for reducing the adhesion of *Candida albicans*. However, NaOCl acts directly on the organic matrix of the resin, resulting in the dissolution of the polymeric structure of the denture, modifying its structural characteristics, which can lead to the weakening of the resin. This is proven by the low flexural strength and modulus of elasticity of the 3D-printed resin with 1% NaOCl.

Multiple pair comparisons showed that the resins manufactured using CAD/CAM showed significantly less colour change than the conventional resin for all denture cleansers ($P < 0.05$). Compared to water, 1% hypochlorite solution showed the highest colour change values, with a significant increase in all resins ($P < 0.05$).

Surface roughness values were significantly higher in 3D-printed resin than in other resins for all cleansers ($P < 0.05$), with the exception of 1% hypochlorite, which did not show a significant difference with conventional resin ($P = 0.104$). Compared to water, 1% hypochlorite solution presented the highest roughness values, with a significant increase in all resins ($P < 0.05$).

The 1% hypochlorite showed the highest surface free energy values, a significant increase compared with those of other cleansers in the 3D-printed resin ($P < 0.05$). Additionally, the denture cleansers did not significantly alter the contact angles of the conventional and milled resins. Multiple pair comparisons (Tukey's test) showed that the surface microhardness was significantly lower for 3D-printed resin for all cleansers ($P < 0.05$), with the exception of 1% hypochlorite ($P = 0.088$). Compared to water, all cleansers demonstrated significantly reduced surface microhardness ($P < 0.05$); with the lowest values for Corega and Efferdent cleansers, with no difference between them ($P > 0.05$). Listerine outperformed all the cleansers and was the most effective in reducing *Candida albicans* without altering the properties of conventional and CAD/CAM denture resins. Notably, the samples were immersed in denture cleansers only for 20min.

Conclusions

Listerine demonstrated superior efficacy in reducing *Candida albicans* with minimal effect on denture properties, whereas 1% NaOCl had a significant negative impact on the properties. The mechanical properties were significantly lower in 3D-printed resin than in other resins for all denture cleansers.

Implications for practice

The ease of use of CAD/CAM technology and milling or 3D printing dentures must be tempered against the impact denture cleansers have on the properties of these dentures.

REFERENCE

1. Bento VA, Sayeg JM, Rosa CD, Lopes LF, Marques MC, Pellizzer EP. Efficacy of denture cleansers on *Candida albicans* adhesion and their effects on the properties of conventional, milled CAD/CAM, and 3D-printed denture bases. *Clinical Oral Investigations*. 2024 Jul;28(7):1-1

2. PERFORMANCE OF CHATGPT IN CLASSIFYING PERIODONTITIS ACCORDING TO THE 2018 CLASSIFICATION OF PERIODONTAL DISEASES

A new classification for periodontal and peri-implant diseases and conditions was introduced in 2018 and remains in use today. Various diagnostic tools have been developed to aid clinicians in the decision-making process based on the 2018 periodontal classification.¹

ChatGPT is an implementation of the Generative Pre-trained Transformer 3 (GPT-3.5) language model developed by OpenAI, which is freely available to the public.¹ GPT-3.5 is a highly expansive neural network-based natural language processing (NLP) model, currently one of the largest in existence. With training on 175 billion parameters, its primary purpose is to generate text that closely resembles human language. Acting as a versatile chatbot, GPT-3.5 is capable of performing diverse NLP tasks such as language translation, summarisation and answering questions. Furthermore, it can offer alternative differential diagnostic support. Clinicians can obtain a list of potential diagnoses and advice on subsequent management choices by providing the model with case details.¹ Better differential diagnostic assistance systems may be created by considering the strengths and weaknesses of such models. To explore this possibility, Tastan Eroglu and colleagues (2024)¹ reported on a study that sought to evaluate the ability of ChatGPT to determine the stage, grade and extent of periodontitis according to the 2018 classification when provided with rich case descriptions, understanding the capabilities and limitations of this tool.

Methodology

This research was based on an analysis of the baseline digital records and subsequent stage, extent and grade characterisations of 200 untreated patients diagnosed with periodontitis. All cases were evaluated by four examiners to obtain gold standardised diagnoses. The information used to determine the stage, grade and extent of periodontitis was input directly to ChatGPT, followed by the query, "What is the stage, grade and extent of periodontitis?" The chatbot's replies were then compared with the standardised diagnoses.

Two hundred and fifty-eight periodontitis cases were selected from the archive of patients of the Periodontology Department at a university in Turkey. Patients with acute periodontal lesions, gingival diseases, dental implants and periodontitis as a manifestation of systemic diseases were excluded (n=43). The four experts, who were responsible for providing the standardised reference diagnoses

(RDs), reviewed and discussed the cases collaboratively, reaching a consensus through open discussion. Cases in which consensus could not be reached and those with inappropriate clinical, photographic and radiographic records were excluded from the study (n=15). As a result, the experts provided consistent diagnoses for the remaining cases (n=200), which were considered RDs for the respective cases.

Each case description included a comprehensive summary of the patient's medical and dental history, intraoral photographs, a panoramic radiograph, a complete set of periapical radiographs and periodontal charting that encompassed various clinical measures related to periodontal health. The measures were plaque scores, probing depth, bleeding on probing, clinical attachment loss (CAL), furcation involvement (FI) and tooth mobility. The dental records of each patient included information regarding various aspects of their oral health, such as gingival bleeding, tooth mobility, dentin hypersensitivity, halitosis, family history of periodontitis, utilisation of interdental oral hygiene devices, usage of mouthwashes, presence of para-functional habits, chewing dysfunction, tooth migration, prior orthodontic treatment, previous periodontal treatment and previous prosthetic treatment. Moreover, the last dental examination and professional oral hygiene procedure (≤ 1 year, > 1 year or > 3 year) and the number of teeth lost due to periodontitis ($0, \leq 4$ or ≥ 5) were reported. Each patient's medical history contained details on pertinent medical issues, including glycaemic management and cigarette use. The entire documentation was compiled into a presentation file. This presentation file was evaluated together by four experts.

All radiographs were reviewed by the experts and re-evaluated until consensus was reached. For cases with radiographs available from five years prior, bone loss over the past five years was measured in millimetres. When previous radiographs were not available, the percentage of radiographic bone loss (RBL) was calculated. The four experts assessed the case phenotype in addition to RBL to determine indirect evidence of progression. This evaluation was classified into three categories: heavy biofilm deposits with low levels of destruction, where significant biofilm accumulation is present but associated tissue destruction is minimal; destruction commensurate with biofilm deposits, where the extent of tissue destruction is proportionate to the amount of biofilm present; and destruction that exceeds expectations given biofilm deposits, where observed tissue destruction surpasses what would be anticipated based on biofilm accumulation alone.

The performance of ChatGPT in staging, grading and determining the extent of periodontitis was evaluated using case descriptions. Since ChatGPT is a language model and cannot use images, the patients' radiographs were evaluated by the experts. The extent and rate of bone loss were measured and converted to numerical data that ChatGPT could use. Standardised texts containing the information used to determine the stage, grade and extent of periodontitis for each case were created.

For the purposes of this study, a ChatGPT account was created in September 2023. The current ChatGPT version was used. To minimise the impact of prior responses, a new chat window was used for each case. A standardised

text was created for every case in the ChatGPT query. It was then asked, "What is the stage, grade and extent of periodontitis?" The responses were recorded for later analysis.

The primary outcome was the level of agreement between the reference diagnoses (RDs) and the results obtained from ChatGPT. The secondary outcome was the effectiveness of each variable input to ChatGPT in determining the periodontitis stage and grade.

Results

The 200 cases analysed in this study comprised the full periodontitis spectrum. According to the analysis conducted by ChatGPT, out of a total of 200 instances, 78 cases (39%) were classified as stage I, 44 cases (22%) were classified as stage II, 74 cases (37%) were classified as stage III, and 4 cases (2%) were classified as stage IV. In relation to the grading system, 91 cases (46%) were classified as grade A, 85 cases (43%) were classified as grade B and 24 cases (12%) were classified as grade C. A total of 136 cases (68%) were classified as localised, while the remaining 64 cases (32%) were categorised as generalised.

ChatGPT correctly determined the stage in 59.5% of the cases, the grade in 50.5% of the cases and the extent of periodontitis in 84.0% of the cases. The levels of agreement between the RDs and ChatGPT's responses in terms of stage, grade and extent of periodontitis were determined. Moderate agreement was observed in terms of periodontitis stage (kappa of >0.4 to <0.6). Fair agreement was seen in terms of grade (kappa of >0.2 to <0.4). Regarding the extent, there was a substantial agreement (kappa of >0.6 to <0.8). ChatGPT used confident language consistently, even when incorrect (100%, 200 of 200).

The multiple correspondence analysis showed high variance (64.08%) between ChatGPT's stage, RD's stage and the variables affecting the periodontitis stage (CAL, PD and RBL). There was observed correspondence among RD's stage I, ChatGPT's stage I, 1-2mm CAL, PD of up to 4mm and RBL

below 15. A strong correspondence was seen among RD's stage II, ChatGPT's stage II, CAL of 3-4mm, PD of up to 5mm, and RBL between 15 and 30%. ChatGPT's stage IV, the number of teeth loss is five and above, ChatGPT's stage III, RD's Stage III, 5mm and above CAL, 6mm and above PD, RBL greater than 30% values were very close to each other. Additionally, they were located close to the point of origin. The variables and ChatGPT's stages III-IV exhibited a lack of clear distinction.

In the context of multiple correspondence analysis, the proportion of variation accounted for by the variables ChatGPT's grade, RD's grade, RBL/age, smoking and diabetes status, and the phenotype of destruction was found to be relatively low, namely 42.71%. It was observed that ChatGPT's grade B corresponds to DCB and $10 >$ cigarettes a day. There was correspondence among ChatGPT's Stage C, RD's Stage C, RBL/Age ratio of >1 , $10 \leq$ cigarettes a day and DEB but no correspondence was observed between ChatGPT's Grade A-B and RD's Grade A-B.

Conclusions

ChatGPT was better at diagnosing the extent and distribution of periodontitis impacted by a single component than the stage and grade influenced by numerous components and modifying variables. ChatGPT's periodontitis classification performance was reasonable, but future improvements are expected. Further research is required to fully comprehend its capabilities and limitations and to identify optimal approaches to their integration into clinical practice.

Implications for practice

AI technology is advancing rapidly and will certainly be useful as an adjunct for clinical diagnosis. However, the final responsibility still lies with the clinician in determining diagnosis and treatment decisions.

REFERENCE

1. Tastan Eroglu Z, Babayigit O, Ozkan Sen D, Ucan Yarkac F. Performance of ChatGPT in classifying periodontitis according to the 2018 classification of periodontal diseases. *Clinical Oral Investigations*. 2024 Jun 29;28(7):407

CPD questionnaire on page 346

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Mastering patient complaints: Effective strategies for dental practices – part two

SADJ JULY 2024, Vol. 79 No.6 P341-342

By Dr Jacobus Barnard, BChD (UP), MFGDP (UK), PDD (Impl.), PDD (CS) – Dental Mediator at SADA and Dr Tinesha Parbhoo, BChD (UP) – Head: Clinical Support at SADA

In the previous Ethical article on complaints featured in the June 2024 edition of the SADJ, we discussed the principles behind a complaints-handling procedure. In this edition, the reasons for patient complaints and the appropriate methods for handling them is addressed. It is further discussed how our behaviour can increase the risk of a patient complaint as well as the impact of useful communication skills in reducing and addressing patient complaints.

Reasons for patient complaints

Patients lodge complaints for a variety of reasons, influenced by their individual circumstances. The motivations behind these complaints typically fall into the following categories:

- 1. Need to be heard:** Many patients simply wish to express their frustrations and be acknowledged. Validating their experiences and showing empathy can significantly alleviate their distress and help restore the professional relationship.
- 2. Desire for information:** Patients often lack detailed knowledge about dentistry. Unanticipated post-operative complications can be perceived as adverse outcomes if they were not explained beforehand.
- 3. Expectation of an apology:** While healthcare professionals may be hesitant to apologise for fear of admitting fault, offering a sincere apology for the patient's negative experience can be a powerful gesture. It is crucial to differentiate between expressing regret and admitting liability.
- 4. Requirement for remedial action:** Taking corrective steps to address the issue can greatly appease an aggrieved patient.
- 5. Reassurance of preventive measures:** Patients often seek assurance that measures are being implemented to prevent recurrence of the problem.
- 6. Loss of confidence and financial recompense:** Some patients, having lost trust in their dentist, may seek a financial refund to pursue treatment elsewhere. A minority may demand financial compensation, which can be either justified or unrealistic.

Methods of receiving and handling complaints

Complaints may be conveyed via telephone, in writing or in person, and each mode requires a tailored response:

Complaints by telephone should ideally be met with a same day initial response by the complaints coordinator, the dentist or a senior member of staff. Try to give the patients an option: Would they like to make an appointment, have the dentist phone them back or come into the practice?

Complaints in writing should be acknowledged by return letter or e-mail, enclosing a copy of the written complaints procedure so that the patient knows what to expect. Many studies show that contacting the patient by telephone as soon as possible after the complaint is received establishes trust and indicates a commitment to resolving the complaint. Again, try to give the patient choices.

Complaints in person to the practice should be directed to the complaints coordinator, a dentist or a senior staff member. The availability of the coordinator or the dentist and the nature of the complaint will determine the best way forward. If it is not possible to spend sufficient time with the patient immediately, try to schedule the next contact with the patient as soon as possible. The sooner you make this time available, the better the chances of achieving a successful outcome.

Communication skills to reduce complaints

Understanding why competent dentists may receive more complaints than their peers involves examining communication behaviours. Studies have highlighted differences between doctors with high and low litigation risks (Haynes, 2007):

- **Low risk of litigation:**
 - Spend more time with patients.
 - Know personal details about their patients.
 - Possess strong communication and listening skills.
 - Respect patients' dignity, privacy and time.
 - Are polite but maintain professional boundaries.
- **High risk of litigation:**
 - Interactions appear rushed.
 - Exhibit poor listening and communication skills.
 - Lack personal connection with patients.
 - Fail to establish patients' expectations.
 - Are perceived as rude or indifferent.

By consciously improving our communication behaviours, we can significantly reduce the risk of complaints. Key areas include:

- **Nonverbal skills:** Up to 70% of communication is nonverbal. Our "body language" helps to reinforce or contradict verbal comments and tends to override our verbal communication if contradictory (Silverman and Kinnersley, 2010). Being mindful of our body posture, eye contact and facial expressions is important.

Healthcare providers can use several strategies to consciously improve nonverbal communication. For example:

- Smile and maintain appropriate eye contact without staring.

- Show genuine interest in what the patient is saying. Avoid tapping your fingers, gazing out the window, checking the clock, yawning or any other actions that might suggest boredom or impatience.
- Sit whenever possible and lean forward to demonstrate engagement. Avoid standing over the patient in a paternalistic manner.
- Nod your head to indicate active listening.
- Keep an open and relaxed posture, avoiding crossed arms or other gestures that might imply reluctance to listen, disapproval or judgment. Encourage the patient to share all relevant information.

Verbal skills: The tone and manner of speech are crucial. When dealing with complaints on the telephone, these skills become essential as your voice and tone contributes a great deal to the patient’s perception of you and your manner.

Listening skills: Healthcare practitioners may interrupt patients very early during consultations (Langewitz et al. 2002, Rhodes et al. 2004). Failure to listen may lead to the perception that the consultation was “rushed” or you are not interested. Active listening involves eye contact, not interrupting, nodding and recounting the patient’s story and their emotion back to them.

Benefits of effective communication

Effective communication in healthcare is vital for patient health and safety, offering several benefits:

Understanding patient needs: Comprehending patients’ perspectives, including their emotional states and individual requirements, is crucial for providing appropriate care.

Tracking and communicating changes: Clear, accurate communication is necessary to convey frequent changes in medications, procedures and administration, ensuring timely and proper patient care.

Creating synergy among healthcare teams: Flawless communication among healthcare professionals aligns staff members, reduces patient stress and increases efficiency.

Other benefits include:

Making personal connections: Building trust and compassion with patients and colleagues humanises healthcare providers and helps patients relax.

Cultural awareness: Open communication fosters understanding of diverse backgrounds, preventing awkward interactions.

Better patient satisfaction: Effective communication enhances patient satisfaction, decreases complaints and reduces readmissions.

CONCLUSION

Complaints are an inherent aspect of providing professional services. While they may initially seem like an affront or a threat, it is more constructive to view them as opportunities. Complaints can serve as a crucial feedback mechanism, highlighting areas for improvement and allowing healthcare professionals to address issues before they escalate to involve third parties.

A structured complaints procedure is essential in effectively managing and resolving most complaints. Such a procedure ensures that all complaints are handled consistently and fairly, providing a clear pathway for patients to express their concerns. This transparency and consistency helps to build trust and demonstrates a commitment to patient care and continuous improvement.

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.



RELIEVES CRAVINGS GIVING PATIENTS MORE POWER TO THEIR WILLPOWER*^{1,2}



*Data at 1 year and with adjunctive behavioural therapy



Reference: 1. Hartmann-Boyce J et al. Nicotine replacement therapy versus control for smoking cessation. 2018. 2. Tønnesen P, et al. Efficacy of a nicotine mouth spray

in smoking cessation. Feb 16-19th, 2011. ^{S1} Nicorette® Transdermal Patch 15 mg: Each patch contains nicotine equivalent to 1,75 mg per 1,0 cm². Content of nicotine per patch 23.62 mg.

Reg. No. 45/32.16/0953. ^{S0} Nicorette® Freshfruit 2 mg: Each piece contains nicotine-resin complex 20% 10,0 mg equivalent to 2 mg nicotine. Reg. No. A40/34/0565. ^{S1} Nicorette® Quickmist: Contains

nicotine (1 mg/spray). Sugar free. Contains sweeteners (0,1 mg sucralose and 0,1 mg acesulfame potassium/spray). Reg. No. 50/32.16/0547. For full prescribing information, refer to the Professional

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Requires willpower. ZA-NI-2300009.

MAXILLOFACIAL RADIOLOGY

Simple bone cyst

SADJ JULY 2024, Vol. 79 No.6 P338-339

J Simpson¹, S Indermun²

CASE

A 15-year-old male presented to the dental clinic after noticing a mild swelling in his lower jaw. Radiographic examination (Figure 1) revealed a well-defined, non-corticated, unilocular radiolucency with scalloped margins in the anterior mandibular symphyseal region. Notably, no root resorption or displacement was noted on this view. All associated teeth were vital, and the patient had no history of trauma. During surgical exploration, no cystic lining was discovered in the lesion; instead, a bony wall was present. Histological examination showed small fragments of viable bone, some of which were covered by a thin fibrovascular lining. No epithelial lining was observed in the examined sections.



Figure 1: Panoramic radiograph

INTERPRETATION

A simple bone cyst (SBC), also known as a solitary bone cyst or traumatic bone cyst, is a lesion surrounded by a bony wall without an epithelial lining.¹ As a result, SBCs are classified as pseudocysts and are typically empty or filled with blood, serum or a serohaematic fluid.²

Typically, SBCs occur in the metaphyseal region of long bones but can also appear in the maxillofacial region, most commonly in the mandible.¹ Most of these lesions in the jaws are found in the body of the mandible, between the canine and third molar, followed by the mandibular symphysis region.³

Authors' information

1. J Simpson, BDS, PgDip, MSc (Oral and Maxillofacial Radiology), Department of Craniofacial Biology, Pathology & Radiology, Faculty of Dentistry, University of the Western Cape, South Africa ORCID: 0009-0009-6757-6577
2. S Indermun, BDS, PgDip, MSc (Oral and Maxillofacial Radiology), Department of Craniofacial Biology, Pathology & Radiology, Faculty of Dentistry, University of the Western Cape, South Africa ORCID: 0000-0001-6954-0281

Corresponding Author

Name: J Simpson
Email: jasimpson@uwc.ac.za

Author's contribution

J Simpson – 80%
S Indermun – 20%

ymptomatic and are discovered incidentally on panoramic radiographs.¹ However, some patients may experience symptoms such as pain, paraesthesia, cortical expansion, failure of permanent teeth to erupt, pathological fractures and displacement of the inferior alveolar nerve canal.³ The current case corresponds to reported literature, as these lesions typically occur in young individuals, in the first and second decades of life, with a male-to-female ratio of 2:1.³

Radiographically, SBCs appear as well-defined radiolucencies with sharp to irregular margins. A characteristic feature is the scalloping of the superior border of the lesion between the roots of teeth. The differential diagnosis includes odontogenic keratocyst, central giant cell granuloma, glandular odontogenic cyst, ameloblastoma and odontogenic myxoma.⁴ Microscopically, the cystic wall is composed of a connective tissue membrane packed with numerous collagen fibres and lacks an epithelial lining. Occasionally, numerous fibroblasts and giant cell-like osteoclasts may be present, along with newly formed trabecular bone encircled by osteoblasts.² Haemorrhage and hemosiderin pigment may often present within the lesion.¹

The pathogenesis of SBCs is not well understood but is believed to be a reactive lesion rather than a true bone

neoplasm.²⁻⁵ Several theories have been postulated including cystic degeneration of fibro-osseous lesions, alteration of bony metabolism and low level of infection. The most widely accepted theory suggests that following trauma, the blood clot is resorbed, resulting in the destruction of the surrounding bone by enzymatic activity, thereby causing enlargement of the bone cavity.⁴

Surgical exploration and curettage of the bony walls has been the most widely recommended treatment for SBC.⁴ This process allows for the induction of osseous neoformation while simultaneously preserving vital structures. Most patients obtain total healing in the region of the bone defect within three months, but others may possibly require more than six months to achieve the same bone healing status.⁶ Therefore, regular follow-up is mandatory. The prognosis is usually good and recurrence is rare.²⁻⁵

AUTHORS' DECLARATION

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethics approval

According to the University of the Western Cape Biomedical Research Ethics Committee, ethics review was not warranted for this case report.

REFERENCES

1. Suomalainen A, Apajalahti S, Kuhlefelt M, Hagström J. Simple bone cyst: A radiological dilemma. *Dentomaxillofacial Radiol.* 2009;38(3):174-7
2. Harnet JC, Lombardi T, Klewansky P, Rieger J, Tempe MH, Clavert JM. Solitary Bone Cyst of the Jaws: A Review of the Etiopathogenic Hypotheses. *J Oral Maxillofac Surg.* 2008;66(11):2345-8
3. Babu HS C, Rai B Das, Nair MA, Astekar MS. Simple Bone Cyst of Mandible Mimicking Periapical Cyst. *Clin Pract.* 2012;2(3):e59
4. Razmara F, Ghoncheh Z, Shabankare G. Traumatic bone cyst of mandible: A case series. *J Med Case Rep.* 2019;13(1):1-8
5. Madiraju GS, Yallamraju SR, Rajendran V, Srinivasa Rao K. Solitary bone cyst of the mandible: A case report and brief review of literature. *BMJ Case Rep.* 2014;2013-5
6. Lima LB, de Freitas Filho SA, Barbosa de Paulo LF, Servato JP, Rosa RR, Faria PR, Loyola AM, Cardoso SV. Simple bone cyst: description of 60 cases seen at a Brazilian School of Dentistry and review of international literature. *Med Oral Patol Oral Cir Bucal.* 2020;25(5):e616-e625

Online CPD in 6 Easy Steps



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CPD questionnaire



An analysis of complaints against dentists made to the HPCSA: 2009-2023

1. Select the **CORRECT** objective. What were the objectives of the study mentioned in the article?
 - A. To describe common dental procedures
 - B. To analyze the incidence types and consequences of professional misconduct complaints against South African dentists from 2009-2023
 - C. To improve dental equipment standards
 - D. To investigate new dental treatments
2. Which is the **CORRECT** category. Which category had the highest percentage of complaints against dentists according to the study?
 - A. Fraud
 - B. Clinical negligence
 - C. Unethical advertising
 - D. Employing unregistered personnel
3. Select the **CORRECT** answer. What percentage of dentists received fines as penalties for their misconduct?
 - A. 24%
 - B. 53%
 - C. 18%
 - D. 16%
4. Which option is **CORRECT**. Which method was primarily used to gather data for the study?
 - A. Surveys
 - B. Interviews
 - C. Analysis of publicly available HPCSA records
 - D. Experimental trials

Health Seeking Behavior of Oral Cancer Patients in Botswana: A Qualitative Study

5. Select the **CORRECT** reason. One of the reasons why most patients present with advanced stage oral cancer is
 - A. The concealing nature of oral cancer.
 - B. It is not curable
 - C. It is always in hidden areas
 - D. It is difficult to diagnose
6. Which of the following statements is **CORRECT**. Health seeking behavior of oral cancer patients can be improved through the following means?
 - A. By improving access to information and awareness about oral cancer to the public.
 - B. Involving nurses and general practitioners in oral cancer education so that they can guide the patients better.
 - C. Consider involving traditional healers in cases like these as they have shown to be in the pathway of seeking improved health so that they can advise patients appropriately.
 - D. A and B
 - E. All of the above

Oral Presentation of Haematological Disease: Part II – Iron Deficiency Anaemia

7. Choose the **CORRECT** answer. Because of continuous losses of iron, iron has to be absorbed from the diet. Please select the **incorrect** statement:
 - A. Our diets contain more haem than elemental iron.
 - B. Haem iron is the most bioavailable.
 - C. Vitamin C increases the absorption of ferric iron.
 - D. Tea reduces iron absorption by forming insoluble iron-tannate complexes.
8. Which of the following is **INCORRECT**. Iron deficiency anaemia (IDA), presents with various clinical features. Please select the **incorrect** statement:
 - A. Classic features of anaemia, such as fatigue, are the first to appear because of the reduced oxygen-carrying capacity of the blood.
 - B. The burning tongue sensation that patients experience in IDA is mostly due to *Candida* infection.
 - C. Recurrent aphthous ulceration may also be seen in other haematinic deficiencies but is the most common in iron deficiency.
 - D. Angular cheilitis may also appear independent of infective aetiologies such as *Candida* or *Staph. Aureus* infection.
9. Choose the **CORRECT** answer. In the treatment of iron deficiency anaemia:
 - A. Ferrous salts should be taken with Vitamin C-rich foods to increase absorption.
 - B. Compliance may be limited by gastrointestinal side effects, such as nausea and constipation.
 - C. Absorption of iron will be increased if higher doses are given daily.
 - D. Serum ferritin should be monitored to measure the success of treatment.

Dentigerous cyst of inflammatory origin: A case report

10. Choose the **CORRECT** option. Which one of the following lesions represents a developmental odontogenic cyst?
 - A. Dentigerous cyst of inflammatory origin
 - B. Follicular variant of odontogenic keratocyst
 - C. Radicular cyst
 - D. Inflammatory collateral cyst
 - E. Adenomatoid odontogenic tumour
11. Select the **CORRECT** feature. Features specific for a dentigerous cyst include which one of the following?
 - A. Predilection for the mandible
 - B. Occurrence in the first and second decades
 - C. Attachment of cyst at the CEJ
 - D. Male predisposition
 - E. Association with impacted teeth

12. Which answer is CORRECT. Dentigerous cysts of inflammatory origin may develop because of which one of the following conditions.

- A. Stimulus by the inflammatory exudate associated with a carious primary tooth.
- B. Inflammatory cytokines which stimulate the cell rests of Malassez.
- C. Stimulation of the cell rests of Serres by inflammation.
- D. Fluid ingress between the REE and the crown of a tooth due to crowding.
- E. A sporadic genetic event which is not associated with any form of syndrome.

13. Select the CORRECT answer. The clinical differential diagnosis of a dentigerous cyst of inflammatory origin includes which one of the following?

- A. Lateral periodontal cyst
- B. Gorlin-Goltz syndrome
- C. Solid / multicystic ameloblastoma
- D. Radicular cyst
- E. Adenomatoid odontogenic tumour

Radiology Corner: Simple bone cyst

14. Select the CORRECT statement. Which of the following best describes a simple bone cyst (SBC)?

- A. A fluid-filled or empty lesion with an epithelial lining.
- B. A lesion with a bony wall and an epithelial lining.
- C. A lesion surrounded by a bony wall without an epithelial lining.
- D. A solid lesion with no fluid content.

15. Which option is CORRECT. What is a characteristic radiographic feature of SBCs?

- A. Mixed radiopaque-radiolucent appearance with irregular margins.
- B. Well-defined radiolucency with sharp to irregular margins and scalloping between roots of teeth.
- C. Uniform radiopacity with ill-defined margins.
- D. Solid radiopaque appearance with sharp borders and scalloping between roots of teeth.

16. Select the correct answer. Where do SBCs most commonly occur in the maxillofacial region?

- A. Anterior maxilla, between the canines
- B. Mandibular condyle
- C. Body of the mandible, between the canine and third molar
- D. Mandibular ramus

17. Select the CORRECT option. Which decade of life is most frequently affected by SBCs?

- A. The 2nd - 3rd decade of life
- B. The 3rd - 4th decade of life
- C. The 1st - 4th decade of life
- D. The 1st - 2nd decade of life

Evidence-based Dentistry

18. Select the INCORRECT option. Conventional techniques for manufacturing dentures does not include which of the following:-

- A. Taking impressions using special trays
- B. Scanning the mouth to obtain a digital image
- C. Bite registration
- D. Try-in stage

E. Checking the occlusion

19. Which option is CORRECT. In the Bento et al study, which of the following denture cleansers reduced the quantity of Candida albicans by 100%

- A. Non-abrasive toothpaste
- B. 0.5% NaOCl
- C. Listerine
- D. Effervescent tablets

20. Select the CORRECT answer. Which of the following type of denture was the most impacted in terms of their mechanical properties when exposed to denture cleansers

- A. Conventional denture
- B. CAD/CAM milled denture
- C. 3D printed denture
- D. All denture types were equally impacted

Ethics: Mastering patient complaints: effective strategies for dental practices – part two

21. Select the CORRECT answer. What is one of the primary reasons patients lodge complaints according to the article?

- A. To obtain free dental services
- B. To express their frustrations and be acknowledged
- C. To switch dental practices
- D. To get a second opinion on their treatment

22. Which of the following is CORRECT. What should a dentist or staff member do when receiving a complaint by telephone?

- A. Refer the patient to another dental practice
- B. Schedule the patient for an appointment a month later
- C. Offer the patient options like making an appointment, having the dentist call back, or coming into the practice
- D. Ignore the complaint and continue with their work

23. Choose the CORRECT option. According to the article, what type of communication skill is crucial when dealing with complaints over the phone?

- A. Nonverbal communication
- B. Written communication
- C. Listening skills
- D. Technical skills

24. Select the CORRECT statement. Which of the following behaviours is associated with healthcare professionals who have a low risk of litigation?

- A. Rushing through patient interactions
- B. Maintaining strong communication and listening skills
- C. Avoiding personal details about patients
- D. Displaying indifference to patients' concerns

25. Which answer is CORRECT. What is a recommended nonverbal communication strategy to show engagement during a patient consultation?

- A. Checking the clock frequently
- B. Standing over the patient
- C. Leaning forward and nodding
- D. Crossing arms and tapping fingers

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2. Drafting the work or revising it critically for important intellectual content, AND
3. Final approval of the version to be published, AND
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved (www.icmje.org).
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2

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3

Have you provided all author information including first names, affiliations, qualifications, positions held, Department and Institution, ORCID number, contact details?
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4

Is the first author under the age of 35 on submission of the article?
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5

Have you provided all details of the Communicating Author?
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Have you submitted questions for the CPD section? (four or five multiple choice, one correct answer)?
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Have you submitted details of the contribution of each author... can be percentage or descriptive... or both?
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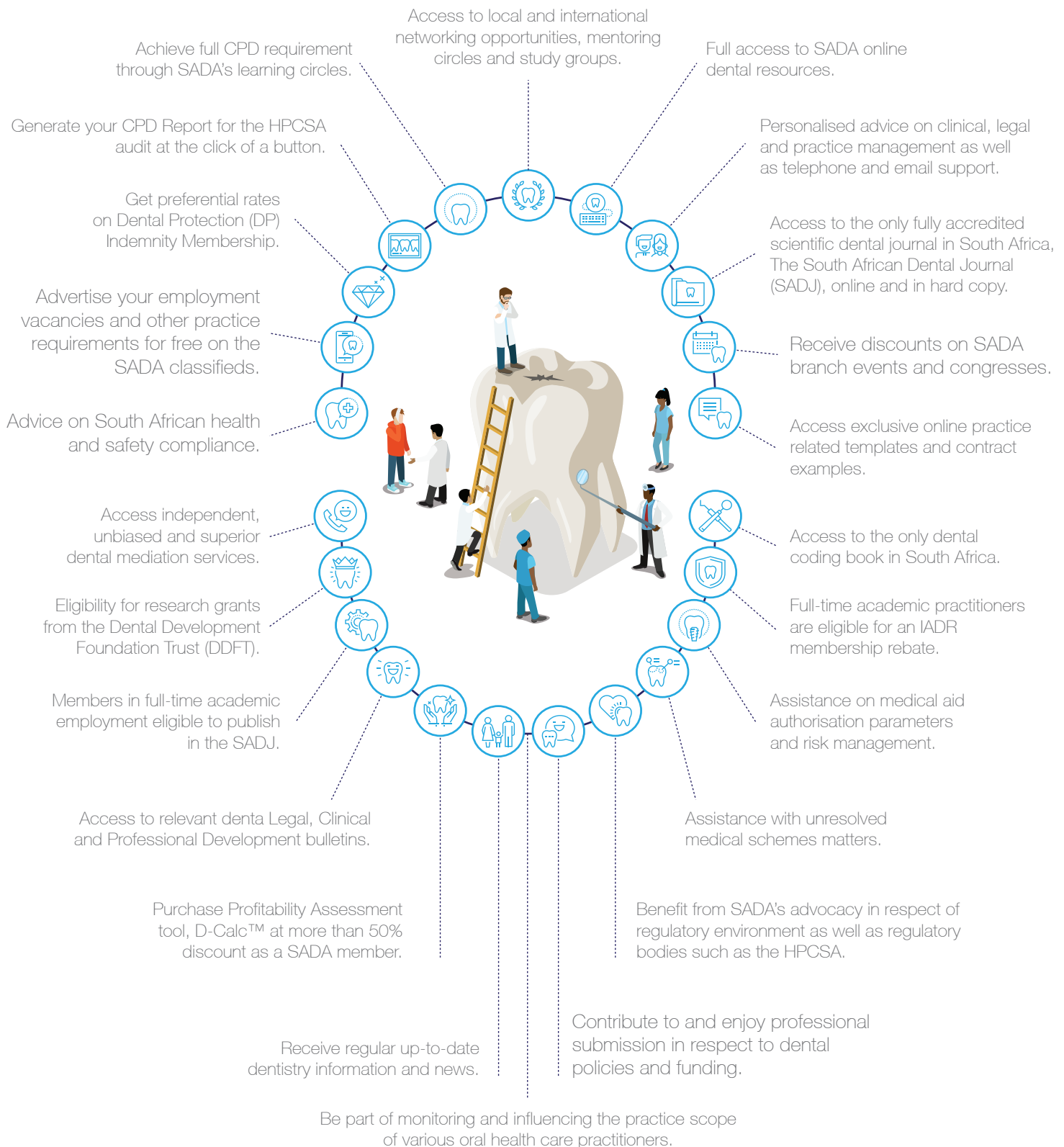
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