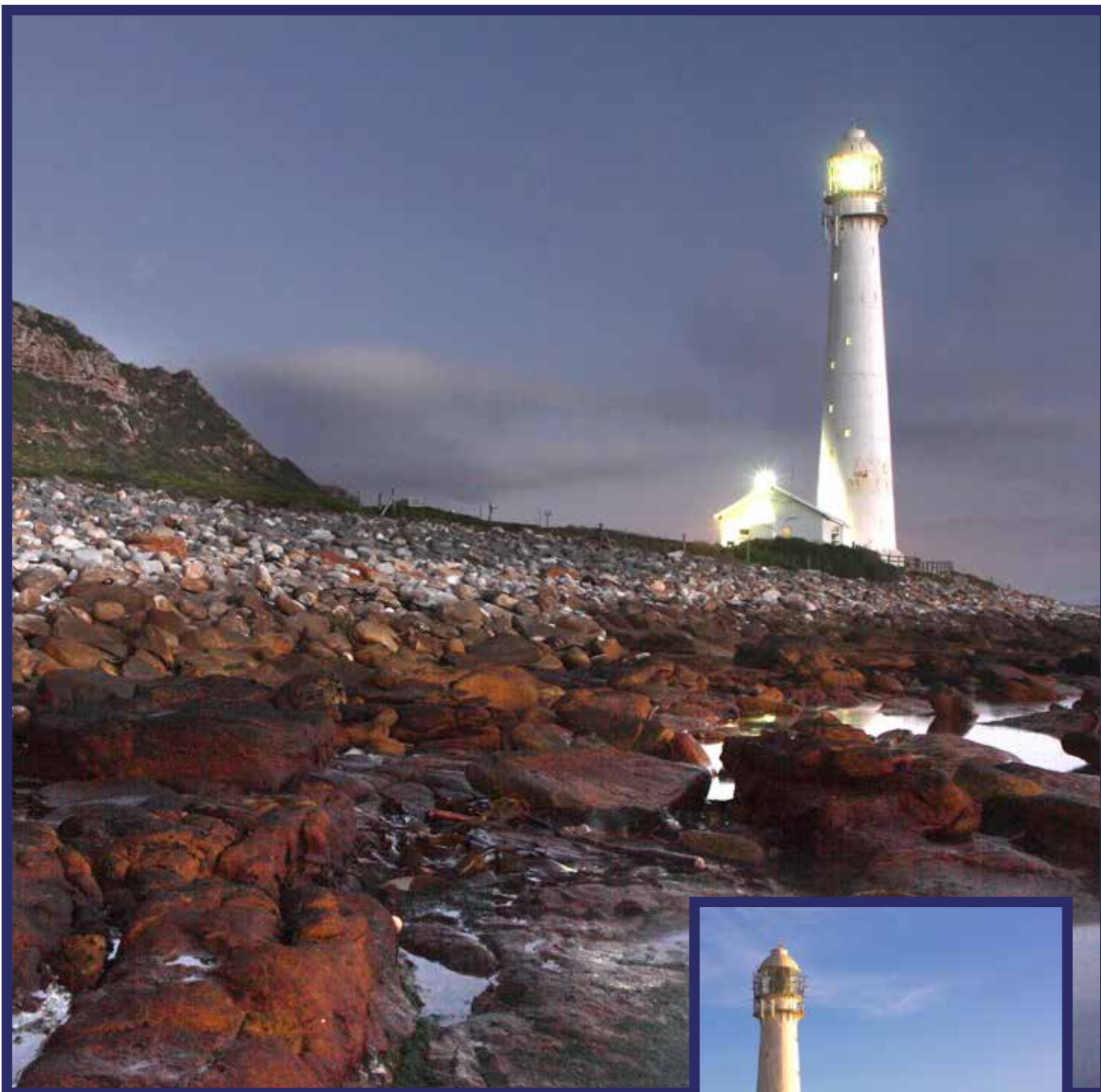


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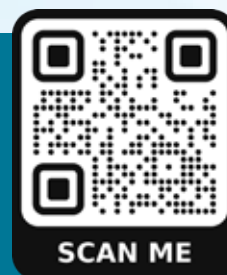
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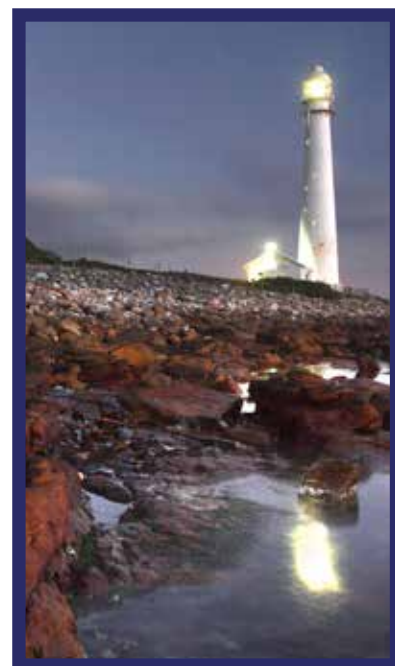
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Out of sight, out of care: The marginalisation of oral health in public policy

SADJ APRIL 2025, Vol. 80 No.3 P125-P127

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

When the mouth disappears, so does the patient

There is a strange quiet around oral health in South Africa: a kind of silence not born of irrelevance, but of omission. While the country mobilises around universal health coverage, builds policy frameworks for noncommunicable diseases and reimagines access to care, one part of the body continues to be left behind – the mouth.

It is a disappearance that is subtle, systemic and dangerous. Oral health is scarcely mentioned in national policy debates, barely represented in funding streams and routinely overlooked in health planning and reporting. Despite the mounting evidence that oral diseases are widespread, interconnected with systemic illness and deeply inequitable in their distribution, the mouth remains invisible in the very spaces where health priorities are defined.

This editorial is not a complaint, it is a call to clarity. It does not seek blame, but insight. We ask: How did we allow this erasure to happen? And, more urgently: How do we correct course before the cost becomes irreversible, not only for the dental profession but for the patients we are failing to serve?

What follows is not just a critique of policy, it is a differential diagnosis of collective blind spots, and a set of evidence-informed, practical actions to reposition oral health where it belongs – at the centre of care, within the broader story of health in South Africa.

The mouth is not a luxury. It is not optional. It is health, full stop.

The disappearing mouth: a metaphor for systemic blind spots

In the story of health in South Africa, the mouth has quietly disappeared. It is neither centre stage in policy discussions, nor given a meaningful line in the national script for health priorities. Yet its absence speaks volumes.

Oral health, unlike many other areas of healthcare, suffers not from lack of relevance, but from lack of recognition. It is a silent contributor to suffering, to school absenteeism, to avoidable hospital visits and to diminished quality of life. And while it is intimately linked to chronic conditions such as diabetes, cardiovascular disease and HIV/AIDS, it remains largely invisible in the design and delivery of health services.

As mentioned, this editorial is not a protest, but rather it is a provocation. It is an invitation to reflect on why oral health continues to fall through the cracks of policy, practice and planning. We ask not merely whether oral diseases are prevalent (they are) but why the institutional response has been so muted, and what this says about the way we define health in the South African context. The mouth may have disappeared from our policies, but it has not disappeared

from our people. And if we are to build a truly integrated and equitable health system, it is time to bring it back into focus.

The forgotten front line: the real burden of oral diseases in South Africa

Oral diseases are neither rare nor benign. Globally, untreated dental caries in permanent teeth is the most common health condition, affecting an estimated 2.5 billion people. In South Africa, the situation is no less concerning, yet the data to quantify the full extent is outdated or absent. The last national oral health survey was conducted more than two decades ago (1999-2002),¹ and efforts to repeat it have not come to fruition, despite calls from both professional bodies and public health experts.

What we do know comes from regional and smaller-scale studies, which continue to reveal unacceptably high levels of dental decay and periodontal disease, especially in underserved populations: A 2023 study in Gauteng reported that more than 40% of school-aged children presented with untreated dental caries, leading to pain, absenteeism and disrupted learning.²

Periodontal disease remains highly prevalent among adults, with data from the South African Demographic and Health Survey indicating a growing burden of severe periodontitis, particularly in males and older populations. In communities with limited access to dental services, advanced oral infections – including those related to HIV, TB and poorly controlled diabetes – go undiagnosed, reinforcing health disparities.

These are not just dental problems; they are public health failures. Untreated oral diseases lead to difficulty eating and speaking, poor self-image, chronic infection and, in some cases, life-threatening complications. The cost of neglect is borne in the form of reduced productivity, impaired school performance and preventable hospitalisations. Yet oral health continues to be framed as a peripheral concern, if not omitted altogether, in national health policy.

The truth is that the burden of oral disease in South Africa is significant, predictable and largely preventable. But without comprehensive, up-to-date national data, and without systemic acknowledgment of the issue, oral diseases remain on the margins of both research and response. To speak of a disappearing mouth is not metaphor alone. It reflects a very real epidemiological gap: a health burden so widespread that it becomes invisible, because we have not chosen to see it clearly.

Not in the room: the downgrading of oral health from national policy agendas

In the architecture of South Africa's health policy, oral health remains an afterthought, if it appears at all. While the country has made commendable progress in building a more

equitable and integrated health system, oral health has too often been excluded from the rooms where decisions are made.

Nowhere is this more evident than in the National Health Insurance (NHI) Bill, the centerpiece of South Africa's push towards universal health coverage. Despite strong rhetoric around equity and accessibility, the bill makes only cursory mention of oral health, with little indication of how dental services will be integrated into primary care packages or funded sustainably across provinces. Without a defined oral health benefit, and with no clear roadmap for human resources or infrastructure investment, dental services risk being deprioritised in both planning and budgeting processes once the NHI is implemented.

The same absence is reflected in broader noncommunicable disease (NCD) strategies, where oral health, though inextricably linked to diabetes, cardiovascular disease and cancers, is often omitted from national frameworks and surveillance systems. Even within the Integrated School Health Policy, dental care features more as a footnote than a core pillar of child health.

This omission is not accidental; it is structural. For years, oral health has lacked formal representation at high-level planning tables, with few select dental professionals involved in national or provincial health strategy forums. The underrepresentation of oral health in governance means that critical decisions about resource allocation, workforce development and service delivery models are often made without considering their impact on the dental profession or the patients it serves.

It is not that oral health has no place in the system – it simply hasn't been invited in. And when health priorities are shaped without its input, the result is a slow erosion of relevance: budget lines shrink, registrar posts disappear, school programmes are cancelled and clinic shelves run empty.

I do not suggest that this is the result of malice or disregard. Rather, it reflects a system that has not yet come to see the mouth as integral to the body, and oral health as inseparable from general health. If we are to change this, the dental profession must not wait to be invited, we must step forward and claim our seat at the table, armed with evidence, policy fluency and the will to lead.

Symptoms of neglect: service, workforce and system failures

When oral health is not prioritised in policy, the symptoms manifest everywhere, in our clinics, in our classrooms and in our communities.

Across South Africa, dental professionals report frequent stock-outs of basic materials, including local anaesthetic, gloves and impression materials. Dental chairs, if even installed on site, sit idle for months awaiting repair, and sterilisation equipment often functions well beyond its safe operational lifespan. Oral health services may even be informally suspended in some public clinics to redirect limited resources elsewhere, leaving patients with pain, infection and few options.

At a systemic level, the picture becomes more concerning. Sessional and periodical contracts, once the backbone of clinical teaching and service delivery, are increasingly

vulnerable to cost-cutting measures. Without these part-time clinician-teachers, dental schools cannot provide adequate clinical supervision. Students will then be forced to extend sharing of clinical sessions, further limiting their hands-on exposure and undermining the competency-based goals of their training.

Meanwhile, registrar posts in critical disciplines remain empty (for whatever reasons given), as we silently fall behind in specialist succession planning. Without a pipeline of trained academics and specialists, the burden shifts onto a shrinking cohort of overextended faculty, most of whom already wear the triple hats of clinician, educator and administrator. The system is not only overburdened; it is becoming structurally unsustainable.

At the community level, outreach programmes, once proudly integrated into school health and mobile services, have become patchy or nonexistent in many provinces. This regression is not only a missed opportunity for prevention and early intervention; it is a breach in the continuum of care that disproportionately harms children, the elderly and rural populations. Where such services persist, they do so despite policy support, not because of it, driven by local champions rather than systemic commitment.

These are not isolated frustrations, they are the predictable outcomes of a system that has not made oral health a priority. And they demand a national conversation not only about funding, but about values. What does it mean to speak of equity, prevention and access, while whole disciplines and service lines fade into the background? South Africa does not lack the clinical skill, professional commitment or some of the training infrastructure to deliver excellent oral healthcare. What it lacks is the policy recognition and system-level support to match the reality on the ground.

A mouth that connects: making the case for oral health as a multisectoral interface

The mouth is not an isolated structure – it is a mirror of systemic health and a gateway to broader disease. It speaks not only in words, but in lesions, inflammation and microbial shifts that often reveal what the rest of the body conceals. And yet, oral health remains siloed from the rest of the healthcare system, both in how we train and in how we treat, and perhaps how we are treated.

We can no longer afford to view oral healthcare as a standalone service. The evidence is clear: oral conditions are deeply intertwined with chronic illnesses such as diabetes, HIV/AIDS, cardiovascular disease and even adverse pregnancy outcomes. Periodontitis has been identified as a risk marker and modifiable factor in several systemic diseases. Oral lesions are often the first clinical signs of immunosuppression or systemic infection. In oncology, oral medicine specialists play an essential role in managing the oral toxicities of chemotherapy and radiotherapy, yet few are available in public sector settings.

Despite this, oral health professionals are still rarely integrated into interdisciplinary healthcare teams, and dental considerations are often omitted from clinical care pathways and referral systems. This gap not only undermines holistic patient care, it also represents a missed opportunity to prevent, detect and manage systemic conditions earlier and more effectively.

Reimagining oral health as a multisectoral interface opens the door to a new kind of relevance. It positions dental professionals as key contributors to team-based care, to early detection and to the management of shared risk factors across conditions. It invites stronger partnerships between oral health and primary care, infectious disease, maternal health, endocrinology, oncology, dermatology, pediatrics and geriatrics. It also calls on the dental profession itself to step into these spaces, not as guests, but as partners in the design and delivery of integrated health.

Training must reflect this shift. Dental students and specialists must be exposed to interdisciplinary education and practice. Public health policies must embed oral health into national screening, referral and chronic care frameworks. And, most importantly, healthcare administrators and policymakers must see oral health not as an adjunct, but as an amplifier of public health outcomes.

In an era where systems-thinking is rightly celebrated, we must ask: how can we claim to be integrated if the mouth remains disconnected?

Toward reclaiming the mouth: five calls to action

The road to reintegrating oral health into South Africa's health agenda is not without obstacles, but it is navigable. What is needed now is not more rhetoric, but deliberate and coordinated action, rooted in shared responsibility across disciplines, institutions and levels of government.

These five calls to action offer a starting point:

1. Put oral health in the room

Oral health must be formally included in strategic health decision-making bodies, from NHI steering committees to national NCD task teams and school health implementation groups. The absence of dental professionals from high-level planning structures leads to blind spots in policy and underinvestment in services. Inclusion is not symbolic, it is structural. Let oral health professionals shape the policies that govern them.

2. Fund the data

South Africa urgently needs a new national oral health survey, not just to understand the scope of disease but to inform resource allocation, workforce planning and service design. Without contemporary, disaggregated data, oral health remains an invisible burden. Funding must be prioritised to support routine oral epidemiological surveillance, integrated with existing NCD and primary care data systems. What we do not measure, we will not manage.

3. Train for tomorrow

We must invest in a future-ready oral health workforce. This includes restoring and protecting registrar posts in all specialties, enabling structured postgraduate training in the public sector. It also requires better utilisation of oral hygienists and dental therapists, whose roles in prevention, education and community-based care are underleveraged. Without training today, we will have no teachers, or clinicians, tomorrow.

4. Engage the community

The decline of outreach services and school-based oral health programmes is not just a loss of service, it's a missed opportunity for prevention, education and equity. Provinces must reinstate these programmes and grow existing ones

further, supported by public-private partnerships and integrated with nutrition, hygiene and health literacy initiatives. Prevention is not a luxury, it is a necessity, especially for those with the least access.

5. Protect the pipeline

The stability of oral health training platforms, especially dental faculties embedded in public sector service models, must be safeguarded. These institutions are essential for producing competent practitioners, delivering care and generating research. National and provincial departments must collaborate to ensure these platforms are adequately staffed, resourced and retained. We cannot expect a pipeline to produce anything if we allow the source to run dry.

These actions are not radical. They are reasonable, feasible and overdue. More importantly, they reflect a shift in mindset, from treating oral health as a peripheral service to recognising it as a core component of public health.

Reclaiming what has been lost

The silence around oral health in South African policy is not benign. It is the quiet erosion of something vital: our ability to care holistically, equitably and responsibly for those who rely on the public health system. And like all things left unattended, it will not fix itself. The longer we wait to respond, the more invisible the problem becomes, until the mouth, and all it represents, vanishes from view entirely.

But the disappearance of oral health from our national priorities is not inevitable. It is the result of choices, of what we measure, fund, staff and elevate. And that means it can be reversed. We can choose to recentre oral health. We can choose to speak of it not in isolation, but as integral to dignity, nutrition, learning, chronic disease management and quality of life. We can choose to train, to serve, to lead.

There is no shortage of skill, passion or purpose within the dental profession. What is lacking is the systemic recognition that oral health is not a peripheral concern, but a public health necessity. It is time for policymakers to acknowledge this truth, not as a courtesy to the profession, but as a duty to the people. Because when oral health disappears from our planning tables, it disappears from our patients' lives. Their pain does not vanish. Their infection does not wait. Their dignity does not pause until a policy shift arrives. And their trust in a health system that sees everything but their mouth begins to fade.

The question, then, is not whether we can act. It is whether we are prepared to live with the consequences if we do not.

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Understanding patient expectations: Key factors that drive patient loyalty and referrals in dentistry

SADJ APRIL 2025, Vol. 80 No.3 P128-129

Mr KC Makhubele – CEO, South African Dental Association

In today's competitive dental landscape, understanding what patients truly want is essential to building a successful, patient-centred practice. Patients now have more options than ever, and they're often seeking not just expert clinical care but a positive, holistic experience that meets their personal and practical needs. For dental practitioners, fulfilling these expectations can lead to higher patient satisfaction, stronger loyalty and valuable word-of-mouth referrals. Here are the key factors that influence patients to choose, return to and refer friends and family to their dental practitioner.

1. Transparent and clear communication

Patients are looking for transparency in both treatment options and costs. They want a practitioner who takes the time to explain procedures, answer questions and discuss potential outcomes. By fostering open and clear communication, practitioners can help patients feel more comfortable and confident in their choices.

Treatment explanations: Patients appreciate when dentists explain treatment options thoroughly, including the benefits, risks and alternatives. Breaking down complex dental jargon into understandable language can make a significant difference.

Cost transparency: Discussing costs upfront and being transparent about fees can help prevent misunderstandings

and financial anxiety. Clear communication about costs builds trust and reassures patients that they won't face unexpected expenses.

Follow-up support: Aftercare instructions and follow-up calls after significant treatments show patients that their health is a priority even after they leave the clinic. Patients value this level of attentiveness and care, which makes them more likely to return.

2. Personalised care and comfort

Patients are increasingly drawn to practices that offer a personalised, comfortable experience. This begins from the moment they enter the clinic and includes everything from the waiting room atmosphere to the attentiveness of the practitioner and staff.

Gentle and attentive care: Many patients have a fear of the dentist, so a gentle approach and sensitivity to patient discomfort is crucial. Practitioners who check in with patients during procedures and adjust their approach based on feedback are likely to be appreciated.

Individual attention: Personalised care, such as remembering a patient's preferences or following up on personal details shared in prior visits, helps patients feel valued and respected. Building this rapport can make the experience less clinical and more welcoming.



Anxiety reduction techniques: For patients with dental anxiety, offering options such as relaxation techniques, noise-cancelling headphones or even sedation can help them feel more at ease. Creating an environment that addresses patient comfort is a powerful differentiator in dental care.

3. Efficient appointment scheduling and minimal wait times

Busy patients value a practice that respects their time. Long wait times, difficulty scheduling appointments or unresponsive customer service are some of the most common reasons patients may leave a practice. Streamlined appointment processes can make a big difference.

Easy booking and appointment reminders: Online booking options and reminders via text or email make it convenient for patients to schedule and remember appointments. These options also reduce the likelihood of missed appointments.

Efficient time management: Minimising wait times in the clinic demonstrates respect for patients' schedules. If delays are unavoidable, informing patients ahead of time and giving them options can help alleviate frustration.

Flexible scheduling options: Offering flexible scheduling, including early morning, late evening or weekend appointments, can cater to patients with busy lives, making it easier for them to prioritise dental care.

4. High standards of cleanliness and infection control

Infection control and cleanliness are non-negotiable for most patients, especially in light of recent global health events. A clean, sanitary environment instils confidence and trust.

Visible hygiene practices: Patients feel reassured when they see hygienic practices in action, such as regular disinfection of surfaces, the use of protective gear and visibly clean instruments.

Covid-19 protocols: Adhering to Covid-19 safety protocols, such as wearing masks, providing hand sanitiser and social distancing in waiting areas, can help alleviate patient concerns and show commitment to their safety.

Consistent standards: Patients notice inconsistencies, so maintaining a high standard of cleanliness at all times is essential. Regularly communicating your practice's sanitation measures can reinforce patient trust.

5. A warm, welcoming environment

Patients who feel welcomed by friendly, empathetic staff are more likely to return. The atmosphere of the clinic, from the front desk to the dental chair, plays a significant role in shaping the patient's experience.

Professional and friendly staff: The attitude and demeanour of the staff, from the receptionist to the hygienist, can leave a lasting impression. Patients appreciate kindness, empathy and professionalism in every interaction.

Patient comfort amenities: Small touches such as a well-appointed waiting room with comfortable seating, soothing music or refreshments can make patients feel more relaxed and comfortable.

Empathy and patience: Patients can often feel nervous or self-conscious about their dental issues, so empathetic listening and a nonjudgmental approach can create a positive experience that encourages them to return.

6. Emphasis on preventive care and patient education

Patients are increasingly interested in learning how to maintain their oral health proactively. They value practitioners who educate them on preventive care and support them in making informed decisions about their dental health.

Preventive care plans: By offering preventive care plans or check-up reminders, practitioners can emphasise the importance of ongoing oral health, which benefits the patient and creates a steady flow of repeat visits.

Educational resources: Providing educational materials – such as brochures, blogs or videos on common dental topics – can empower patients and show that the practice cares about their overall wellbeing.

Encouraging healthy habits: Engaging patients with advice on brushing, flossing and other preventive measures helps them feel more in control of their health and shows that the practice is committed to long-term patient care, not just short-term treatments.

7. Leveraging patient feedback for continuous improvement

Inviting and acting on patient feedback can drive continuous improvement and demonstrate a commitment to quality care. Many patients appreciate a practice that listens to their suggestions and works to make improvements based on them.

Patient satisfaction surveys: Sending out post-appointment surveys or follow-up emails to collect feedback gives patients a chance to share their opinions and shows that their experiences are valued.

Online reviews and testimonials: Encouraging satisfied patients to leave positive online reviews can boost the practice's reputation and attract new patients. Responding to reviews, both positive and negative, with professionalism shows dedication to patient satisfaction.

Adapting based on feedback: Implementing changes based on feedback, such as reducing wait times or improving communication practices, signals that the practice is actively working to meet patient needs and improve service quality.

Conclusion: A patient-centred practice drives loyalty and growth

Meeting patient expectations in a dental practice goes beyond clinical expertise – it's about creating a patient-centred experience that promotes trust, comfort and satisfaction. Dental practitioners who prioritise transparency, comfort, convenience, cleanliness and education can set themselves apart, building stronger relationships with patients who feel respected, valued and cared for.

When patients have positive experiences, they're more likely to stay loyal, return for future visits and recommend the practice to others. In a field as personal as dentistry, building trust through thoughtful, patient-centred care can make all the difference in growing a successful, reputable practice.

Arguments of a non-oral health professional for interprofessional education in undergraduate oral health education curriculum in South Africa

SADJ APRIL 2025, Vol. 80 No.3 P130-P131

SL Amosun

ABSTRACT

It is perceived that undergraduate oral health education is yet to maximise participation in available opportunities for interprofessional education.

Keywords

Interprofessional education, oral health education, curriculum transformation

MAIN TEXT

Celebrating World Oral Health Day in 2023, the South African Dental Association (SADA), in agreement with the World Health Organisation's report on the global oral disease burden, acknowledged that South Africa faces an oral health crisis, with millions of people suffering from tooth decay, severe gum disease, tooth loss and oral cancer.¹ In 2024, SADA acknowledged the three-year (2024-2026) theme unveiled by the World Dental Federation (FDI) – “A Happy Mouth Is ... A Happy Body”,² geared to motivate people to value and care for their mouths and protect their health and wellbeing.

One of the ambitious targets in the 2023-2030 Global Oral Health Action Plan envisions that by 2030, 80% of countries will have oral healthcare services generally available in primary healthcare facilities.³ It is believed that an interdisciplinary partnership between oral and general health professionals is key to improving communities' oral and general health.^{4,5} Evidence of such partnership is still limited in South Africa as healthcare professionals often operate in silos.⁵⁻⁷ Is this also reflected in undergraduate oral health education though Interprofessional Education (IPE) is acknowledged as a core competence?⁸

The FDI stressed the importance of IPE and collaborative practice for maintaining optimal oral health.⁹⁻¹² The need for an oral health workforce to be proficient in interprofessional collaboration is crucial in addressing the oral health challenges in South Africa.¹³ There are opportunities for IPE in the undergraduate curricula of healthcare professional

students,¹³⁻²⁴ including medicine, nursing, physiotherapy, occupational therapy, nutrition and dietetics, pharmacy, social work and “other professions” including “dentistry and oral health”.

For example, the absence of oral health students from IPE platforms is perceived to hinder primary prevention or early identification of oral diseases.¹⁷ Is the training of oral health professionals in South Africa still aligned mostly with the 20th century healthcare focus on acute conditions?²⁵

Successful integration of IPE within the undergraduate oral health education curriculum requires more than a mere change in curriculum.²⁶ Like all other healthcare professional education in South Africa, it requires a significant paradigm shift toward a more collaborative and efficient healthcare system that ensures doctors, nurses and other health professionals constantly work [together] to improve the care they provide through proper support systems.^{25,27-29} It is heartwarming to note that SADA still believes “constructive engagement and a collaborative approach are essential for developing a healthcare system that serves the best interests of all South Africans”,³⁰ (p359) though the transformation of the undergraduate curriculum to achieve this goal is taking a while.

The time to act is now to contribute to achieving the WHO global target³ and the goals of the three-year theme of the FDI.² Healthcare has always been about teamwork.²⁵ Using the words of Sir Richard Horton, the Editor in Chief of *Lancet*: “*Everyone who cares about global health should advocate ending the neglect of oral health.*”² (p69)

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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.



Job satisfaction among dental technologists working in the public health sector in Nigeria: A phenomenological study

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ABSTRACT

Background

Job satisfaction is critical in healthcare professions, including dental technologists – influencing individual wellbeing, service delivery quality and workforce retention. This study explored factors influencing job satisfaction among dental technologists working in public health sectors in Nigeria.

Methods

This qualitative study employed a phenomenological research design to capture the lived experiences of 18 dental technologists (10 males, 8 females) working in Lagos's federal and state government healthcare facilities. Data were collected through semi-structured interviews and thematic content analysis was used.

Results

The study found that job satisfaction among dental technologists in the public health sector is affected by several interconnected factors. Key themes included the workplace environment, compensation, opportunities for professional development and interpersonal relationships. Participants noted that inadequate resources, limited career advancement opportunities and unsatisfactory pay were significant challenges that impacted their job satisfaction.

Conclusion

Addressing job satisfaction challenges necessitates a holistic approach, including reforms for fair pay and placement, enhanced educational access, respectful interprofessional relationships and improved infrastructure. Such initiatives would enhance job satisfaction among dental technologists and strengthen their contributions to the healthcare system overall.

Keywords

Job satisfaction, dental technologists, public health sector, qualitative research, Nigeria.

BACKGROUND

Job satisfaction among healthcare professionals is a critical issue affecting workforce retention and quality of care. Studies across multiple countries reveal generally low levels of job satisfaction among healthcare providers.¹⁻³ Factors influencing job satisfaction include working conditions, autonomy, supervision, recognition and interpersonal relationships.^{2,4,5} Furthermore, job satisfaction is associated with factors such as poor remuneration, large workload, lack of equipment, limited workplace socialisation, low autonomy and lack of training opportunities.⁶

Job satisfaction, particularly in the healthcare industry, is pivotal in ensuring the efficient functioning of healthcare organisations, employee retention and improved patient outcomes.^{7,8} Job satisfaction impacts workplace behaviours such as absenteeism, productivity and organisational commitment.⁷⁻¹⁰ Job satisfaction varies across healthcare professions, with pharmacy professionals reporting higher satisfaction than other specialities.¹¹ Stress and burnout are prevalent among healthcare workers, particularly in mental health professions.¹²

In dental professionals, studies have shown that the overall job satisfaction.¹³⁻¹⁵ The following factors were reported to play a significant role in job satisfaction among the dental workforce: work environment productivity; the level of stress and burnout; low remuneration; long working hours; the perceived quality of staff relationships; and lack of opportunities for speciality training.¹⁵⁻¹⁹

Although there were studies conducted about job satisfaction among dental professionals, there is, however, a paucity of studies in Africa. Thus, this study explores the factors influencing job satisfaction among dental technologists working in public health sectors in Nigeria.

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3. Preparation and submission of the final manuscript: Michael Chijoke Ndubuisi (33.3%), Alexis Harerimana (33.3%) and Julian David Pillay (33.3%)
4. Acquisition and recording of data: Michael Chijoke Ndubuisi (100%)

METHODOLOGY

Research design

This study utilised a phenomenological research design, ideal for investigating individuals' lived experiences and perceptions of specific phenomena. The research focused on job satisfaction among dental technologists in public health sectors in Lagos, Nigeria.

Study participants

Participants were selected through purposive sampling, a non-probability technique that targets individuals with pertinent knowledge and experience relevant to the research question. This approach ensured the inclusion of dental technologists who were able to provide valuable insights into job satisfaction. Specifically, the study focused on dental technologists employed in federal and state government health institutions in Lagos, Nigeria, chosen for their unique challenges, such as variability in employment conditions, access to resources and opportunities for professional growth, differing from private practice or NGO environments. The final sample comprised 18 participants (10 males, 8 females) to capture diverse perspectives and account for potential gender-related differences in workplace experiences.

Data collection methods

Data were collected through semi-structured interviews, balancing the flexibility of open-ended questions with the consistency of a structured interview guide. This approach allowed for an in-depth exploration of themes related to job satisfaction while permitting participants to share their experiences freely. Interview questions were designed to align with the study's objectives, covering work environment, remuneration, professional development and workplace relationships. A pilot test with five dental technologists was conducted to refine questions for clarity and relevance. Interviews lasted 30 to 60 minutes and were conducted in comfortable settings, primarily face-to-face, to promote open and honest communication. All interviews were audio-recorded with participants' consent, and field notes were taken to capture non-verbal cues and contextual details.

Data analysis

Thematic content analysis was employed as a qualitative method for identifying, analysing and reporting patterns within the data. The following steps were undertaken to ensure the rigour and reliability of the analysis: transcription, familiarisation, initial coding, generating themes, reviewing themes, defining and naming themes and final analysis.

Ethical considerations

Ethical principles were maintained throughout the study. Written informed consent was obtained from all participants, with confidentiality ensured via anonymisation of responses. The study received ethical approval from the Institutional Research Ethics Committee (IREC) at Durban University of Technology under certificate reference number REC-147/15.

RESULTS

Demographics of participants

Table 1 illustrates the research participants' demographics, including age groups, sex, qualifications, work experience, salary grade level, type of employer and number of places where the participants previously worked.

Table 1. Demographics of participants

Age (groups in years)	21 – 30	1
	31 – 40	8
	41 – 50	7
	51 – 60	2
	Over 61	Nil
Sex	Men	10
	Women	8
Qualification(s) held	CDT	9
	C&G	1
	HND	8
	HND&CDT	4
	B-Tech	Nil
Work experience (in years)	1 – 10	6
	11 – 20	9
	Over 21	3
Salary grade level	8 – 11	12
	12 – 14	6
	15 – 17	Nil
Type of employer	Federal	6
	State	12
No of place(s) worked	One	6
	Two	10
	Three	1
	Four	1

CDT - Certificate of Dental Technology
 C&G – City & Guilds
 HND- Higher National Diploma
 B-Tech- Bachelor of Technology

Factors associated with job satisfaction among dental technologists

Several factors affecting job satisfaction among dental technologists were identified and included: entry level placement, remuneration, promotion opportunities, interprofessional relationships, education and training advancement and working conditions.

Entry level placement

Entry-level placement has emerged as a critical determinant of job satisfaction among dental technologists within the context of this study. Numerous participants articulated feelings of frustration and discontent regarding their placement at lower salary grades in comparison to other health professionals possessing equivalent qualifications and training. This disparity not only adversely affects their immediate financial compensation but also significantly impedes their long-term career advancement and overall professional morale. One participant elucidated the concern by asserting: *"The entry level where we are placed is lower than other health professionals who are at a similar level in terms of training and practice."*

Another participant expounded: *"Being on SGL 08 instead of SGL 10 means that I am losing my salary for two SGLs."*

This discrepancy engenders a perception of inequity and dissatisfaction, particularly given that dental technologists often require several years to attain comparable standing to their counterparts in other health professions. The study further underscored that low entry-level placement exerts a cascading effect on various dimensions of job satisfaction, including remuneration. A participant correlated these elements by stating: *"The impact of poor remuneration can intricately be linked to low entry level, because low entry level is the resultant effect of low remuneration."*

Moreover, the inequity associated with entry-level placement was identified as a systemic issue entrenched in policy and structural deficiencies, resulting in many professionals experiencing a sense of being undervalued within their occupational roles.

Remuneration

Remuneration has been recognised as a pivotal element affecting job satisfaction among dental technologists. The results disclosed a prevalent sense of dissatisfaction regarding salaries, which numerous participants believed were not aligned with their qualifications, efforts or the intricacy of their responsibilities. This discontent was frequently associated with systemic challenges, such as low entry-level positions and inconsistencies in salary frameworks compared to other health professionals. Many participants pointed out the insufficiency of their earnings. One participant commented: *"Considering the nature of my job and my monthly output, my income does not reflect my contributions."*

This feeling was shared by another participant, who stated: *"Since the entry-level salary is quite low, it ultimately influences the monthly salary I receive."*

These remarks highlight how compensation not only impacts their immediate financial security but also undermines their sense of professional value and drive. The results also uncovered notable salary inequalities between dental technologists and other healthcare professionals within the same organisations. One participant conveyed their frustration, saying: *"We collaborate closely with other health professionals, yet the salary difference is substantial. It's disheartening, particularly when you recognise the importance of your role in patient care."*

This disparity intensifies dissatisfaction, as dental technologists feel unappreciated despite their vital contributions to healthcare services. In addition to inadequate base salaries, participants mentioned the withholding or non-receipt of certain allowances as an additional source of discontent. For instance, one respondent remarked: *"Certain allowances, such as call duty allowances, are not provided to dental technologists in my workplace."*

These overlooked financial benefits further intensified feelings of inequity and diminished job satisfaction.

Promotion opportunities

Promotion opportunities profoundly affect job satisfaction among dental technologists, serving as both a source of motivation and frustration, depending on the individual's educational background and career path. For numerous participants, promotions were regarded as a beneficial element of their jobs, acknowledging their contributions and chances for career advancement. Nevertheless, the study also identified the challenges faced by those without degrees, who encounter obstacles that restrict their professional development. Several participants conveyed their contentment with the promotion procedures within their organisations, especially those who fulfilled the necessary qualifications. One participant noted: *"I received my promotions as scheduled, in my workplace. I've consistently been promoted because you take exams."*

This recognition of a systematic and reliable promotion framework positively influenced their job satisfaction.

Conversely, for individuals without degrees, the situation was quite different. Many believed that their educational qualifications created a barrier to their careers, preventing them from progressing beyond certain grade levels. One participant shared: *"If you lack a degree, your career is stalled. You can't climb the ladder, and it feels like there's no opportunity for growth."*

This restriction meant that non-degree holders frequently found themselves unable to advance beyond Standard Grade Level (SGL) 14, whereas degree holders could move up to higher tiers such as SGL 17. This discrepancy fostered a sense of frustration and inequality among non-degree holders, as it limited their professional aspirations and left them feeling stuck in their positions. One participant commented: *"Technologists reach the end of their career at level 14; once you hit SGL 14, you remain there until retirement, especially those with the HND, while those with a BSc can surpass that threshold."*

Education and training advancement

Education and training play crucial roles in shaping job satisfaction among dental technologists, largely because of their influence on professional development, career progression and skill enhancement. The research underscored notable obstacles in obtaining additional education and specialised training, leading to frustration and stagnation among the participants. Numerous dental technologists voiced their discontent with the scant opportunities for further education and specialisation. One participant commented: *"There are hardly any chances for further education or specialisation. We're left to figure it out ourselves, but even then, the opportunities are just not there."*

This deficiency in access to advanced educational offerings, like postgraduate degrees in dental technology, obstructed their ability to gain specialised skills, progress in their careers and maintain competitiveness in the industry. The lack of organised opportunities for continuing professional development (CPD) was another major issue. Participants indicated that training programmes were either non-existent or required personal funding, which created both financial and logistical obstacles. One participant expressed: *"There are no funding opportunities for continuing professional education. I have had to fund myself to attend training, and even then, it's not always easy."*

The absence of employer-supported CPD initiatives restricted their capacity to keep abreast of advancements in dental technology, further fuelling their dissatisfaction. Furthermore, the study highlighted the detrimental effect of these educational deficiencies on professional self-esteem. One participant articulated: *"Lack of educational structure is one of the factors that reduces one's professional esteem. It reduces it to the core because you're not bold enough to say, 'I am an HND [Higher National Diploma] holder.' It demoralises you, makes you feel inferior."*

This erosion of confidence, stemming from inadequate educational opportunities, diminished their sense of professional pride and overall satisfaction. Additionally, the limited access to specialised training in fields such as ceramics, orthodontics and maxillofacial technology further hampered career progression. One participant observed: *"The lack of opportunity for specialty training also can be linked to limited career advancement. If there were good educational structures, one would be able to further*

specialise in one area of dental technology.”

The unavailability of such opportunities left many individuals feeling confined to their current positions, unable to explore and cultivate new skills.

Interprofessional relationships

Interprofessional dynamics play a crucial role in determining job satisfaction among dental technologists, with numerous participants voicing their discontent regarding strained relations with other healthcare providers, especially dentists. The difficulties within these interactions arise from perceived disparities, a lack of mutual respect and restricted professional autonomy, each of which adversely affects workplace morale and overall satisfaction. A prevalent observation identified was the perception of a “master-servant” relationship between dentists and dental technologists. Several participants conveyed feelings of being undervalued and disrespected by their dental peers. One participant articulated: *“My observation is that there is this master-servant relationship from the dentists. They see other interprofessional colleagues as servants; however, it is now left to me as a dental technologist to let them know that I am not their servant.”*

This underlying dynamic breeds resentment and diminishes the sense of professional camaraderie that is essential for a constructive work atmosphere. Participants also highlighted the absence of collaborative decision-making and autonomy in their responsibilities. One participant noted: *“In the procurement procedures, technologists are not allowed to test-run the machines/equipment to certify them, we are not involved.”*

This exclusion from vital elements of their work undermines their expertise and lessens their sense of contribution to the healthcare team. Furthermore, the hierarchical structure of the dental team was a significant source of dissatisfaction for many participants. They perceived dentists as the predominant leaders of the team, which left scant room for acknowledging the contributions of dental technologists. One participant remarked: *“The issue with this profession that I don’t like is the fact that dentists are believed to be the head of the dental team ... Dental technology should be a standalone profession; we should not be receiving direct instructions from dentists administratively.”*

Such feelings reflect a yearning for greater professional autonomy and acknowledgement. Nevertheless, not all participants recounted negative experiences. A select few reported positive interprofessional relationships characterised by mutual respect and teamwork. One participant stated: *“There is a mutual relationship with professional colleagues, including the dentists.”*

Although these positive experiences were less frequent, they underscore the potential for enhanced collaboration to improve job satisfaction.

Working conditions

Working conditions significantly influenced job satisfaction among dental technologists, with numerous participants pointing out deficiencies in their work environments as a primary source of frustration and discontent. These issues primarily revolved around inadequately equipped laboratories, a shortage of essential materials and outdated facilities, which together impeded their ability to carry out

their responsibilities effectively. Participants often highlighted the inadequate condition of laboratory equipment and the insufficient supply of consumables necessary for high-quality service delivery. One participant commented: *“Our labs are inadequately equipped, and it impacts the quality of work we can provide. How can you feel fulfilled when you lack the proper tools for the task?”*

Such shortcomings not only reduce the quality of care provided to patients but also diminish the professional satisfaction of dental technologists, who find themselves unable to fully leverage their skills due to the limitations of their work environment. Moreover, insufficient maintenance of vital amenities emerged as another persistent concern. Participants recounted experiences where malfunctioning electrical fittings, ineffective air conditioning and delays in acquiring urgently needed supplies caused unnecessary stress. One participant expressed: *“When essential amenities like air conditioners or electrical fittings are out of order, and the body language suggests that there is nothing that can be done about it, it is extremely frustrating.”*

These obstacles rendered the work environment less supportive, contributing to feelings of neglect and diminished motivation. Government policies also influenced working conditions, particularly through restrictive regulations and disparities in resource distribution. Participants observed that policies frequently favoured other healthcare professions, leaving dental technologists with fewer resources and opportunities. One participant remarked: *“Policy matters are closely linked with both entry-level and retirement positions ... other health professionals start at salary entry grade level 10 (CONHESS 9), while we begin at a much lower level.”*

DISCUSSION

This study explored the factors influencing job satisfaction among dental technologists in the public health sector in Lagos, Nigeria. Several factors affecting job satisfaction among dental technologists were identified and included: entry level placement, remuneration, promotion opportunities, interprofessional relationships, education and training advancement and working conditions. Similarly, a growing body of research underscores that factors such as remuneration, career progression, and workplace conditions are fundamental in shaping job satisfaction among healthcare professionals.^{19,20} A study by Teng, Wu and Lee²¹ found that dental technicians in Taiwan generally experienced moderate job satisfaction. Key factors influencing this satisfaction included occupational burnout, acceptance of dental technology and whether the technician held a position as an employer or employee.²¹ Higher levels of occupational burnout were linked to decreased job satisfaction, while greater acceptance of dental technology and being in an employer role were associated with increased job satisfaction.²¹ A study conducted in Fiji by Kumar and Mohammadnezhad¹⁹ identified that job satisfaction among dental technologists is subject to a multitude of determinants, including professional relationships, the work environment and avenues for professional advancement.

In this study, poor remuneration emerged as a significant concern. Similarly, Kumar and Mohammadnezhad¹⁹ found that dental technologists articulated their discontent regarding their compensation and the level of organisational support, thereby highlighting the necessity for enhanced remuneration and structured career development opportunities. The

findings in this study align with broader research indicating that the starting grade of employment significantly affects employee morale, progression and motivation within public sector roles.²²

The issue of limited career progression and professional growth emerged as a significant barrier to job satisfaction. Kumar and Mohammadnezhad¹⁹ identified that the absence of professional development opportunities and restricted access to local postgraduate training were recognised as impediments to job satisfaction among dental technologists. Interpersonal relationships within the workplace emerged as a significant factor in job satisfaction. In a study by Kumar and Mohammadnezhad¹⁹, participants acknowledged that positive interpersonal relationships with supervisors and peers significantly augment job satisfaction, as supportive interactions positively impact workplace performance. The literature indicates that clinical dental technicians have expressed significant frustration and discontent arising from misconceptions held by fellow dental practitioners and patients regarding their service delivery, expertise and professional identity.^{23,24} A study conducted in Pakistan showed a concern between dentists and dental technicians and their impact on prosthesis manufacturing.²⁵ Approximately 43% of dentists refrained from providing a drawn restoration design on the work authorisation form. Consequently, a deficiency in satisfaction was observed among dental practitioners about the precision of the prosthetic devices acquired from dental fabrication facilities.²⁵

Poor working conditions were also pivotal in our findings. Participants highlighted issues such as outdated equipment and inadequate supplies of dental laboratory consumables, which hindered their ability to perform and contributed to feelings of professional frustration. Similarly, Kumar and Mohammadnezhad¹⁹ reported that the occupational milieu for dental technologists in Fiji is frequently characterised by insufficient resources and substandard working conditions, which collectively contribute to diminished job satisfaction.

Strengths, limitations and recommendations

The strength of the study resides in its comprehensive analysis of the factors influencing job satisfaction among dental technologists in Africa, with a specific focus on Nigeria. Furthermore, a notable advantage of this research is its phenomenological approach, which prioritises the understanding of participants' lived experiences. This methodology facilitates the capture of authentic and nuanced insights into the challenges and perceptions faced by dental technologists.

The study reveals several limitations. The findings are specific to a certain group of dental technologists, restricting generalisability to other populations. Self-reported data may introduce biases due to social desirability or recall issues. The study mainly focuses on public health challenges, overlooking private employment experiences. Systemic issues were noted but not explored in depth, resulting in gaps in actionable insights. The cross-sectional design captures only a moment in time, failing to account for the evolution of experiences across career stages.

In response to these findings, several recommendations have been made. Policy reforms should ensure equitable pay and career advancement for dental technologists in line with their qualifications. Access to education and training

must be improved through degree-awarding institutions and CPD initiatives. Promotion policies should be revised to eliminate barriers for non-degree holders. Employers must enhance laboratory conditions by upgrading facilities and maintaining infrastructure. Cultivating positive interprofessional relationships is essential for collaboration and respect between dental technologists and dentists. Advocacy from dental technologist associations is vital to address systemic inequities in career progression and recognition. Further research, including longitudinal studies, is necessary to understand job satisfaction across the profession comprehensively.

CONCLUSION

This research identified factors influencing job satisfaction among dental technologists and revealed significant challenges that negatively impact their professional experiences. Identified issues include inequitable entry-level placements affecting compensation, limited promotional pathways for non-degree holders, insufficient educational frameworks for career progression and poor interprofessional dynamics, particularly with dentists, alongside suboptimal working conditions that hinder effective practice.

Addressing these challenges requires a comprehensive approach with far-reaching implications. Establishing fair placement and remuneration policies would promote equity and financial stability, while accessible educational pathways and advanced training opportunities could empower technologists and facilitate career progression. Building respectful interprofessional relationships would enhance workplace morale, and upgrading workplace infrastructure would improve efficiency and job satisfaction. By tackling these interconnected issues, dental technologists would be better positioned to thrive in their roles and make stronger contributions to the healthcare system.

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Conflict of interest

The authors declare no conflict of interest.

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Assessing students' clinical time management performance: A case study

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ABSTRACT

Introduction

Student-centred clinical training forms part of the undergraduate training programmes in dental therapy and oral hygiene. Within this setting, students develop soft skills such as time management. However, it is unclear how these skills are assessed.

Aims and objectives

The study examined patient satisfaction related to students' time management in completing clinical procedures within an allocated training session at a higher education institution in South Africa.

Methods

A descriptive, cross-sectional survey using an adapted Dental Satisfaction Questionnaire (DSQ) collected data from 231 dental patients referred to the undergraduate student training clinic.

Results

Only 68.8% of the patients strongly agreed that students completed their treatment during the appointment session. About 93.5% of the patients (n=216) indicated that students were punctual for their appointment. Almost 95.7% of patients (n=221) indicated that students explained each step of the treatment procedure to them. One central theme emerged: the perceived impact of time taken during sessions.

Conclusion

Patients were satisfied with the time students took to complete the clinical session. Patients' inputs could provide further insights into student-centred clinical training in the identified training programmes.

Keywords

Time management skills, patient satisfaction, clinical competency, dental therapy, oral hygiene, soft skills, competency-based curricula, experiential learning

INTRODUCTION

The goal of competency-based learning underpinned in dental training programmes is to support dental therapy and oral hygiene students into developing competencies aligned to the designed scope of practice for each identified dental professional.¹⁻² These undergraduate training programmes are developed using experiential teaching and learning pedagogy to drive learning outcomes.³ Learning outcomes promote competency development.^{1,5,7} Competency is initially developed in the preclinical setting, where dental therapy and oral hygiene students train on simulators to learn basic technical skills to transition into the clinical environment.^{1,8} In student-centred clinical training, students complete a series of clinical procedures directly on patients aligned with service-based learning. Settings such as academic hospitals, community clinics, schools and other decentralised training sites provide opportunities for students to learn in real-world settings.⁴

These experiences could enhance patient-centred care, leading to the development of clinical competency.^{1,5,7-9,22-23} This could, in turn, culminate in the knowledge, vocational skills and values developed.^{1-2,5,7} However, a key issue raised in the literature has suggested that assessing competency remains complex and controversial within the framework of competency-based curricula.⁵⁻⁷ A growing trend in the literature has shed light on using patient satisfaction surveys to assess students' competency in dental training programmes.¹⁰⁻¹³ This paper reports patients' satisfaction with students' clinical time management performance at an identified clinical training site (Anonymous version). Dental therapy and oral hygiene training were introduced at the identified institution in the late 1970s to increase the number of dental professionals in the public health sector.²⁶

The training has significantly evolved with expanding the scope of practices to allow graduates to work in a public or private dental setting. Both programmes are offered full time for three years. The curricula embed similarities in theoretical and practical modules, allowing dental therapy and oral hygiene students to undertake clinical-based training from the second to the end of the third year. Training sessions are structured in two-hour allocations at the training site, a Department of Health facility. The service-learning components underpinned in clinical modules enable students to work directly on patients under clinical instruction to accomplish pre-determined clinical requirements per dental procedure. Students are tasked to conduct a dental examination and diagnosis and devise a treatment plan for a patient.²⁶

Time management remains crucial for dental therapy and oral hygiene students to develop in managing their

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clinical tasks and addressing the patient's main complaint within the clinical session. Moreover, students' time management competence assessed in dental therapy and oral hygiene training programmes remained unknown.^{11,14} Other studies assessed students' technical competence in mainstream dentistry.⁶ In turn, time management skills could be assessed in students' clinical sessions through patient voices.^{2,10-14,23} Therefore, given the limited published literature, this study aimed to examine patients' satisfaction with the time taken by second and third-year dental therapy and oral hygiene students to complete clinical procedures within an allocated training session.

METHODOLOGY

Study design

The study design was a case study that included a descriptive, cross-sectional survey used to collect data.

Study tool

The study tool was an adapted Dental Satisfaction Questionnaire (DSQ) version.¹⁶ Approval was granted by the authors' institution for authorisation to use this validated patient satisfaction survey. The survey comprised a total of 30 questions. Questions 1-28 included short, closed-ended statements that evaluated patients' satisfaction across various domains (Table 2). These statements were linked to elicit 5-point Likert scale responses with scores ranging from 1=strongly agree, 2=agree, 3=not sure, 4=disagree and 5=strongly disagree. Some questions were scored reversed. Questions 29-30 gathered the participants' open-ended responses, describing their experiences when the students completed their treatment and identifying areas for the students to improve.

Study participants

The study population were dental patients (18 years and above). The inclusion criteria included patients referred to the undergraduate student training clinic for dental treatment (dental prophylaxis, restorations or extractions). Children and adult patients who needed dental treatment beyond the students' practising scope or from the Department of Health dental staff were excluded. A total maximum sample size of n=231 patients was calculated by a statistician contracted to the study. The sample size determination formula: . Where Z is the upper point of the standard normal distribution, which is 1.96, d is a clinically acceptable margin of error, 5%, and P is the prevalence of patient satisfaction, 80%.¹⁵ Participants were selected using simple random sampling and were given a fair and equal chance to participate in this study.

Data collection

The study tool was piloted on participants (n=24) who met the study's inclusion and exclusion criteria. Research assistants were involved in the data collection process, which involved inviting, distributing and collecting data from participants who provided written consent at the end of the students' clinical sessions. The results gathered were excluded from the main study. Modifications were made for logistical data collection within the clinical setting. Data was collected from the March 25 to April 16 2024. Research assistants commenced primary data collection. The assistants coordinated, invited, distributed and collected data from participants who provided written consent. Participants took 5-10 minutes to complete a survey and

insert it in the designated boxes provided. Data collection spanned from 23rd April to May to 30th of August 2024. The data was cleaned, counted, assigned with codes and captured electronically on a Microsoft Excel® spreadsheet (Windows 11 Version 2405). An independent checker verified data management.

Data analysis

The captured data were entered in the Statistical Package for the Social Sciences (SPSS) version 28 for analysis. Univariate descriptive statistics were used to report on the measures of central tendency and frequencies. The open-ended responses were analysed thematically. The dataset was read over three times to gain an overview and sense of familiarity. Initial codes were assigned to statements. This was an inductive approach, where codes were created according to the responses made and not extracted from the questions. The coded data was then grouped to search for emergent patterns. These patterns were categorised into themes. Themes, including subthemes, were redefined to provide answers to the open-ended questions.

Validity and reliability

This study's internal and external validity was achieved through the following efforts: professional guidance and mentorship from the research supervisor, the design and modifications made to the survey, the piloting of the study tool, the use of the probability sampling method, and the large sample size. Reliability was measured by Cronbach's alpha (27 items; $\alpha=.905$), indicating a good score. The statistician and research supervisor validated the results, leading to credibility.

Ethical considerations

Ethical approval was in line with(Anonymous version).to conduct this study. A language practitioner translated the study tool, information and consent form into isiZulu to ensure participants were comfortable with their language proficiency. Participants' names were not included and code names were assigned to report on quotations used. Patients' rights, confidentiality, trust and anonymity were upheld per the Department of Health policies and practices.

RESULTS

Two hundred and thirty-one participants completed the patient satisfaction survey, which yielded a response rate of 100%. While more than two-thirds of the participants (68.8%) strongly agreed that the student completed their treatment within the appointment session, only 2.6% of the participants strongly disagreed/disagreed that the student understood their dental needs. Most participants (96.1%) strongly agreed/agreed that they had faith and trust in the healthcare facility. Two hundred and sixteen participants (93.5%) indicated that the student was punctual for their appointment. Almost 95.7% of participants (n=221) indicated that the student explained each step of the treatment procedure to them. More than two-thirds of the participants (65.4%) strongly agreed that the students did not keep them waiting (Table I).

The highest satisfaction mean was achieved in the continuity of care (4.70), while the lowest mean score was noted in pain management (3.57). The total time management skills established a high mean (4.50) (Table II).

Table I: Patients' satisfaction with students' time management performance

Statements n (%)	Strongly agree n (%)	Agree n (%)	Not sure n (%)	Disagree n (%)	Strongly disagree n (%)	Total
1 The student was able to complete my treatment within the appointment session.	159 (68.8)	50 (21.6)	9 (3.9)	8 (3.5)	5 (2.2)	231 (100)
2 I feel disappointed with the standard of care received today.	12 (5.2)	4 (1.7)	6 (2.6)	63 (27.3)	146 (63.2)	231 (100)
3 The student understood my dental needs.	171 (74.0)	48 (20.8)	6 (2.6)	1 (0.4)	5 (2.2)	231 (100)
4 I understood what the student advised me regarding my dental condition.	179 (77.5)	44 (19.0)	6 (2.6)	0 (0.0)	2 (0.9)	231 (100)
5 I have faith and trust in the healthcare at this facility.	168 (72.7)	54 (23.4)	5 (2.2)	0 (0.0)	4 (1.7)	231 (100)
6 I was treated with respect and dignity.	191 (82.7)	32 (13.9)	4 (1.7)	1 (0.4)	3 (1.3)	231 (100)
7 The student was punctual for my appointment.	167 (72.3)	49 (21.2)	12 (5.2)	1 (0.4)	2 (0.9)	231 (100)
8 The student explained each step of the treatment to me.	167 (72.3)	54 (23.4)	3 (1.3)	2 (0.9)	5 (2.2)	231 (100)
9 The student performed a quality treatment and standard.	172 (74.5)	47 (20.3)	8 (3.5)	1 (0.4)	3 (1.3)	231 (100)
10 The student did not keep me waiting.	151 (65.4)	59 (25.5)	9 (3.9)	6 (2.6)	6 (2.6)	231 (100)
11 I felt minimal pain during my procedure.	76 (32.9)	74 (32.0)	18 (7.8)	32 (13.9)	31 (13.4)	231 (100)
12 The student communicated with me effectively.	175 (75.7)	49 (21.2)	2 (0.9)	2 (0.9)	3 (1.3)	231 (100)
13 The student needed to be more efficient in treating me.	14 (6.0)	4 (1.7)	8 (3.5)	60 (26.0)	145 (62.8)	231 (100)
14 I will return to the same facility for care again.	180 (77.8)	38 (16.5)	9 (3.9)	2 (0.9)	2 (0.9)	231 (100)
15 The quality of service rendered by the student requires improvement.	30 (13.0)	35 (15.2)	30 (13.0)	47 (20.3)	89 (38.5)	231 (100)

Table II: Measures of central tendency of patients' satisfaction across subscales

Subscales	Mean (SD)	Min	Max	Median
Technical skills	4.36 (0.63)	1.00	5.00	4.40
Quality of care	4.58 (0.55)	1.00	5.00	4.75
Continuity of care	4.70 (0.67)	1.00	5.00	5.00
Health facility	4.68 (0.59)	1.00	5.00	5.00
General satisfaction	4.27 (0.52)	1.80	5.00	4.20
Time management skills	4.47 (0.54)	1.00	5.00	4.56
Pain management	3.57 (1.41)	1.00	5.00	4.00
Total time management skills	4.50 (0.53)	1.00	5.00	4.64
Patient satisfaction index	4.44 (0.49)	1.14	5.00	4.57

Analysis of the open-ended questions

One central theme arose from the analysis, followed by subsequent subthemes on patients' satisfaction with the time students took to render dental treatment efficiently within a clinical session of two hours.

Theme 1: The perceived impact of time taken during sessions

Participants expressed their satisfaction by relating their experiences to the time the students took to treat them during their clinical appointment sessions. They highlighted that those students displayed a standard of professionalism, respect and communication and valued their presence in providing dental care. Three subthemes are shown in Table III.

Table III: How patients perceive students' time management in the clinic

Subthemes	Patient quotations
3.1 Students' punctuality impacts the time spent on treatment	Participants mentioned they were pleased with students being punctual for their appointments and ensuring their treatment was completed on time. <i>"The student finished within the time my appointment was due. He was punctual and he did a great job which made my experience pleasant." DPJG365</i>
3.2 Care graced with compassion	Participants stated that students projected a kind and caring attitude while being treated during their treatment. <i>"I was comfortable during my appointment session, she(student) knew what she was doing, and she did not keep me waiting. There was no delay." DPJD421</i>
3.3 Reduced delays in student clinics	Participants believed that students had overall good time management skills in completing their treatment at the appointments they attended. <i>"I was received by the student on time and we started the session at the exact time that was booked for my appointment, the treatment time was moderate, I have nil complaints." DPJK112</i>

DISCUSSION

The present study examined patient satisfaction related to students' time management in undergraduate student-centred clinical training.

The study findings indicated that most patients (96.6%) agreed they were treated respectfully and with dignity during their clinical sessions. This implied that students professionally conducted themselves when working with patients. This finding is consistent with another report, in which dental students and interns treated 96.5% of participants from a polyclinic with respect.¹⁷ According to the research conducted by Salim et al,¹⁸ communication is a non-technical skill that enables students to establish a rapport to guide treatment planning and prognosis when engaging with patients to achieve better time management. In turn, it was found that 95.7% of patients (n=221) indicated that students explained each step of the treatment to them. This is supported by Tripodi et al,¹⁹ who found that 85.8% of patients rated "excellent" when the students discussed the steps to follow, including the continuation of the treatment plan. Another study further enhanced this, which found positive relationships linking students' time management skills to their communication abilities, leading to their overall motivation.²⁰ These findings, taken together, underscore the need for soft skills to be developed in the clinical dental learning environment.^{11,14}

More than half of the study sample (68.8%) strongly agreed that the students completed their treatment within the appointment session. This suggested that students efficiently provided dental care for their patients within the clinical session. This was supported by another study that found that 87% of patients were highly satisfied/satisfied with the time taken to treat them.⁷ This is further strengthened as 65.4% of participants strongly agreed that students did not keep them waiting. Likewise, participants perceived students to have good time management per subtheme 3.3, which accords the reduced treatment delay. This finding is contrary to a previous study that suggested that waiting times may be longer than expected due to the nature of how academic training programmes operate to accommodate teaching and learning.²¹ Most patients (77.8%) indicated that they would return to the study site for care again. This implies that patients return to the same facility because they trust that the care received meets their expectations. This finding was consistent with other

studies, which found that patients (53.8%) rated the service quality higher than other facilities.²²

Service-based learning can contribute to building students' clinical competency by gaining real-world experience.^{3,9} Through these experiences, students develop confidence in interacting with and treating patients to understand their dental needs better. As such, more than two-thirds of patients (74%) revealed that students understood their dental needs. This indicated that patients were satisfied with students' competence to devise a treatment plan that accommodated their needs.²⁴ This articulates with the pedagogy of patient-centred care, where students tailor treatment plans according to the individualised patient and give advice to improve patient outcomes.^{19,23} One finding that stands out from the earlier results is that most patients (93.5%) agreed that the students were punctual for their appointment sessions. This finding is consistent with theme 3.1. These empirical findings infer that students' clinical time management performance is associated with them being punctual. This association underscores punctuality as one of the critical skills in time management required in clinical-based training. This was supported in another study that linked postgraduate students' punctuality to better time management skills.²⁵

Study strengths and limitations

This study used the Dental Satisfaction Questionnaire, a validated and reliable tool used mainly by international authors. In turn, the data obtained can be used to inform and initiate specific quality improvement projects to improve clinical training programmes. However, several limitations were noted in this study. The study focused on a single training site; thus, the findings are limited in generalisability. Patient demographics were not included in this study. Such data could have provided valuable insight into patient preferences based on sociodemographic profiling. The data was collected in the presence of students and could have introduced some bias based on providing socially desirable responses. The study did not include students' perspectives, including clinical supervisors.

CONCLUSION

Patients were satisfied with how students managed their time and conducted themselves in providing dental clinical care. The findings reported here shed new light on students'

punctuality associated with their clinical time management performance. Patient feedback could add valuable insight into clinical training within the undergraduate programmes. It is recommended that dental training institutions consider punctuality as one indicator to evaluate time management skills in clinical assessment rubrics when assessing students' clinical competency. An allocation of time could be dedicated to the undergraduate dental curricula for patient feedback in clinical assessments to determine students' performance. The soft skills identified by participants, such as communication, respect, empathy, care and punctuality, apart from time management, should regularly be assessed to align with the skills and values defined in learning outcomes. This may lead to and strengthen patient-centred care within student-centred clinical training. The core competencies for all undergraduate clinical training programmes should be reviewed and, if necessary, include training in time management skills.

DECLARATION

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Ethical permission

(Anonymous version)

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Conflicts of interest

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CPD questionnaire on page 170

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.



Dental fear and anxiety of patients visiting selected oral health centres in Gauteng

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T Moyo, C Kruger, TK Madiba

ABSTRACT

Introduction

Dental fear is a concerning public health matter and still prevalent among individuals across communities. Studies have reported greatly varying statistics on the prevalence of dental phobia ranging from 5% to 7%, with other authors reporting higher prevalence rates.

Aim and objectives

To assess the prevalence of dental fear and anxiety and identification of phobia induced factors and stimuli in patients visiting selected oral health centres in Gauteng.

Design

Quantitative cross-sectional study comprising South African women and men 18 years and older residing in Gauteng visiting government facilities (Wits Oral Health Centre (WOHC) and Chiawelo Clinic) and private facilities (Mofolo Dental Surgery and Tembisa Dental Surgery).

Methods

Information was obtained using a modified, self-administered questionnaire which included the Modified Dental Fear Survey (MDFS). The patient's questionnaire had two sections consisting of sociodemographic information and questions from the MDFS. Data was analysed with the Statistical Package for the Social Sciences (SPSS) software version 29. Quantitative variables were summarised as proportions, frequencies and mean with their standard deviations and percentages. A Chi-square test was used to evaluate the association between variables and the level of significance was set at $p \leq 0.05$.

Results

The response was 100% of the calculated sample size of 610 patients. The mean age of participants was 28 years ($SD = \pm 8.92$ years) with more than half of them being male 330 (54%). About 21% of the participants indicated they

have dental fear all the time, while 35% indicated they had dental fear sometimes. The vibration of the drill and sight of the needle were the most fear-provoking stimuli in general for all patients. Significantly more females had dental anxiety as compared to males, $p < 0.05$. There was no association between level of education, employment status and dental anxiety, $p > 0.05$.

Conclusion

This study showed that dental fear is prevalent and leads to patients neglecting their oral care. About 21% of the patients indicated they have dental fear all the time. The results demonstrated a significant difference between males and females, with higher levels of anxiety in women than males, $p < 0.05$. There was no association between level of education, employment status and dental anxiety, $p > 0.05$.

Keywords

Dental phobia, dental anxiety, oral health, dentist, patients.

INTRODUCTION

Dental fear is a concerning public health matter and still prevalent among individuals across communities. While studies have reported greatly varying statistics on the prevalence of dental phobia with percentages ranging from about 5% and 7%, some studies have reported considerably higher prevalence rates.^{1,2}

Dental fear, also referred to as dentophobia or dental anxiety, can be defined as a normal/abnormal reaction to what one can perceive as a menacing/threatening encounter in a dental environment, and is regularly linked with some sense of losing control.³ It is regarded as an intricate, multifaceted issue as the aetiology can arise from the affected individual, the dental health care provider or the related environment.³ Patient-associated causes could be family/peer influence, a patient's own negative previous experience, fear of pain or the dentist or just their character or personality. Provider associated causes could be how the dentist interacts with the anxious patient; with environment associated causes comprising the sound of drills, sight of injection, sight of blood, witnessing another apprehensive patient or just the dental environment in general.³

In some studies, dental fear has been associated with iatrophobia (ie indicated by an extreme, relentless and incomprehensible dread of visiting and meeting doctors).⁴ In his quest to find a solution for painless dental treatment Dr Horace Wells, a dentist from New England who is considered to be the father of anaesthesia, performed his infamous demonstration to administer nitrous oxide to alleviate pain during dental procedures to senior students in an attempt to provide a painless tooth extraction. But this did not go well as the student, who later went on to say that he felt no pain,

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squealed and cried out throughout the procedure showing much discomfort. Wells subsequently said he withdrew the nitrous bag too soon to account for the failed experiment.⁵

Based on the Seattle System, used for diagnosing dentally anxious individuals, there are four diagnostic types in which dental phobic individuals can be categorised according to the main source of their fear: type I (simple conditioned phobia), type II (fear of catastrophe), type III (generalised anxiety) and type IV (distrust of dentists).⁶ Studies conducted to assess the validity of the system proved that 49.6% of dental phobias are more likely to be categorised as type I.⁶ In the same study the prevalence of dental anxiety and its relation to age was also assessed, with the results proving the hypothesis that dental anxiety declines with age.^{6,7}

Age and gender have been the most commonly assessed factors associated with dental fear with anxiety levels of the older age group significantly lower than the younger age group, with girls showing more fear compared to boys.⁶ ⁷ Regardless of the age decline factor being recognised in various literature, it cannot be concluded that the older populations will present with less phobic traits in the dental chair, as there could be other multifaceted variables at play that could affect the outcome. If an individual suffers from any mental health problems, such as generalised anxiety disorder, depression or substance dependence, the incidence of dental anxiety will increase markedly.⁷ Even the most experienced dental practitioners may find an encounter with a fearful patient stressful, and many may also feel not trained enough to deal with the situation, particularly from how a patient might express their anxiety.⁸

Dental treatment has in fact been portrayed to create more anxiety and fear than any other kind of health care treatment.⁸ While some patients might seem irritated or aggressive, introverted or uncommunicative, others may appear argumentative or suspicious of the dental practitioner's motives.⁸ A phobic patient might even fear being judged by dental personnel and might resort to using sarcasm or camouflaged insults as a defence mechanism; for example commenting that the car the dentist is driving was bought with their medical aid funds.⁸ When a dentist is able to attend to the individual fears, altering the negative perceptions of the anxious patient, by integrating either a behavioural or pharmacological approach into the patient's comprehensive treatment plan, a long-lasting rapport is created, producing a warm, fulfilling and jovial environment in the practice for both the dental practitioner and the dental patient.⁸

In South Africa the knowledge gap of dental anxiety prevalence and its impact on society remains to be addressed. Apart from guidelines occasionally aimed at dentists in controlling anxiety when administering sedation in a dental chair, there are few studies or documented data on the prevalence or severity of dental anxiety.

To the authors' knowledge, a study of the prevalence of dental phobia of patients visiting oral health centres in Gauteng has never been carried out and hence the need for this study. The aim of this study was therefore to assess the prevalence of dental fear/anxiety in patients visiting selected oral health centres in Gauteng in 2023.

MATERIAL AND METHODS

A quantitative cross-sectional study design was conducted

on patients who attended health facilities in Johannesburg – two government facilities (Wits Oral Health Centre (WOHC) and Chiawelo Clinic) and two private facilities (Mofolo Dental Surgery and Tembisa Dental Surgery) who met the criteria and were 18 years and older and residing in Gauteng.

A modified, self-administered questionnaire which included the Modified Dental Fear Survey (MDFS) was the chosen dental fear instrument for the study.⁹ The data was collected from the identified dental facilities over a period of one month. The four identified dental facilities consulted, on average, the following number of patients per month:

Chiawelo clinic consulted about 600 adults per month. At a margin of error of 5% and a confidence level of 95% a representative sample for this clinic was determined to be 235.

Wits Oral Health Centre consulted about 1200 adults per month. At a margin of error of 5% and a confidence level of 95%, a representative sample for this clinic was determined to be 292.

Mofolo Dental surgery consulted about 40 adults per month. At a margin of error of 5% and a confidence level of 95% a representative sample for this surgery was determined to be 37.

Tembisa Dental surgery consulted about 50 patients per month. At a margin of error of 5% and a confidence level of 95% a representative sample for this surgery was 45. The total sample for the study was therefore the combined representative samples for the identified clinics and surgeries, which was 610.

The patients' questionnaire had two sections. The first section consisted of sociodemographic information which included age, race, gender, educational, employment and marital status. The second section consisted of the Modified Dental Fear Survey with 20 questions.⁹ It assessed a wider range of dental stimuli such as seeing the dental needle and smelling the dental office and measured a patient's physiological response to dental stimuli, such as muscle tension and increased breathing rates. It also included two items that assessed individuals avoiding dental appointments due to fear.

Data was captured on an Excel spreadsheet and then imported onto the Statistical Package for the Social Sciences (SPSS) software version 29. Quantitative variables were summarised as proportions, frequencies and mean with their standard deviations and percentages. A Chi-square test was used to evaluate the association between variables and the level of significance was set at $p \leq 0.05$.

Ethical clearance and permission to conduct the study was obtained from the University of Pretoria, Research Ethics Committee of the Faculty of Health Sciences (61/2023). All information was strictly confidential.

RESULTS

A total of 610 participants responded to the questionnaire. The mean age of participants was 28 years (SD= ±8.92 years) with more than half of them being male 330 (54%). The demographic information of the participants is summarised in Table 1.

Table 1: Participants demographic characteristics (n=610)

Variables	n (%)	
Education	High school	248 (40.7)
	No education	7 (1.1)
	Primary	17 (2.8)
	Tertiary	338 (55.4)
Institution	Private	163 (26.7)
	Public	447 (73.3)
Employment status	Employed	276 (45.2)
	Unemployed	334 (54.8)
Age categories	18 to 23	245 (40.2)
	24 to 28	155 (25.4)
	29 to 33	77 (12.6)
	34 to 38	47 (7.7)
	39 and over	86 (14.1)

The various stimuli that induce dental fear in patients can be seen in Table 2.

There were various stimuli that induced dental fear in the participants. It was observed that of those who had dental fear, it was mostly when they were in the dental rooms, especially when they observed dental instruments. About 21% of the participants indicated they have dental phobia all the time, while 35% indicated they had dental fear sometimes.

Table 2: Various stimuli that induce dental fear in participants (n=610)

Variable	All the time (n/%)	Not at all (n/%)	Sometimes (n/%)	Total
Has fear of dental work ever caused you to put off making an appointment?	88 (14.4)	374 (61.3)	148 (24.3)	610
When having dental work done, my muscles become tense	170 (27.9)	253 (41.5)	187 (30.7)	610
When having dental work done, I perspire	29 (4.8)	477 (78.2)	104 (17.0)	610
When having dental work done, I feel nauseated (sick to my stomach)	43 (7.0)	462 (75.7)	105 (17.2)	610
When having dental work done, my heart beats faster (I get anxious)	12 (19.8)	280 (45.9)	209 (34.3)	610
Does the fear arise when approaching the dentist's office?	92 (15.1)	327 (53.6)	191 (31.3)	610
Does fear arise when sitting in the waiting room?	111 (18.2)	302 (49.5)	197 (32.3)	610
Does fear arise when sitting in the dental chair?	189 (31.0)	208 (34.1)	213 (34.9)	610
Does fear arise with the smell of the dentist office?	87 (14.3)	387 (63.4)	136 (22.3)	610
Do you have any fear when you see the injection needle?	239 (39.2)	140 (23.0)	231 (37.9)	610
Do you have any fear when you see the drill?	233 (38.2)	207 (33.9)	170 (27.9)	610
All things considered, how fearful are you of having dental work done?	126 (20.7)	270 (44.3)	214 (35.1)	610

Table 3: The association between gender and various stimuli of fear (n=610)

Has fear of dental work ever caused you to put off making an appointment?		All the time	Not at all	Sometimes	Total	p value
	Gender F	48	153	79	280	0.001*
	M	40	221	69	330	
	Total	88	374	148	610	
When having dental work done, my muscles become tense		All the time	Not at all	Sometimes	Total	<0.001*
	Gender F	99	103	78	280	<0.001*
	M	71	150	109	330	
	Total	170	253	187	610	
When having dental work done, my breathing rate increases		All the time	Not at all	Sometimes	Total	<0.001*
	Gender F	52	120	108	280	<0.001*
	M	24	208	98	330	
	Total	76	328	206	610	
When having dental work done, I perspire		All the time	Not at all	Total		0.004*
	Gender F	18	202	60	280	0.004*
	M	11	275	44	330	
	Total	29	477	104	610	
When having dental work done, I feel nauseated (sick to my stomach)		All the time	Not at all	Sometimes	Total	<0.001*
	Gender F	26	191	63	280	<0.001*
	M	17	271	42	330	
	Total	43	462	105	610	
When having dental work done, my heart beats faster (I get anxious)		All the time	Not at all	Sometimes	Total	<0.001*
	Gender F	73	101	106	280	<0.001*
	M	48	179	103	330	
	Total	121	280	209	610	
Does the fear arise when approaching the dentist's office?		All the time	Not at all	Sometimes	Total	<0.001*
	Gender F	51	121	108	280	<0.001*
	M	41	206	83	330	
	Total	92	327	191	610	

Female participants were statistically more fearful and more reactive to environmental-related factors such as hearing the sound of the drill, awaiting the dentist (waiting for longer periods), the smell of the dental room, approaching the dental room, being seated on the dental chair, when seeing the dentist walk in and the sight of the needle than their male counterparts, $p < 0.05$. Females also showed a statistically high level of anxiety than males when it came to physiological-related factors such as muscle tension during treatment, perspiration, increase in breathing rate, nausea and tachycardia (increased heart rate) when the needle was being injected and feeling the drill's vibrations, $p < 0.05$.

Table 4 indicates the association between age and dental phobia when the participant was sitting on the dental chair awaiting treatment.

Table 4: The association between age and dental fear (n=610)

Does the fear arise when sitting in the dental chair?	Age Category	All the time	Not at all	Sometimes	Total	p value
	18 to 23	96	75	74	245	0.000*
	24 to 28	46	52	57	155	
	29 to 33	21	34	22	77	
	34 to 38	14	11	22	47	
	39 to over	12	36	38	86	
	Total	189	208	213	610	

*=Statistically significant

Significant age differences were observed, indicating that age can be an attributable factor to dental fear. Significantly more participants in the age range 18 to 23 were fearful all the time and sometimes when sitting in the dental chair as compared to the other age ranges, $p=0.000$. When the association between age and the various other stimuli of fear was done there was found to be no association, $p>0.05$. There was also no association between education level, employment status and dental anxiety, $p>0.05$.

DISCUSSION

The aim of the study was to investigate dental fear in selected centres in the Gauteng region. The objective was to assess the prevalence of dental fear and identification of phobia induced factors and stimuli in patients visiting selected oral health centres in Gauteng.

The response rate was 100% of the calculated sample size. About 21% of the participants reported to always have dental phobia with 35% being fearful sometimes. This is higher than reported literature.^{1,2} When it came to delaying making dental appointments due to fear, there was a notable increased number in females compared to male participants, resembling existing literature on gender differences which suggests that females have always been identified as having higher levels of dental anxiety compared to their male counterparts.¹⁰ This could be due to the fact that women naturally socialise in groups or circles of friends of which their individual subjective fears may be shared among the groups, inadvertently increasing individual objective fears.

Gender norms and societal expectations could also be contributing factors to this phenomenon, as stereotypes that say men should be more stoic or less expressive of fear or anxiety still exist in particular cultures. This may also have an impact on how men feel about and communicate their dental experiences. Statistics indicate that women are more likely than men to express their emotions honestly. Men may tend to internalise their worries or fears, which could give the impression they are less afraid when, in reality, they may be just as anxious.¹⁰

Muscle tension was the most common physiological symptom recorded according to gender, women ($n=99$), men ($n=71$) respectively in line with literature.¹⁰ The vibration of the drill and sight of the needle were the most fear-provoking stimuli in general for all patients in line with literature.¹¹ It is reported that, in general, procedures that involve the drill and the needle evoke the most fear and this was true for the present study.¹⁰

Although literature has proved that dental fear declines with age, the results of the study for all the fear inducing stimuli showed no association between age and dental phobia, $p>0.05$ except for one stimulus.^{6,7}

This could be due to the fact that there were more participants in the 18 to 23 age group ($n=245$) (40.2%) compared to 39 and over age group ($n=86$) (14.1%) that participated in this study. This could partly be attributable to the fact that adolescents have a natural need to look good as they are growing up to adulthood and more inclined to aesthetics than the older generation. They also have a need to be accepted socially, therefore they will seek help more than the older generation, eg patients with braces. When patients were asked whether they were fearful when sitting

in the dental chair, statistically more patients in the younger age group were more fearful than the older age group, $p=0.00$. The results of this study on this aspect concerning age are in line with published literature.^{6,7,10}

This study also indicated that employment status and educational level have no association with dental fear, in contrast to published literature which proposes that the degree of education and employment status have a major impact.¹¹ People with low levels of education are more prone to put off or skip dentist appointments. Also, it could be more difficult for people with lower levels of education and work to get regular dental care, insufficient availability of preventive care may cause more serious dental problems to arise, which may increase dental visit anxiety. Socioeconomic status is frequently linked to employment and educational level – for instance, lack of medical aid cover, financial constraints and lack of access to oral health care services may result in people with low socioeconomic status having higher levels of dental fear.¹¹ People with lower levels of education and work experience are more vulnerable to oral health-related stigmas and stereotypes in society; this could cause feelings of guilt or embarrassment, which can lead to dental anxiety and no access to preventative dental visits.¹²

A comprehensive approach that considers cultural influences, socioeconomic factors and personal experiences is needed to address dental fear. Dental fear can be lessened in a variety of populations by initiatives to enhance oral health education, expand access to reasonably priced dental care and reduce stigma.

Furthermore, to reduce dental anxiety for people with different educational and professional backgrounds, dental practices must foster a supportive and understanding environment.¹²

CONCLUSION

The study proves that dental fear leads to patients avoiding/neglecting their much-needed dental care, a concern that is common in most dental practices and government clinics. About 21% of the patients indicated they have dental anxiety all the time. The results demonstrated a significant difference between males and females, with higher levels of anxiety in women than males. There was no association between level of education, employment status and dental fear.

Early identification and interventions towards these patients should be carried out and addressed as soon as possible.

RECOMMENDATIONS

Interventions such as psychotherapeutic or pharmacological interventions could be adopted to manage dental anxiety. The oral health team and relevant health care workers can play a critical role in partnering up and helping the affected individuals overcome dental anxiety by exercising empathy. Also, engaging policymakers and mobilising community action through proper mass awareness programmes such as early school outreach programmes and community mobile clinics could benefit children by providing early exposure to dental treatments and awareness, which will be beneficial in the long term. In addition, further research and attaining knowledge/skills on identifying dental phobia and knowing how to manage it should be encouraged so that routine management approaches can be initiated thus providing better dental care to patients.

Limitations

This study is limited by the cross-sectional study design and causality cannot be inferred. Response acquiescence is common in questionnaires that tend to determine habits that are considered taboo or have negative connotations. Despite the limitations, the current study provided useful information that may inform future oral health education approaches of patients about dental phobia.

Conflict of interest

The authors declare there are no conflicts of interest.

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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.



Access to emergency drugs and equipment among South African dentists

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ABSTRACT

Introduction

General dental practitioners must be proficient in using emergency drugs and equipment during medical emergencies. Concerns persist about the adequacy of South African general dental practitioners' emergency supplies.

Aims and objectives

To evaluate South African general dental practitioners' access to emergency drugs and equipment and develop a medical emergency drug and equipment list for practitioners.

Methods

A prospective mixed-methods study employed a Knowledge, Attitudes, Practices and Beliefs (KAPB) survey among South African general dental practitioners. Data analysis included descriptive statistics and frequency distributions in Microsoft® Excel®.

Results

Emergency services were available to only (**n**=237, 65.8%) of participants. Sphygmomanometers were available to (**n**=180, 50%), with limited access to automated external defibrillators (**n**=38, 10.6%). No tranexamic acid was available to any participant and aspirin was accessible to (**n**=161, 44.7%). Oxygen supplies were recorded as (**n**=106, 29.4%) and (**n**=132, 36.7%) had access to EpiPens®. Reliance on external services (**n**=46, 35.1%), financial constraints (**n**=39, 29.8%), drug expiration (**n**=26, 19.8%), negligence (**n**=37,

13.7%), lack of confidence (**n**=18, 13.7%) and maintenance challenges (**n**=5, 3.8%) hindered procurement of emergency supplies.

Conclusion

South African general dental practitioners lack confidence in using emergency drugs and equipment, hindered by complacency and cost-related concerns. This article proposes an emergency drug and equipment list, and incorporates a dental emergency flowchart for general dental practitioners.

Keywords

General dental practitioners, medical emergency management, emergency drugs and equipment, preparedness.

Abbreviations

AED	Automated external defibrillator
AHA	American Heart Association
GDP	General dental practitioner/dentist
GDPs	General dental practitioners/dentists
KAPB	Knowledge, Attitudes, Practices and Beliefs
ME	Medical emergency
MEs	Medical emergencies
SA	South Africa
SADA	The South African Dental Association

INTRODUCTION

A medical emergency (ME) can occur at any time, though the risk of medical emergencies (MEs) occurring in a dental setting may be greater during invasive oral surgical procedures. It is therefore essential that general dental practitioners (GDPs) are prepared to appropriately manage emergency situations.¹ It is further the responsibility of GDPs to ensure that all auxiliary dental personnel are appropriately educated and trained to assist in the management of in-office MEs.² This may reduce the morbidity and mortality associated with MEs during dental treatment.^{2-3,14}

In France and Belgium, GDPs are confronted with at least one ME in a 12-month period.⁴ In the US, the American Dental Association Council of Scientific Affairs revealed that in the lifetime of every four GDPs, three are confronted with patients who present with a life-threatening ME.⁵ The association further states that one in every 20 GDPs may be confronted with a patient in cardiac arrest.⁵ Atherton reported that GDPs in Great Britain encounter MEs on average once every three to four years.⁶⁻⁷ Moreover, a survey conducted by Malamed revealed that 96.6% of GDPs encountered an in-office ME over an average practice lifetime of 20 to 30 years.⁸ Reports reveal that the most common MEs in dental practice are anaphylaxis, angina, asthma attacks, fainting, a hypertensive crisis, hyperventilation, hypoglycaemia, orthostatic hypotension, pre-syncope, seizures and vasovagal

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Author's contribution

1. Steve Swanepoel – principal author, study conceptualisation and design, literature review, intellectual content, dental emergency flowchart review, participant recruitment, funding, data- and statistical analysis, manuscript layout, preparation and write-up, proofreading, editing and review. Contribution: 100%
2. Karl-Heinz Merbold – second author, intellectual content, participant recruitment, manuscript layout, preparation and write-up, proofreading, editing and review. Contribution: 100%
3. Tinesha Parbhoo – third author, dental emergency flowchart conceptualisation, design and review. Contribution: Manuscript review.

syncope.^{2,8-12} Even though the majority may not impose life-threatening outcomes, appropriately managing such events should not be of less importance than dental intervention itself.¹³ According to the American Heart Association (AHA) nearly 350,000 patients succumb to cardiac arrest annually in the US¹⁵⁻¹⁶ and therefore recommends that every healthcare professional's office in the US should be equipped with an automated external defibrillator (AED). Past studies have revealed that GDPs lack confidence to manage MEs.¹⁷ This may be due to a lack of training or the absence of appropriate emergency drugs and equipment.^{10,18}

The prevalence of MEs is increasing in dental practice, with several studies suggesting that emergency management skills of GDPs are substandard, even if practitioners may have positive self-reported proficiency levels.^{9-11,19-24} The Department of Oral and Maxillofacial Surgery at the Brooklyn Hospital Center in New York developed an in-depth guide in 2016 on preparing for emergency medical situations in dental settings.² This report provides the GDP with a list of emergency drugs, equipment and checklists/worksheets advised for the dental office. They further suggested using impromptu emergency scenarios and having emergency contact details accessible to all staff members.² Other independent studies appear to have drawn similar conclusions.²⁵⁻²⁶

Locally, the Resuscitation Council of Southern Africa serves as an elective coordinating body with the aim to promote and direct theoretical education and practical training in resuscitation.²⁷ Resources such as academic publications, algorithms in systems of care, and emergency equipment supplier contact details are available publicly.²⁸ The South African Dental Association (SADA) furthermore provides an open access dental emergency flowchart on their website.²⁹ This chart provides a step-by-step process for the management of MEs and is suitable for use by all GDPs and their staff. A section of this study delved into a more recent review of this flowchart.

Owen and Mizra conducted a study in South Africa (SA) in 2013 to assess the preparedness of GDPs to manage MEs.³⁰ Their study reported that 37% of participants had encountered multiple MEs over a 12-month period and 15% of participants had no access to emergency armamentaria. These authors also established that private GDPs in SA do not have sufficient access to emergency equipment and drugs in their practices.³⁰ To our knowledge, the recommendations of Owen and Mizra regarding the formulation of an emergency equipment and drug list has not been implemented in general dental practice in SA. Therefore, we saw it as essential to re-investigate the current situation in SA regarding GDPs' access to and knowledge of the use of emergency drugs and equipment in the management of MEs. We aimed to expand on Owen and Mizra's study by being more inclusive. A Knowledge, Attitudes, Practices and Beliefs (KAPB) survey aimed at GDPs from the public, private and academic sectors could provide a more accurate description and strengthen the previous researchers' recommendations.

METHODS

The study was approved by the Faculty of Health Sciences Research Ethics Committee at the University of Pretoria (Reference no: 564/2021). In addition, it was conducted in accordance with the ethical biomedical research protocols of the World Association Declaration of Helsinki of 1975 (most recent update, October 2012). Given a target population of

6,059 it was essential that a sample size with a minimum of 358 participants be obtained to achieve results within an accuracy of 5% and a confidence interval of 95%. The sample size was formulated from guidelines for sample size estimation in clinical research as proposed by Hulley et al (2007).³¹ A mixed-methods prospective research design was employed for data collection through an anonymous, cross-sectional KAPB survey created using the Qualtrics DesignXM™ platform, which is provided by the University of Pretoria to support students in conducting academic research. The survey was validated through a structured process to ensure reliability and applicability to the study population which involved multivariate regression analysis to confirm survey components.⁶⁸⁻⁷¹ Face validity was conducted to ensure that questions appear relevant and understandable to respondents. Content validity followed, where authors reviewed survey items for completeness which was subjected to a pilot study to enhance the survey's clarity and effectiveness based on feedback from the pilot study's respondents. The questionnaire was consecutively distributed, electronically, to GDPs in public and private sectors in all provinces in SA. Results were thereafter descriptively reported using frequency distributions and Microsoft® Excel® was employed for exploratory data analysis. Responses were thematically coded by using an open-ended coding strategy as proposed by Braun and Clarke.³⁹ Variables were evaluated using simple descriptive statistics.

MEASUREMENTS

Quantitative assessment involved measurement of binary categorical dependent variables where participants had to indicate which emergency drugs and armamentaria they had at their disposal in their clinical setting and if they have access to ME services. Qualitative assessment from continuous numerical dependent variables consisted of independent individual structured reflections of open-ended questions to evaluate opinions on shortcomings regarding drugs and equipment in their respective clinical settings. This included thoughts on what the participants perceived the reasons are for a lack of drugs and equipment within their setting (if applicable). The assessment as part of the questionnaire was formulated based on review of AHA guidelines (2020).³²⁻³⁸

RESULTS

Four hundred and seventy participants completed the questionnaire. Response rate was 6.5% with an accuracy of 5% at 95% confidence interval. Three hundred and sixty respondents were included. Most participants had access to emergency medical services within their immediate vicinity ($n=237$, 65.8%). Exactly half of participants ($n=180$, 50.0%) had access to blood pressure machines (sphygmomanometers). Low accessibility to an AED was reported ($n=38$, 10.6%) and the availability of oxygen cylinders with standard fittings and oxygen masks was ($n=106$, 29.4%). Respondents demonstrated a proficiency in AED use of ($n=71$, 19.7%) and EpiPens® ($n=120$, 33.3%). The drug most readily available was aspirin ($n=161$, 44.7%). Among the other emergency drugs, tranexamic acid was the least available, with zero availability. Figure 1 demonstrates the statistics that were recorded in terms of the listed emergency drugs and armamentaria: Adrenaline [1:1000/1:10 000] or EpiPen® ($n=132$, 36.7%), antihistamine ($n=143$, 39.7%), Corticosteroids/Cortisone (eg Prednisone) ($n=87$, 24.2%), Dextrose ($n=117$, 32.5%), Diazepam/Lorazepam (or similar) ($n=79$, 21.9%), Intralipid® 20% ($n=18$, 5%), Salbutamol/

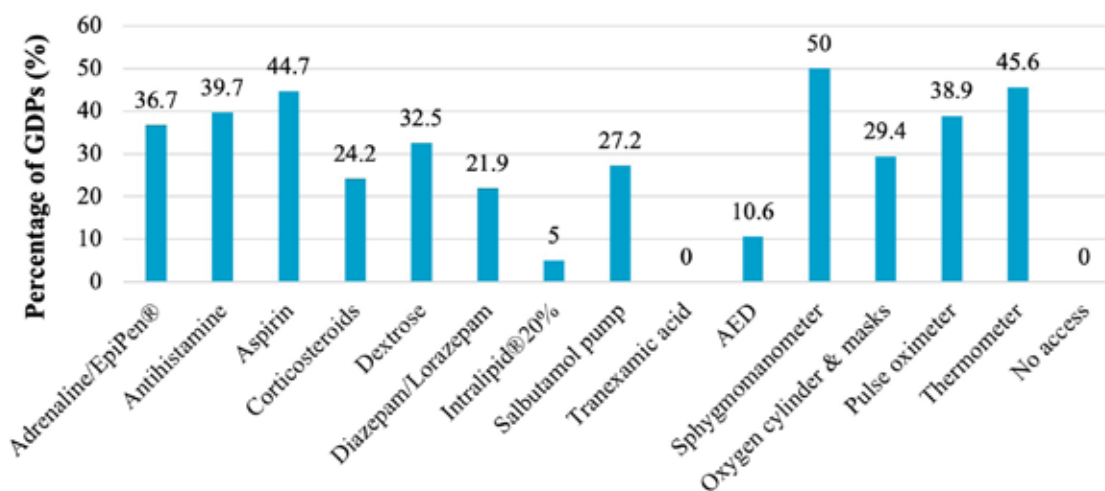


Figure I: Emergency drugs and equipment

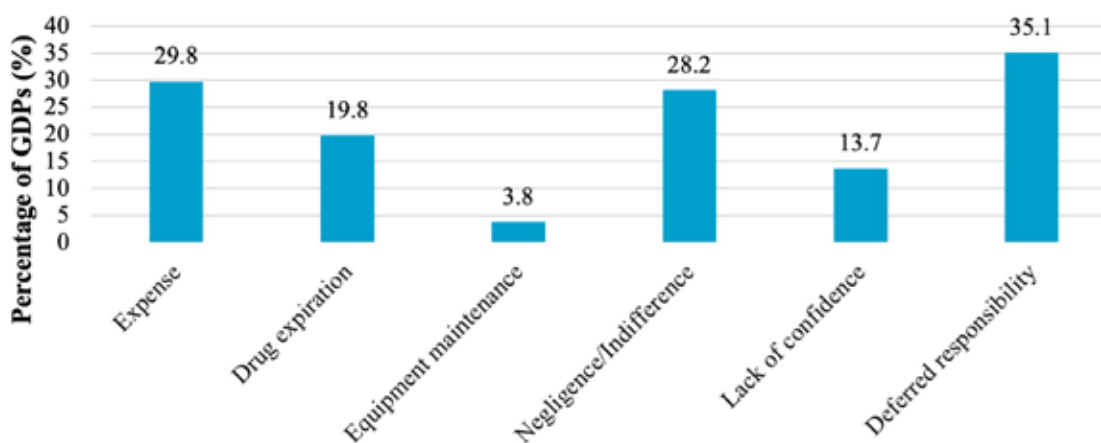


Figure II: Response

asthma pump/bronchodilator ($n=98$, 27.2%), pulse oximeter ($n=140$, 38.9%) and a thermometer ($n=164$, 45.6%). Zero percent of participants reported to have no access to emergency drugs and equipment.

Of the total of 360 participants ($n=131$, 33.9%) provided answers to the instruction “Give information as to why you think some items are not at your disposal” demonstrated in Figure II. A nearby medical centre for referrals was mentioned in ($n=46$, 35.1%) of these responses. Financial constraints hindered procurement for ($n=39$, 29.8%) responders and ($n=26$, 19.8%) reported drug expiration as a barrier to acquiring emergency drugs. In ($n=37$, 28.2%) of responses the participants mentioned that an indifferent attitude by staff or supervisors in the dental set-up contributed towards items not being available.

DISCUSSION

MEs are a concern in dentistry. It is crucial for every member of the dental team to understand their responsibilities and work in partnership with emergency medical providers. Awareness of the signs and symptoms of MEs, along with appropriate management of auxiliary staff, will enhance the efficacy of emergency management protocols.²⁻³ Patient safety may be improved through a solid grasp of emergency management principles, ongoing training in emergency care

and frequent practice of first-aid skills.^{2,3,14,40-45} Many reports on MEs in dental offices worldwide have been published.^{6,47-51} Several studies have examined the skills and attitudes of GDPs in CPR, their preparedness for MEs and the availability of emergency drugs and equipment.^{23,45,52-54}

Additionally, differences in the management of MEs in private, public and academic dental sectors have received limited attention. The objective of attaining a sample size of 358 responses set during the power calculation was slightly exceeded by obtaining 360 usable responses in order to obtain results within an accuracy of 5% and a confidence interval of 95% as proposed by Hulley et al (2007).³¹

The response rate of 6.4% was, however, very low. This may most likely be attributed to the study’s voluntary nature and the comprehensive nature of the questionnaire. Some participants only partially completed the survey, possibly due to survey fatigue. It’s worth noting that the response rate is lower compared to other studies because this study aimed to include GDPs across all provinces and sectors in SA. According to study findings by Bhayat et al,⁵⁵ statistics from 2016 revealed a count of 6,125 GDPs. To enhance response rates, consecutive distributions were sent through Medpages International SA and SADA. The responses received met the minimum required sample size for a statistically significant outcome.

Access to medical emergency services

The majority of participants ($n=237$, 65.8%) had access to nearby emergency medical services. The type of service provided by GDPs may vary according to the area in which they practice. This service may include a healthcare response system which incorporates first responders/paramedics, ambulance services, a hospital department emergency room/casualties, mobile clinics or doctors' rooms. It is comforting to know that almost two-thirds of GDPs have access to ME services. Those who, however, lack access to emergency medical services may be exposed to life-threatening risks as patients encounter unexpected complications in the dental office, whether procedure-related or not.

Access to emergency equipment

Just more than half of participants reported having access to blood pressure monitors ($n=180$, 50%). This is similar to the findings of a previously conducted South African study by Owen and Mizra, who reported that 51% of their participants had access.³⁰ However, the accessibility to AEDs remains notably limited, with only ($n=38$, 10.6%) of GDPs having access. While the result is still worrisome it is again in line with Owen and Mizra³⁰ for GDPs but higher when compared to an international study by Müller et al.¹⁰ Cost might be the motivating factor in this discrepancy. The low availability of AEDs in general dental practice likely indicates a lack of preparedness for sudden cardiac emergencies in dental settings. The availability of oxygen cylinders with standard fittings and oxygen masks was reported by ($n=106$, 29.4%) of GDPs, which is 12.6% less than that of Owen and Mizra.³⁰ The idea that GDPs lack access to oxygen may arise from the fact that standard dental procedures typically do not necessitate the use of oxygen, as patients are usually conscious and breathing independently. Nevertheless, in scenarios involving sedation or anaesthesia, oxygen plays a crucial role in ensuring safety within dental practices. In practices where the former are not performed, GDPs may not see a need to procure oxygen cylinders and Ambu bags. It is therefore worth exploring further improvements in this aspect as it appears as if though preparedness is declining in SA.

Variability in drug availability

Among the examined drugs, aspirin was reported as the most available option ($n=161$, 44.7%) and tranexamic acid being the least available emergency drug, with no GDPs having access. This raises questions about the potential impact on the effective management of haemorrhagic emergencies within dental practice. Persistent bleeding increases the risk of haematoma formation and secondary infections, which can compromise the healing process.⁵⁶ Infection risk rises when there is an open wound with continuous bleeding, potentially leading to localised or systemic infections.⁵⁷ Uncontrolled bleeding can prolong the recovery period for the patient. Extended healing times may impact the patient's overall wellbeing and quality of life. Failure to manage post-operative haemorrhage adequately could have legal and ethical consequences for GDPs which could result in malpractice claims, damage to professional reputation and regulatory scrutiny. If results from this study are compared to Australia^{18,57-58}, Germany¹⁰ and Great Britain⁶ it appears that South African GDPs are less prepared for emergency management.

Access barriers to emergency medical resources

GDPs face challenges in accessing emergency medical resources. These obstacles negatively influence the readiness of GDPs to manage emergencies effectively. Three-quarters

of respondents have access to a nearby centre for referral ($n=237$, 65.8%). This suggests that the vast majority of GDPs may have a reliable avenue for transferring patients in critical situations, which is encouraging. This points to the importance of a collaborative approach between dental and medical facilities for comprehensive patient care. A nearby centre to manage emergencies can be pivotal in cases where the dental office might not have all the necessary resources. GDPs should, however, not rely solely on referring patients for urgent care, but should rather strive to enhance their skills to manage MEs when they do occur in the dental setting. It might be regarded as a luxury to have these services nearby; therefore GDPs should equip themselves to be competent.

Financial constraints and procurement challenges

A quarter of respondents ($n=39$, 29.8%) reported financial constraints as a primary factor contributing to the shortage of emergency resources in their practices. Addressing this issue is imperative to ensure adequate preparedness for MEs. Potential solutions include adjusting service tariffs to better accommodate emergency resource procurement and exploring alternative approaches to the acquisition of disposable medical supplies. One such approach could involve exchanging near-expiry drugs with emergency centres that utilise them more frequently, establishing collaborative agreements with pharmacies or implementing stricter inventory management protocols to monitor medication expiry dates within dental practices. Additionally, the perceived high cost of emergency training courses could be mitigated if increased attendance among GDPs leads to greater financial viability for course providers. It is essential to recognise that the consequences of an inadequately managed ME extend beyond the GDP, potentially affecting patients, staff and the broader professional community. The financial burden of emergency preparedness should therefore be weighed against the ethical responsibility of safeguarding human life. These findings underscore the direct relationship between access to emergency resources and the ability of GDPs to respond effectively to critical situations. Overcoming these barriers is essential to enhance patient safety and reinforce GDPs' confidence in managing MEs.

Given the complexity of potential emergencies in dental practice, there is a clear need for a comprehensive yet practical emergency drug and equipment list. This study identifies existing resources while integrating practitioner insights on essential emergency preparedness measures. However, recommendations must align with established literature. The emergency drug and equipment list was formulated based on a comprehensive literature review,^{2,6,13,59-67} assessing multiple published articles to identify a consistent pattern of essential drugs for inclusion. Additionally, qualitative responses were incorporated from the study findings, engaging in author discussions to determine the most relevant information for the dental setting to ensure a well-rounded and evidence-based selection. The inclusion or exclusion of specific items was determined based on their clinical relevance, accessibility and practicality in a dental setting, with emphasis on drugs essential for managing life-threatening emergencies while omitting those deemed redundant, impractical or outside the scope of routine dental practice. Table I presents a list of essential equipment, while Table II outlines an emergency drug list. Additionally, Figure III features a revised dental emergency flowchart designed to enhance preparedness in dental offices, ensuring effective management of medical emergencies until advanced medical support is available.

The revised dental emergency flowchart, updated in 2022, provides a structured guide for managing MEs in dental practice. Initially made available to members of SADA, it has since been made accessible online to non-members as well. This resource serves as a critical reference for dental professionals, ensuring they can effectively respond to emergency situations with clear, evidence-based protocols and is available from:

<https://www.sada.co.za/sites/default/files/content-files/Clinical%20Templates/Emergency%20Flow%20Chart%2010-10-2022.pdf>

Table I. Recommended emergency equipment list

Equipment	Clinical indication
Automated external defibrillator (AED)	Defibrillation of cardiac arrhythmia
Bag-valve mask with oxygen reservoir	Ventilation/respiratory support
Oro-pharyngeal airway (size 1 to 4)	
Oxygen cylinder with standard fitting and mask	
Pulse oximeter	
Glucometer	Blood glucose level analysis
Intravenous infusion set	Intravenous drug and fluid administration
Hypodermic needles and syringes	Administration of emergency drugs
Sphygmomanometer	Blood pressure measurement
Thermometer	Evaluation for hypo- and hyperthermia

Table II. Recommended emergency drug list

Emergency drug	Drug classification, clinical indications, adult and paediatric dosage and route of administration	
Adrenaline	Classification	Sympathomimetic agent
	Indications	Anaphylaxis, cardiac arrest, severe bronchospasm unresponsive to salbutamol and shock-related hypotension
	Adult dose	Ampoule: 0.01mg/kg [1:1000] IMI OR 1mg/ml IMI every 3 – 5 minutes Autoinjector (EpiPen®): 0.3ml IMI
	Paediatric dose	Ampoule: < 6 yrs [1:1000] 0.15ml IMI every 3 – 5 minutes 6 – 12 yrs [1:1000] 0.3ml IMI every 3 – 5 minutes > 12 yrs [1:1000] 0.5ml IMI every 3 – 5 minutes Autoinjector (EpiPen®): 0.15ml (< 6 yrs); 0.3ml IMI (> 6 yrs)
Aspirin (acetylsalicylic acid)	Classification	Non-steroidal anti-inflammatory agent
	Indications	Angina pectoris, ischaemia and myocardial infarction
	Adult dose	Non-enteric coated chewable tablet (160 – 325mg) placed sublingually
Ammonia inhalant	Paediatric dose	Not advised
	Classification	Category II respiratory stimulant
	Indications	Vasovagal syncope
Glucose	Adult dose	Crushed 0.3ml held away from face for inhalation
	Classification	Glycogenolytic agent
	Indications	Hypoglycaemia in conscious patient and able to swallow
Glucagon	Adult dose	15 – 20g fast acting carbohydrate
	Classification	Glycogenolytic agent
	Indications	Hypoglycaemia in unconscious patient/unable to swallow
Diazepam Lorazepam Midazolam	Adult dose	1mg IMI
	Paediatric dose	< 8 yrs (< 25 kg): 0.5mg IMI OR > 8 yrs (> 25 kg): 1mg IMI
	Classification	Benzodiazepine
Diphenhydramine Promethazine	Indications	Convulsions, seizures and status epilepticus (> 5 min/>3/hr)
	Adult dose	Midazolam: 10mg buccal administration/ 5mg IMI OR Lorazepam: 4mg IMI
	Paediatric dose	1 – 5 yrs: 5mg IMI; 5 – 10 yrs: 7.5mg IMI; 10 – 18 yrs: 10mg IMI
Hydrocortisone	Classification	Antihistamine
	Indications	Mild/delayed onset allergic reaction
	Adult dose	25mg IMI/slow IMI
Hydrocortisone	Paediatric dose	25mg IMI/slow IMI (contra-indicated < 2 yrs)
	Classification	Corticosteroid
	Indications	Adrenal insufficiency (Addisonian crisis), allergic reaction, severe asthmatic attack and severe shock
Hydrocortisone	Adult dose	100-200mg IMI/IMI
	Paediatric dose	< 11 yrs: 4mg/kg IMI/slow IMI (max 100mg); > 12 yrs: 100-200mg IMI/slow IMI

Intralipid	Classification	Sterile non-pyrogenic fat emulsion
	Indications	Local anaesthetic toxicity
	Adult dose	1.5ml/kg STAT bolus IVI over 1 minute followed by 15ml/kg/hr IVI
Naloxone hydrochloride	Paediatric dose	
	Classification	Opiate antagonist
	Indications	Opioid overdose
Nitroglycerine (glyceryl trinitrate)	Adult dose	0.4mg IVI every 5 minutes until improvement
	Paediatric dose	0.1mg/kg IVI
	Classification	Vasodilator
Crystalloid solutions (Lactated Ringer's/ Saline)	Indications	Acute chest pain (with history of angina pectoris and/or signs and symptoms of myocardial infarction)
	Adult dose	Sublingual/translingual application (1 tablet/1 – 2 sprays/powder sachets)
	Paediatric dose	0.25 to 0.5 mcg/kg/min IVI
Salbutamol inhaler (nebuliser/spacer)	Classification	Crystalloid
	Indications	Intravascular volume loss replenisher and treatment of electrolyte imbalance
	Adult dose	500ml IVI warmed bolus
Tranexamic acid	Paediatric dose	20ml/kg IVI warmed bolus
	Classification	β_2 -adrenergic agonists/bronchodilator stimulant
	Indications	Acute wheezing, bronchospasm secondary to asthma
	Adult dose	2 inhalational sprays
	Paediatric dose	
	Classification	Antifibrinolytic agent
	Indications	Haemorrhage control
	Adult dose	10 mg/kg IVI loading dose and max three times daily maintenance
	Paediatric dose	< 2 yrs not advised > 2 yrs: 10 mg/kg IVI loading dose and max three times daily maintenance

Study limitations

Participants' preparedness for MEs was self-assessed, introducing subjectivity and possibly not reflecting actual practices.

Questionnaire surveys are inherently limited and prone to reporting biases.

Uneven distribution of participants across regions and universities may skew results towards larger population centres and certain institutions.

Voluntary participation likely influenced the response rate.

CONCLUSION

This study assessed the preparedness of South African GDPs in managing MEs, focusing on emergency drug and equipment availability. Including practitioners from all provinces and sectors (private, public and academic), the findings revealed areas of concern:

- Lack of confidence and insecurity in the use of emergency drugs and equipment.
- Complacency and absence of incentive to procure emergency drugs and equipment.
- Unwillingness to procure ME drugs and equipment due to the cost of purchase, maintenance and potential expiration.

The data shows that despite positive attitudes, South African GDPs are not adequately prepared for MEs in dental settings, especially regarding emergency drugs and equipment use and its availability. Participants emphasised the need for an emergency drug and equipment list and an emergency flowchart to assist with ME management. This research highlights the importance of educational institutions,

regulatory bodies and professional organisations in improving dental emergency care. Instituting a policy that mandates essential emergency drugs and equipment and adequate training is crucial. Further studies in SA are recommended to validate findings on emergency occurrences, practitioner confidence, knowledge and proficiency.

This study sets the stage for further research to enhance GDPs' competence for safer patient outcomes during MEs. It led to the development of an emergency drug and equipment list and a revised dental emergency flowchart in collaboration with SADA, the University of Pretoria and the University of the Witwatersrand.

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DECLARATIONS

Conflict of interest

The authors have no financial, commercial or any other associated interests to declare that represent a conflict of interest about the research undertaken and all other aspects related to the content of this paper.

DENTAL EMERGENCY FLOW CHART

Provincial Ambulance: Land line: 10177
 Cellphone: 112/911
Private Ambulance: 082 911/ 084 124
Poison control: 0800 333 444
Numbers are subject to change please consult your directory.

PREVENTION

1. Update medical history at every visit.
Check drug allergies.
2. Update contact details of patient's medical doctor/ physician at every visit.
3. Ensure that the patient has taken their usual medication.



SADA
 THE SOUTH AFRICAN
 DENTAL ASSOCIATION

HOW TO MAKE AN EMERGENCY CALL

- Give the operator your name, and telephone number immediately in case you are disconnected.
- Give as much detail as possible of your location (address, the building, room number, describe the building or house, give well known landmarks, eg., school, halls, shopping centre, etc.).
- Give time of incident to operator (particularly important with stroke patients), NB Time is brain.
- Describe the nature of your emergency as fully as possible.
- Stay on the line for as long as the operator asks you to, if you are able to do so.

COLLAPSED PATIENT



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Figure III. Revised and restructured dental emergency flowchart¹

Source: SADA. Reprinted with permission from Dr T. Parhboo (Head: Clinical Support Services, SADA). Reviewed by the principal author in collaboration with the following scholars: Dr T. Parhboo (Head: Clinical Support Services, SADA), Adjunct Professor F. Motara (Academic Head: Emergency Medicine Division, Department of Family Medicine and Primary Care, Division of Emergency Medicine, University of the Witwatersrand), and Dr V. Lalloo (Specialist Emergency Physician (MMed (Emergency Medicine)) academic program coordinator, Steve Biko Academic Hospital, School of Medicine, Faculty of Health Sciences, University of Pretoria).

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Salivary duct carcinoma – review of literature and report of a case

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ABSTRACT

Salivary duct carcinoma (SDC) is a rare, highly aggressive malignancy that arises from the excretory ducts of the salivary glands and, histomorphologically, it resembles a high-grade ductal carcinoma of the breast. The tumour accounts for about 10% of all malignant salivary gland tumours with frequent local recurrences, local and distant metastasis and poor survival rate. Early detection of the tumour followed by appropriate treatment and regular follow-ups is paramount as it may improve the survival rate of patients. This paper aims to review literature and also report this rare, aggressive tumour encountered in the parotid gland of a 49-year-old African male patient.

Keywords

Salivary duct carcinoma, parotid gland, comedonecrosis, squamous differentiation

INTRODUCTION

In the revised histologic classification of the salivary gland neoplasm by the World Health Organization in 1990, the term salivary duct carcinoma (SDC) was officially recognised as a clinicopathological entity, though it was first described in 1968.^{1,2} This was based on histological characteristics comparable to that of invasive ductal carcinoma of the breast and prostate.³ The tumour has also been termed cribriform salivary carcinoma of excretory ducts, infiltrating salivary duct carcinoma and intraductal carcinoma.^{4,5}

SDC is an uncommon, high-grade malignancy that represents about 10% of all salivary gland malignancies and about 0.9%-6% of all parotid tumours. It can arise de novo or from a pre-existing pleomorphic adenoma.^{6,7,8} The tumour has a prevalence in males between 50 and 60 and the parotid gland is the commonly affected site.^{6, 9,10} The lesion usually presents as a rapidly growing firm mass that may infiltrate extracranial branches of facial nerve. It has a potential to metastasise through the temporal bone via

perineural spread.^{9,10} Treatment is usually radical surgery followed by post-operative adjuvant radiotherapy as the tumour is aggressive. Chemotherapy has shown to be effective in the metastatic form of SDC.^{11,12}

To the best of our knowledge, there are no reported cases of SDC of the major salivary gland in South Africa; hence, we considered it appropriate to report this case as an addition to the very few cases already documented in Africa.^{13,14} The only five South African SDC reported were from the minor salivary glands.¹⁵

CASE REPORT

A 49-year-old black male with no comorbidities presented with facial asymmetry due to a rapidly growing painless firm mass of four-month duration on the left parotid gland extending to the adjacent cheek. The lesion measured approximately 6.0 x 5.5 x 5.0cm. No facial nerve palsy was noted. There was no previous history of tobacco use or alcohol consumption.

Relevant investigations were planned but the patient absconded, to return five months later. The mass had enlarged to measure about 12 x 10 x 10cm. It was still not painful but the overlying skin was fixed to the lesion. The left facial nerve was still intact and the cervical lymph nodes were not palpable. On intraoral examination, there was a large ulcerated exophytic lesion, with some areas of surface necrosis. The lesion occupied most of the left upper and lower buccal vestibules (Figure1).

A computed topography (CT) scan revealed a heterogeneous, minimally enhancing soft tissue mass with multilocular cystic areas of the left parotid extending to the adjacent cheek with no infiltration to the surrounding bone (Figure 2). The lesion measured 8.6 x 7.5 x 6.6cm. No clear fat plane between the gland and the mass was noted. There were some radiopaque nodules identified in the right middle and lower lobe as well as the left anterior upper segment of the lungs (Figure 3) which could possibly be metastases. All other organs appeared intact. A malignant salivary gland neoplasm was suspected and incisional biopsy was then done.

Histological examination of the specimen showed a malignant salivary gland neoplasm characterised by multiple large, medium and small islands of epithelial cells exhibiting solid and cribriform growth pattern. Extensive comedonecrosis was observed in numerous tumour islands (Figure 4). Few malignant ductal structures were also present, some showing intraductal growth (Figure 5a). There were also multiple nodules of squamous cells observed within the tumour islands (Figure 5b). The tumour cells were predominantly round with vesicular to hyperchromatic nuclei and moderate nuclear pleomorphism. There was brisk mitotic activity with more than 15 atypical mitotic figures per 10hpf and the proliferative index of approximately 70%-80% as detected

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3. TO Adedoja (20%)

by Ki-67 (Figure 6e). No evidence of lymphovascular and perineural invasion were observed in the examined sections. The tumour cells stained diffusely and strongly positive for AE1/AE3, p63 and CK7 (Figure 6a,6b,6c). There was diffuse but faint positivity for c-ERBB2 /HER2 (Figure 6d). The tumour cells stained negative for prostate specific antigen (PSA), estrogen (ER) and progesterone (PR). A final diagnosis of salivary duct carcinoma with squamous differentiation was made.

Chemo-radiation was chosen as the treatment modality; however, the patient absconded to return nine months later as an emergency case. About 20Gy of radiation was given as palliative treatment. Unfortunately, he died five months later.



Figure 1. Large ulcerated exophytic lesion with some areas of surface necrosis and haemorrhage occupying the left upper and lower vestibule.

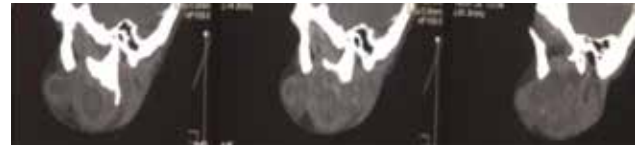


Figure 2. CT scan showing heterogeneous, minimally enhancing soft tissue mass with multilocular cystic areas of the left parotid.

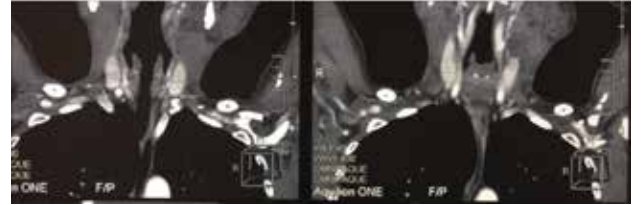


Figure 3. Radiopacities in both the left and the right lung.

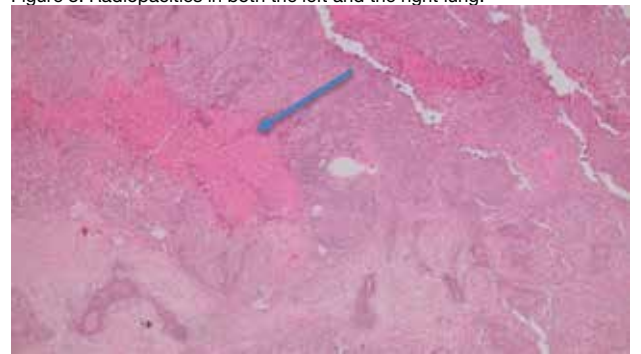


Figure 4. H&E – a large tumour island with comedonecrosis. The blue arrow indicates the comedonecrosis. Magnification: 5hpf.

DISCUSSION

SDC is a rare, high-grade salivary gland malignancy that represents <1.8% of all major salivary gland tumours and about 5%-10% of all salivary gland malignancies.^{1,2,8,10,16,17}

Literature also supports the scarcity of SDC in Africa. In a study where a 10-year multicentre epidemiological study was undertaken in Nigeria, only 6 (1.9%) SDC out of 308 salivary gland malignancies were diagnosed.¹³ Of the five major salivary gland carcinomas identified among studies reported worldwide, SDC is not among the mentioned, emphasising its rarity.¹⁴ Additionally, South Africa lacks reported data on the incidence of SDC of major salivary glands.

Although there are no known etiological factors associated with SDC, there have been cases related to autoimmune disease such as IgG4-related sclerosing disease of the parotid and one associated with long-standing chronic obstructive sialadenitis.^{18,19,20,21} About 60% of SDC arise de

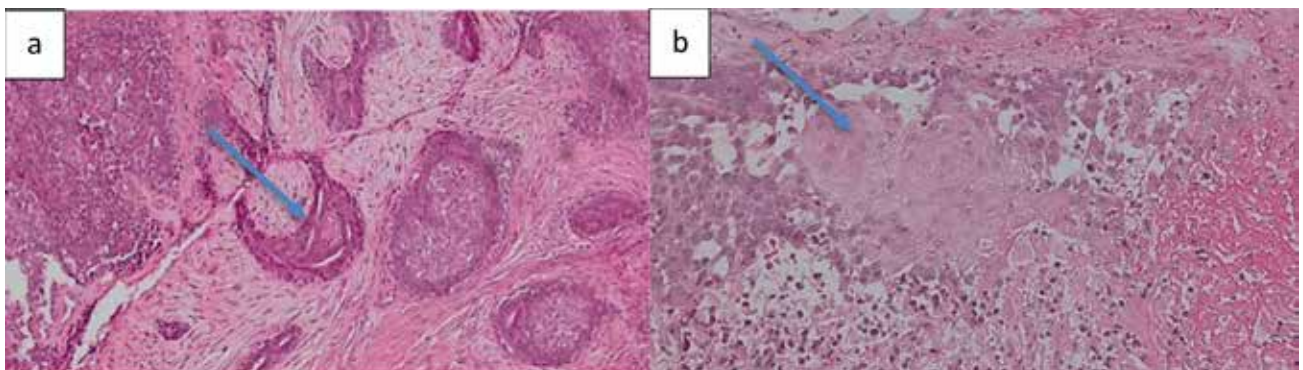


Figure 5. Blue arrows show evidence of intraductal growth, in-situ features (a) and squamous differentiation (b). Magnification: 10hpf and 20hpf (b) respectively.

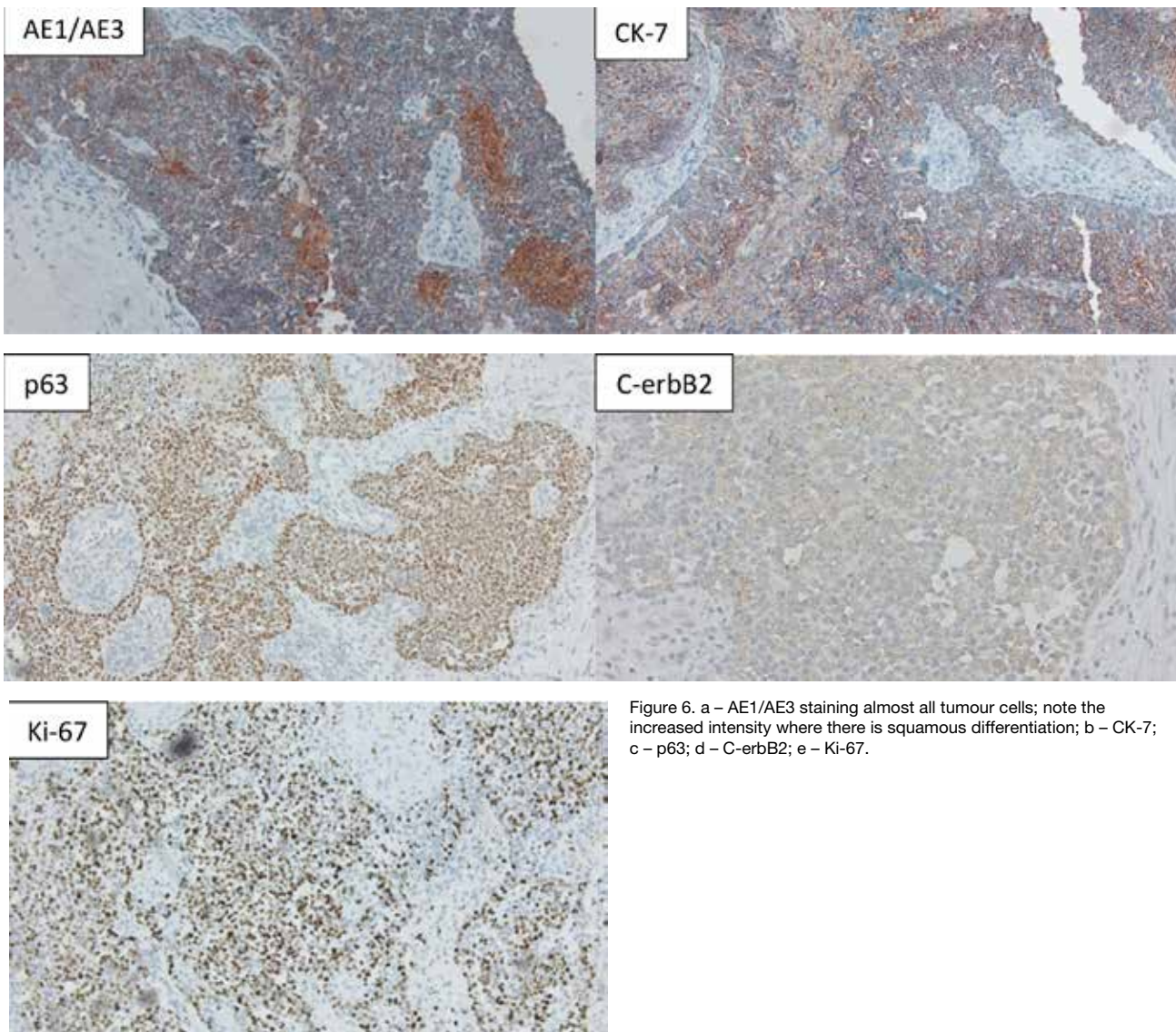


Figure 6. a – AE1/AE3 staining almost all tumour cells; note the increased intensity where there is squamous differentiation; b – CK-7; c – p63; d – C-erbB2; e – Ki-67.

novo with the remaining 40% from pre-existing pleomorphic adenoma.^{5,7,8,9} The malignant transformation of ductal epithelial cells could be the reason for SDC to arise in pre-existing pleomorphic adenoma.⁵ However, there has been a case of SDC arising in polymorphous low-grade adenocarcinoma of the palate.¹⁸ Smoking and alcohol consumption were found to be the associated risk factors in some patients.²² The identified molecular causes of SDC include mutation of TP53, PIK3CA and HRAS and loss of PTEN; amplification of MYC, CDK4/6, PIK3R1, ERBB2 and deletion of CDKN2A.^{23,24} Interestingly, none of the outlined aetiological or risk factors was established in our case. This raises the possibility that certain unidentified factors may play a role in the development of SDC. Molecular investigations were not done in our case; however, expression of c-ERBB2 could indicate possible association.

Literature survey revealed that SDC exhibits significant male predilection with at least a 4:1 male to female ratio with most of the patients being between 50 and 60.^{4,5,11, 25} The parotid gland was found to be the most frequently involved site^{6,10,11,21,22,25} though cases have been reported in the submandibular gland and occasionally in the minor salivary glands.^{19,26,27} Our case is comparable with those reported in the literature as the patient was a male in his 50s and the tumour was encountered in the parotid gland.

The tumour usually presents as a rapidly growing firm large mass that may involve the extracranial branches of the facial nerve and has a tendency to metastasise through the temporal bone via perineural spread.^{8,9} It has also been shown to have a potential for extra glandular invasion, and high incidence of regional and distant metastases, leading to tumour-related death.²¹ In a single institution's 20-year experience, where 40 patients with SDC were analysed, 42.5% presented with facial nerve pain and 32.5% showed paralysis. Cervical lymphadenopathy and lymph node invasion were seen in 30% and 40%-80% of patients respectively.⁸ Neither nerve paralysis nor cervical lymphadenopathy were noted in our patient, although lung metastasis was suspected. There was evidence of rapid growth as the tumour attained almost double its size within five months. Clinically, any type of primary aggressive/high grade salivary gland malignancy could be suspected and metastatic tumours.

CT scan and Magnetic Resonance Imaging (MRI) are usually non-specific but they are helpful in the diagnosis and management of malignancies. They can indicate the malignant nature of the tumour by showing ill borders or an infiltration of the adjacent tissue.⁹ PET/CT scan is found to be more accurate than CT scan and MRI and it plays a significant role in providing more accurate diagnostic information for the

evaluation of high-grade salivary gland malignancies. It also has a major impact on treatment decision making.²⁸ Only CT scan was performed in our case and it highlighted the extent and the nature of the tumour.

Fine needle aspiration biopsy is considered to be accurate and reliable in classifying SDC as a malignant neoplasm; however, it was found to be inaccurate in determining a specific tumour type.²⁹ Hence, it is crucial to perform an incisional tissue biopsy to accurately specify the tumour type when malignancy is suspected. It is for that reason why an incisional biopsy was performed in this case as there were already overt signs of malignancy.

Microscopically, SDC exhibits small to large ducts with comedonecrosis, cribriform and "Roman-Bridge" like features resembling high grade ductal carcinoma of the breast. Both lymphovascular and perineural invasion are common.^{10,11} The tumour cells are typically apocrine, oncocytoid and may exhibit abundant eosinophilic to granular cytoplasm and large pleomorphic nuclei with coarse chromatin and prominent nucleoli.⁶ There is usually an increase in mitotic figures with proliferative index of more than 25%¹¹ although, in our case, there was high proliferative index of 70%-80%. Several histological variants have been described such as sarcomatoid, mucin-rich, papillary, invasive micropapillary, oncocytic and pure in situ cases.^{6,11} Squamous differentiation was observed in fewer cases and is deemed a rare aggressive variant with some resemblance to squamous cell carcinoma.³⁰ An interesting finding in our case is the evidence of ducts with in situ features and also the presence of squamous differentiation in various islands as demonstrated in Figures 5a and 5b respectively.

Although SDC is generally diagnosed on hematoxylin and eosin stain, a number of studies have shown the importance of immunohistochemistry.^{5,7,25} The tumour cells usually express androgen receptor (AR), CK7, AE1/AE3, common epithelial antigen (CEA) and epithelial membrane antigen (EMA), but there is usually no expression for S100, estrogen (ER), progesterone (PR), cytokeratins 5/6 and 14, p63, Calponin and smooth muscle myosin heavy chain (SMMHC).^{10,11,31,32,33} Additionally, almost all salivary gland tumours stain negative for AR, unlike SDC.^{10,11,31,34} Interestingly, p63 expression was observed in cases of SDC with squamous differentiation.²⁹ This observation is virtually similar to our case wherein the tumour had squamous differentiation and p63 expression. AR was not performed in our setting, however the architecture, cytomorphology and the immunoprofile favoured the diagnosis of SDC.

Of great interest was the increased intensity of AE1/AE3 expression in areas of squamous differentiation. High human-epidermal growth factor receptor-2 (HER2)/c-ERBB2 expression was reported in 25%-30% and 90% of cases, respectively.^{6,10,34} In our case, there was a diffuse, though faint, positivity for c-ERBB2.

Histological differential diagnosis of SDC includes primary oncocytic carcinoma, high-grade mucoepidermoid carcinoma, myoepithelial carcinomas, metastatic melanoma, squamous cell carcinoma, breast ductal carcinoma and prostate carcinomas.¹¹ The presence of comedonecrosis, brisk mitotic activity and intraductal growth or carcinoma in situ was in favour of SDC. Lack of epidermoid cells and goblet cells excluded mucoepidermoid carcinoma. Oncocytic,

myoepithelial and squamous cell carcinomas lack intraductal growth pattern. There were no melanocytic features and cystic differentiation which excluded metastatic melanoma and cystadenocarcinoma, respectively.

Due to the infiltrative nature of SDC, radical surgery is the primary treatment option followed by postoperative radiation therapy to improve the outcome.^{12,21,35,36} Some authors are of the opinion that postoperative radiation therapy is indicated in cases of extraparotid extension, pathological resection margins, cervical lymph node metastasis, lymphatic embolus and/or neurologic invasion. Chemotherapy is generally reserved for metastatic forms of the disease.³⁴ The treatment options corroborate the treatment modality chosen for the case presented as there was possible metastasis to the lungs; unfortunately, the patient absconded, got worse and came back to be given about 20Gy of radiation as palliative treatment, but he later died.

Approximately 60% of patients die of the disease within five years of initial diagnosis despite radical surgery and adjuvant chemo-radiation.^{6,11} The above alarming treatment failures call for exploration of other treatment options or trials. Some authors have reported good treatment outcomes in patients with recurrent SDC who were treated with both Docetaxel and Trastuzumab which is an established combination treatment for advanced breast cancer.^{9,11} Furthermore, androgen deprivation therapy may be applied to treatment of SDC.³⁵ Androgen deprivation therapy, as well as Trastuzumab therapeutic strategies, have achieved positive results in a small number of cases of the head and neck.^{35,37} It is also reported that AR and ERBB2 status in SDC classifies tumours with distinct molecular profiles relevant for future therapy.²³ Presuming our patient was compliant, he could have benefited from treatment with Trastuzumab as the tumour was c-ERBB2 positive.

SDC has poor prognostic factors including lymphovascular invasion, perineural invasion, lymph node metastasis, male gender, age 50 years and older and smoking.^{12,23} The gender and the age of our patient were unfortunately already regarded as poor prognostic factors, hence the patient did not survive. Reports regarding the tumour site to be of prognostic value, indicating the parotid gland to have a positive prognosis compared to submandibular gland and the palate,^{17,38} was found to contradict our experience and that observed in Pittsburg.²² There are several independent prognostic factors including prominent nuclear pleomorphism; high tumour budding; high poorly differentiated clusters and high Ki-67 proliferative index.^{32,38,39,40} Although the tumour cells in our case showed moderate nuclear pleomorphism, the presence of a high Ki-67 proliferative index of 70%-80% alone was equivalent to poor prognosis hence our patient died within a year of initial diagnosis. AR negative SDCs and molecular features such as MYC amplification were also found to be associated with poor prognosis.²³ The tumour also exhibited high recurrence rate, local and distant metastasis.^{6,36} Although lung metastasis was not confirmed in our case it was, however, suspected.

CONCLUSION

SDC is a rare and aggressive tumour with frequent local recurrences, distant metastasis and poor survival rate. Early detection of the tumour followed by appropriate treatment and regular follow-up is of paramount importance as it may improve the survival rate of patients. The presence of

high Ki-67 and squamous differentiation in SDC should be considered as poor prognosis even though the tumour cells exhibit mild to moderate nuclear pleomorphism and the patient does not smoke.

RECOMMENDATION

South African institutions are encouraged to publish the studies on the prevalence of salivary gland tumours from which the prevalence of SDC will be deduced. Furthermore, AR expression should be investigated in all diagnosed SDC.

Informed consent

An informed consent was not obtained from the patient or relatives due to reasons explained to the Ethics committee and the Editor. A letter from the Ethics committee is attached.

Conflict of interest

None.

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CPD questionnaire on page 170

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 (April 2025)

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

1. Accuracy of full arch scans performed with nine different scanning patterns

In recent years, dentistry has embraced the transformative potential of digital scanning technology, redefining how oral health is assessed, diagnosed and treated. Dental digital scanning technology replaces traditional impression techniques with a noninvasive, precise and efficient method of capturing oral structures. It uses a handheld intraoral scanner with high-resolution cameras and advanced imaging capabilities to create 3D digital models of your teeth, gums and surrounding tissues.

With so many manufacturers to choose from, dentists want to know which are the best intraoral scanners for their investment. The most popular scanners, their features and approximate price in US dollars (\$) is shown in the table below.

A complete digital workflow without the process of a conventional impression involves three coordinated steps: data acquisition, data processing and restoration fabrication.¹ The accuracy of the scan, and consequently the data acquisition process, plays a decisive role in this initial step of the digital workflow, as the subsequent steps depend on the quality of this data. Several factors can influence this accuracy. In this context the scanning system and its calibration, experience of the operator and the scanning strategy are critical determinants of the accuracy, in detail trueness and precision of the resulting model data.

For evaluating the accuracy of full-jaw datasets, there is currently no standardised guideline available. Two methods are described in the literature.¹ The first involves using a best-fit algorithm to superimpose test and reference data,

Scanner details	Features	Price in US\$*
Aoralscan	<ul style="list-style-type: none"> • Scan speed 15 frames/second • Data optimisation uses artificial intelligence to help identify and delete extraneous data • Real-time scanning • Realistic colour • User-friendly motion-sensing scanning • Plugs in directly to USD 3.0 port • Offers both .STL and .OBJ output file formats 	11 000
Cerec Primescan	<ul style="list-style-type: none"> • Superior accuracy – processing more than 50,000 images per second • Scans at an incredible density to deliver 3D images instantly • Touchscreen for intuitive use • Comes with a mobile cart 	16 000
Carestream Dental 3600	<ul style="list-style-type: none"> • Uses LED light source • 13mm x 13mm field of view • Anti-fogging technology prevents distortion of accurate images • Handpiece weighs about 11.5oz (326g) • Interchangeable tips in different orientations help you capture scans in hard-to-reach areas • Plugs into USD 2.0 port 	20 000
Condor	<ul style="list-style-type: none"> • Uses 15 white LEDs and 2 blue LEDs as its light source • Lightweight handpiece weighs only 3.9oz (110g) • Scan of a single arch takes 1 minute • Plugs into USD 3.0 port • .STL output files make data transmission seamless • Free software upgrades for the life of the equipment 	13 000
iTero Element	<ul style="list-style-type: none"> • Scans a full arch in as little as 60 seconds • Adaptive anti-fogging technology • Time-lapse system allows patient history visualisation of tooth wear, tooth movement, gingiva • Compatible with Align Technology's Invisalign system 	50 000
Medit i700	<ul style="list-style-type: none"> • LED light source • Scans up to 70 frames/second • Ergonomic handpiece weighs 8.7oz (246g) • Adaptive anti-fogging technology • Plugs into USD C-type port • Full arch accuracy 11 microns • 3D in-motion video technology that allows for full-colour streaming capture • Additional impression scanning and 3D facial scanning features are built in • Modeless crown fitting software reveals whether alterations may be needed to fully seat crown 	20 000
Trios 5	<ul style="list-style-type: none"> • Excellent scanning ability for all indications • Great ergonomics and design • Feature-rich scanner software • Long-lasting battery • Easily connected to visual tools such as monitors, iPads etc • Engagement apps to personalise every patient's experience and boost case acceptance 	30 000

allowing the calculation of metric deviations between the two datasets.¹ However, this method is limited by potential unrecognised misalignments introduced by the software algorithm during the alignment process. The second method uses metrical analysis of real geometric values obtained from reference objects, which are either fixed to an in vitro analysis model or attached to the patient's arch in vivo.¹ The current consensus in literature is that the new generation of intraoral scanners demonstrate convincing accuracy for scans up to a quadrant, with equivalent or even superior accuracy of the generated virtual dental model. However, scanning an entire jaw remains challenging as increased scan distances are associated with cumulative scanning and merging errors, resulting in higher inaccuracies, particularly for full-arch scans.¹ Thus, scanning strategy is important to minimise inaccuracies during the scanning process. Schlögl et al (2025)¹ reported on an in vitro study that sought to systematically investigate the influence of different movement patterns and targeted scan segmentation on scan accuracy. This study evaluated trueness and precision in the in vitro digitisation of a maxillary model using a new generation IOS scanner (CEREC Primescan AC). The null hypothesis was that varying the scanning pattern will not result in significant differences in trueness or precision.

Materials and methods

A maxillary full-arch model made of polyurethane with a homogeneous, matt surface was used as analysis model to conduct the study. A metal bar was inserted in the area of the second molars and used as a reference structure. The reference measurement of the metal bar was carried out with a coordinate measuring machine (CMM) before it was fixed on the analysis model. This measurement was performed at a temperature of 20°C with a maximum permissible error (MPEe) of the CMM of $1.9\mu\text{m} + (3 \cdot L/1000)$, where the parameter L is defined by the real length of the used metal bar. Subsequently, the STL dataset generated by the CMM was imported into the analysis software. The calculated reference length of the metal bar was 55.066mm.

CEREC Primescan AC (software version 2015.3.1.0, Dentsply Sirona) was used for all scans ($n=25/\text{strategy}$). Nine different scanning strategies were developed for direct digitisation, combining the segmentation of the scan area (F=full jaw, H=half jaw and S=sextant) and three different scan movement patterns (_l= linear, _z= zig-zag and _c= combined). During the scan, it was ensured that a maximum of 20mm of the bar ends were captured by the scanner to avoid connection of the complete bar in the virtual dataset. The full length of the bar was not scanned, due to the following reason: the reference bar contains no geometric structures for optimal merging the single captures of CEREC Primescan AC. Hence, the digitisation of the complete bar was not possible without causing distortions in the complete arch scan, as the software algorithm of CEREC Primescan AC tried to connect both bar ends if the scanning area was too large.

An experienced operator performed all scans using the extraoral data acquisition mode of CEREC Primescan AC. Each scan was obtained under the same conditions with constant ambient light settings. At the beginning of each scan, the CEREC Primescan AC scanning device was calibrated using the "Calibration Set Primescan" according to manufacturer's guidelines. A maximum of two scans were performed successively with a following break of 30min, so that any influence by heating of the scanning device could be excluded.

Each scan ($N=225$, $n=25$ per group) was exported as an STL dataset from the respective scan software of CEREC Primescan AC and imported into the analysis software (Geomagic Control 2015). The data was virtually adjusted in a three-dimensional coordinate system that included XZ-, XY- and YZ-axes as the coronal, transversal and sagittal planes. Trueness was assessed by evaluating linear differences in the X, Y and Z axes and angular deviations (α axial, α coronal, α total) compared to a reference dataset. Statistical differences were analysed using Kruskal-Wallis and Mann-Whitney U tests ($p<0.017$). Precision was analysed by the standard deviation of linear and angular aberrations (ISO 5725-1) ($p<0.05$).

Results

Strategy F_L showed significantly higher trueness and precision than F_Z for VE ($p=0.009$), V_{E(y)} ($p=0.010$), α_{overall} ($p=0.004$) and α_{axial} ($p=0.002$). Strategy F_C demonstrated significantly better trueness than F_Z for VE ($p=0.007$), α_{overall} ($p=0.010$) and α_{coronal} ($p=0.013$). For scan segmentation, F_L showed better trueness for V_{E(y)} ($p=0.001$) and α_{axial} ($p<0.001$) than H_L. Strategy H_L showed better trueness for V_{E(z)} than for F_L and S_L ($p=0.001$, $p=0.002$). The scanning patterns F_L, F_C and H_L exhibited the best performance for trueness and precision.

Conclusions

The researchers reported that: The combination of full arch with the linear or combined movement pattern (strategies F_L and F_C) resulted in better trueness and precision for most measured parameters compared to the zig-zag movement (F_Z).

The linear motion pattern in combination with full-arch or half-jaw segmentation (strategies F_L, H_L) showed significantly better trueness compared to sextant segmentation (S_L) for linear measurement parameters.

Implications for practice

Scanning movement and scan segmentation have a significant influence in trueness and precision of full arch scans.

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- Schlögl K, Güth JF, Graf T et al. Accuracy of full arch scans performed with nine different scanning patterns – an in vitro study. *Clin Oral Invest* 29, 92 (2025). <https://0-doi-org.innopac.wits.ac.za/10.1007/s00784-025-06154-2>

2. Comparison of the two-year clinical performances of class II restorations using different restorative materials

Resin composites are nowadays the most common direct restorative material to treat carious lesions that cannot be arrested or remineralised. In combination with adhesives the dentists can accomplish defect-oriented preparations, which means that they can limit the removal of sound tooth substance to that area of the defect that needs to be restored, whether it is a carious defect, an erosive defect, a tooth fracture or an aesthetic defect that needs correction.¹ Furthermore, adhesive dentistry allows dentists to repair rather than to replace restorations in the case of chippings, fractures, caries at the margins or aesthetic improvements demanded by the patient.¹ Resin composites are delivered in various shades, opacities and translucencies so that the original tooth structure can be restored in an aesthetically pleasing way.

Based on the market volume and materials sold, it can be calculated that in 2014 more than 1.1 billion dental

restorations had been placed in the world. Of these, about 800 million were direct resin composite restorations, followed by 170 million glass ionomer-based fillings, 140 million amalgam restorations and about 25 million compomer restorations.¹ The composite and compomer restorations also include anterior restorations both in primary and permanent teeth (about 30% anterior and 70% posterior restorations). The above-mentioned estimates suggest that the direct placement of a dental restoration represents one of the most prevalent medical interventions on the human body worldwide. Therefore, it is of paramount importance to know the longevity and survival rates of direct resin composite restorations as well as the frequency and reasons of failures and the factors that influence both longevity and failures.

The clinical performance of restorations and restorative materials must be evaluated using detailed, objective and reliable criteria. One of the most commonly used evaluation criteria for this purpose comes from the FDI (World Dental Federation). The FDI evaluation criteria are divided into four main groups: functional (fracture or retention issues, form and contour, marginal adaptation, occlusion and wear, and proximal contact points); aesthetic (surface lustre, surface texture, marginal staining and colour match); biological (caries at restoration margins, dental hard tissue defects at the restoration margin, postoperative hypersensitivity and pulpal status) and miscellaneous (patient's view, assessment of dental restoration on radiographs). The FDI criteria use a scale where 1 indicates "clinically excellent/very good (sufficient)", 2 represents "clinically good (sufficient)", 3 corresponds to "clinically satisfactory (sufficient)", 4 denotes "clinically unsatisfactory (partially insufficient)" and 5 signifies "clinically poor (entirely insufficient)".

Hançer Sarica and colleagues (2025)¹ reported on a trial that sought to evaluate the clinical performance of Class II restorations using conventional composite, bulk-fill composite and high-filler flowable composite resins according to FDI criteria after two years. The null hypothesis of this study was that there will be no significant difference in the two-year clinical performance of the composite resins used.

Materials and methods For this randomised clinical trial, 900 patients were assessed for eligibility for participation, and 790 patients were excluded due to either failing to meet the inclusion criteria or declining to come for follow-up visits. In total, 110 patients who met the inclusion criteria were selected. Thus, a total of 259 teeth were restored in 110 patients (63 females and 47 males). The mean age of the patients was 24.5 ± 2.5 years (ranging from 19 to 50 years). All 110 patients underwent radiographic and intraoral examinations and 259 teeth requiring restoration were identified. The teeth had Class II caries lesions in the external and middle third of dentin thickness as determined radiographically. All restorations were performed by the same dentist, with extensive clinical experience in restorative dentistry.

The restorative materials were randomly selected using a random number table. Local anaesthesia was administered to the teeth to be restored before starting the procedure. Cavity preparations were performed using diamond fissure burs at high speed with water cooling. Hand instruments and low-speed tungsten carbide burs were used to remove the caries. Conservative cavity design (Class II slot) was used and bevelling was not applied to the cavity walls to

avoid unnecessary loss of hard dental tissue. The cavity preparations did not involve any cusps, all the gingival margins included sound enamel, and two surface cavities (MO or DO) were included in this study. The outline shape of the cavity was limited to the removal of caries lesions. Any additional retention was not prepared. The depth of cavities was approximately 4mm-5mm from the gingival border of the cavity when the mesial or distal marginal ridge was taken as reference.

Since the cavity margins are within the enamel and did not require extensive restoration, cotton rolls and saliva ejectors were used for isolation,

The enamel parts of the teeth were then etched using the selective etch technique with 37% orthophosphoric acid (Eco-Etch) for 30sec. After thoroughly washing with water to remove the acid, the tooth was dried with a gentle stream of air. A universal dental adhesive system (G-Premio Bond Universal) was applied to the cavity using an applicator for 20sec in an active manner according to the manufacturer's instructions. After being thinned with gentle air for 5sec, the adhesive was polymerised for 10sec using an LED light-curing device.

In the first group, Filtek One Bulk Fill Restorative (Filtek, 3 M-ESPE) layers were applied without exceeding 4mm in thickness. In the second group, Clearfil Majesty Posterior (Clearfil) was applied and, in the third group, G-aenial Universal Injectable (G-aenial) was applied, with layers not exceeding 2mm in thickness. The layers were polymerised for 20sec from the occlusal surface using an LED light-curing device. After removing the wedge and matrix, an additional 10sec of light was applied to the surface of the restoration. To remove any excess material and irregularities, finishing was performed under water cooling using fine-grit composite finishing burs and Sof-Lex discs. Occlusion was checked using articulation paper, and early contact points were removed. The polishing of the restoration was completed using composite polishing rubbers. Finishing and polishing procedures were performed the same way for all groups.

All restorations were clinically evaluated and scored according to FDI criteria at baseline, after one year, and after two years by two experienced double-blind dentists using mirrors and probes, as well as bite-wing radiographs and intraoral photographs. In cases where there was disagreement between the dentists in scoring, the final evaluation was based on the joint decision of both dentists. Post-operative sensitivity was scored during the baseline assessment by asking patient-related questions within one week after each restorative procedure.

Results In the study, a total of 110 patients (63 females and 47 males) were evaluated for 259 restorations. The average age of the participating patients was 24.5 ± 2.5 years (ranging from 19 to 50 years). At the end of the first year, 238 restorations (in 86 patients) were assessed, while at the end of the second year, 188 restorations (in 74 patients) were evaluated. Due to relocation and changes in contact information, 24 patients could not be reached at the end of the first year and 36 patients at the end of the second year, resulting in their exclusion from the study.

While there was no statistically significant difference between the groups at the end of one year in terms of the evaluated

criteria, at the end of two years the surface gloss scores in the Clearfil group were statistically higher compared to both the G-aenial and Filtek groups ($p < 0.05$). In addition, at the end of two years, the marginal adaptation scores of Clearfil group were similar to Filtek group and were statistically significantly higher than those of G-aenial group ($p < 0.05$).

In intra-group comparisons, a statistically significant increase was observed in colour matching scores at the end of one year in the Filtek group compared to the baseline scores ($p < 0.05$), while there was no significant difference between one and two years. In addition, a statistically significant increase was observed in the marginal adaptation scores of both the Clearfil and Filtek groups after two years compared to the baseline and one-year scores ($p < 0.05$). Additionally, the Clearfil group's contact point scores after two years showed a statistically significant increase compared to both baseline and one-year scores ($p < 0.05$).

Conclusions

High-filler flowable composite and bulk-fill composite exhibited better clinical properties regarding surface gloss compared to conventional composite. It was observed that the marginal adaptation property of the conventional composite was similar to the bulk-fill composite and lower than the high-filler flowable composite.

Implications for practice

The composite resins tested showed similar results in most of the scores evaluated.

REFERENCE

1. Hancı Sarıca S, Arslan S, Balkaya, H. Comparison of the 2-year clinical performances of class II restorations using different restorative materials. *Clin Oral Invest* 29, 128 (2025). <https://doi-org.innopac.wits.ac.za/10.1007/s00784-025-06207-6>

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.



Emergencies: After-hours consultation

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What are your ethical obligations in handling after-hours calls from your patients and those of other dentists in your community?

You are getting calls after hours from patients of other dentists in your community. You have not agreed to cover for these dentists. The patients stated that they were unable to reach their dentist by telephone or that the answering machine at their dentist's office directed them to call you. What is your ethical obligation to treat these patients? What about their follow-up care? What do you tell the other dentists? What do if the patient states that he or she wants to change dentists and start seeing you?

A dentist's dedication to patient care is reflected in how they handle emergencies. Patients seeking after-hours care may be inconvenienced or in severe pain. Your role is to alleviate their discomfort while maintaining professional ethics.

By staying prepared and acting ethically, you ensure that both patients and professional relationships are handled with care and respect.

Emergencies

Although there are many differing views on what constitutes an emergency, clear instances include a patient experiencing severe pain, an abscess, swelling or significant bleeding following surgery.

The Health Professions Council's ethical rules provide that dentists must treat patients in an emergency within the parameters of their practice, in accordance with their education, training, experience and competency, in a suitable setting. If necessary, refer the patient to a colleague or an organisation where the necessary care can be given if you are unable to do so.

An emergency is further defined as where there is a threat to life or limb (including a perceived threat) and where no appropriately trained healthcare professional is available, then the practitioner must intervene to the best of their ability.¹ The Charter provides that everyone has the right to access to health care services that include – a. receiving timely emergency care at any health care facility that is open, regardless of one's ability to pay.²

Ultimately, whether it is an emergency or not will depend on the dentist's professional judgment, combined with a patient assessment, as being the determinants of an appropriate response in an emergency or emergent situation.

A dental emergency also exists if professional judgment determines that a person needs immediate attention to deal with uncontrolled bleeding, uncontrolled swelling, traumatic injury or uncontrolled severe pain.

Duties of practitioners

From a legal perspective, Chapter 2 of the National Health Act, 2003 which applies to all practitioners (in both the private and public sectors), practitioners are obliged to provide emergency care to all patients irrespective of the patient's ability to pay for services.

Dentists shall be obliged to make reasonable arrangements for the emergency care of their patients of record. This is

non-negotiable. These arrangements should cover any time we are not going to be available in our office, including the time after regular business hours.

What is reported above shows that colleagues have failed to meet this obligation. It is advisable to call them and inquire about their emergency coverage policy. When you fail to plan for coverage of your patients' emergencies, then you have failed your patients, your profession and, ultimately, yourselves.

From an ethical perspective, the provision of emergency or out-of-hours care is based on the principles of beneficence and nonmaleficence. Beneficence refers to doing good and the active promotion of goodness, kindness and charity. The practice of dentistry is firmly rooted in the principle "first do no harm".

It is an ethical and legal responsibility of every dental practitioner working in any branch of dentistry to ensure that patients, for whom responsibility has been accepted, have access to emergency treatment outside of normal working hours and that such arrangements are made known to these patients. These arrangements should cover any time the practitioner is away from the practice, including after regular business hours. Failure to ensure this may result in serious professional misconduct.

Handling calls from other dentists' patients after hours

The question is whether dental practitioners, besides making emergency arrangements for their own patients, are also required to be available for emergencies of patients their colleagues in the community.

Although a dentist is not obliged to provide treatment for every new patient who contacts the dental office, a patient with a dental emergency should be assessed and either provided treatment or referred to another practitioner or facility or emergency facility capable of treating the patient. It is your ethical obligation to provide emergency care if the patient is in pain or distress and unable to reach their regular dentist.

This might include:

- Offering immediate treatment.
- Referring them to an appropriate facility or another dentist if you cannot provide care.
- Follow-up care – after treating a patient in an emergency, advise them to return to their regular dentist for follow-up care.

If the patient wishes to switch to your practice, respect their choice and autonomy but ensure proper protocol is followed: Obtain written consent from the patient to transfer their records.

Notify their previous dentist about the change.

In small communities, if there are few dentists or no local emergency facilities are available, you may need to handle the emergency yourself since the patient has no other options.

In larger urban metropolitan areas with more emergency resources available, referring the patient to a dental emergency clinic or hospital may be acceptable.

Communicating with other dentists

It is clear when you receive calls from your colleagues' patients without prior arrangements, they are not fulfilling their ethical and professional responsibilities. It is important to address the issue with the dentist. Ideally, you should reach out to the colleague to clarify their emergency care policy.

What arrangements must be made?

Emergencies can arise during or outside regular office hours, or when a dentist is unavailable. Dentists need to ensure their patients receive timely care:

During office hours

Have a system in place to address dental emergencies promptly.

Patients with urgent needs should be seen as soon as possible, either by the primary dentist or another dentist in the practice. Use associates, employee dentists, partners or directors in the same practice to handle emergencies.

If same-day treatment is not possible, accommodate them by the next day, appointment permitting.

After hours or when the office is closed

- Provide clear instructions for patients needing emergency care:
 - Post notices at the office premises.
 - Record an informative phone message with emergency contact details.
 - Share emergency phone numbers on business cards.

If the dentist cannot personally handle emergencies due to holidays, illness, training or other reasons, ensure alternative arrangements are in place. You can arrange for the colleague nearby in the same building or down the street to cover for you. The key is to make sure that the dentist on whom you are counting to cover for you is willing and available to do so. Make arrangements well ahead of time, and then contact the dentist again just before your needed coverage to make sure he or she has not forgotten those arrangements. It is also not professional to simply refer your patients if they require emergency treatment to the local private hospital or emergency facility with whom no prior arrangements have been made. This may constitute abandonment of the patient.

All practitioners must have an emergency protocol in place so the patient who has a dental emergency during regular office hours may be attended to in a timely fashion. They may be seen as soon as possible, or by another dentist in the office, either accommodated the same day or next day.

When the office is closed arrangements must be made for patients to contact the practitioner by putting proper notices on the premises, recorded messages on telephone equipment or emergency numbers (mobile numbers) on business cards supplied to patients.

Emergency roster

It is also possible for practitioners to draw up an emergency roster whereby a number of dentists in one area join forces to provide out of hours cover on a rota basis even though practitioners are not necessarily gone or absent from their practices.

Dentists who choose to participate in a group on-call service and who are on-call for a period of time have an obligation to provide appropriate emergency management for all patients who are directed to the service, regardless of who their primary care provider might be.

When participating dentists are not on call but are available during office hours, they should see their own patients of record and not automatically refer their emergency patients to the on-call service. These must be clearly communicated to patients.

Those dentists who choose not to belong to such an on-call group are obliged to manage their emergency patients at all times. If they choose not to participate, they must not rely on the group service to look after their patients of record, whether during or after regular office hours.

It is also unethical for a practitioner to be unavailable when on call for emergency duty on a rota basis or continually fails to be available when the practitioner is supposed to be on call. Patient care of other participating practitioners may be neglected or compromised and may result in a charge of unprofessional misconduct.

SADA recommends that on-call dentists offer patients the same terms of payment as those offered by the patients' regular dentists.

During an emergency visit, dentists must guard against doing only a cursory examination, taking a superficial medical and dental history, forgoing diagnostic tests and investigations and focusing only on the presenting condition. It is sometimes difficult to do otherwise as there may be pressure from the patient to sort out the immediate cause of their presenting problem – however, it is imperative that the patient is examined holistically and thoroughly.

Dentists on call who provide care for another dentist's patient are still required to keep treatment records. The patient's dentist should also be provided with reports or copies of the records, referral letters, radiographs or any other investigations that were carried out.

Providing quality emergency care

Avoid superficial treatment focused only on the immediate issue. Take a complete medical and dental history, perform necessary diagnostic tests and assess the patient holistically. Keep detailed records of all treatments, referrals and investigations.

Share relevant records with the patient's regular dentist, including treatment notes, referral letters and radiographs.

Precautions

In an out-of-hours emergency, dentists will sometimes find themselves seeing patients when no one else is present on the premises at all and, while every effort should be made to avoid these situations, the patient's needs and interests should always be the clinician's primary consideration.

It is generally unwise for a dentist to treat any patient without a third party being present, especially when a male dentist is treating a female patient.

The third party should be appropriately trained to assist the dentist in an emergency situation, but if the patient happens

to be of the opposite sex to the dentist, this third party can also fulfil a second useful role as a chaperone. This will often be a dental assistant, but it could equally well be a parent/family member or other third party who is accompanying the patient.

In the South African context, due to safety considerations, dentists may be required to take extra precautions. Female dentists, and even male dentists, are advised to have a trusted person escort them to and from the surgery during after-hours. Ensuring a reliable companion is present can help guarantee personal safety while maintaining professional standards.

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.



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CPD questionnaire



Job satisfaction among dental technologists working in the public health sector in Nigeria

- Which of these statements is CORRECT. Remuneration dissatisfaction among dental technologists was attributed mainly to:
 - Frequent salary delays
 - Salaries not reflecting their qualifications and responsibilities
 - Lack of overtime payment
 - Taxation issues
- Choose the CORRECT answer. Educational advancement for dental technologists was hindered mainly by:
 - Lack of interest among employees
 - Insufficient funding and structured professional development opportunities
 - Overly demanding entry criteria
 - High competition for limited training positions
- Select the CORRECT option. Interprofessional relationship challenges experienced by dental technologists primarily involved:
 - Disagreements with administrative support staff
 - Poor respect and hierarchical interactions with dentists
 - Communication difficulties with laboratory assistants
 - Excessive collaboration demands
- Choose the CORRECT answer. Dental technologists recommended enhancing job satisfaction primarily through:
 - Increasing frequency of performance evaluations
 - Greater emphasis on teamwork training
 - Enhanced educational and professional development opportunities
 - Mandatory workplace wellness programs
- Select the CORRECT statement. Government policies negatively impacted dental technologists' job satisfaction chiefly through:
 - Restrictive regulations on clinical practice
 - Inequitable resource allocation and salary grading compared to other health professionals*
 - Frequent organizational restructuring
 - Excessive documentation requirements

Assessing students' clinical time management performance: A case study

- Which answer is CORRECT. What training programmes were the study conducted on?
 - Dentistry
 - Dental Assisting
 - Dental hygiene
 - Dental therapy and oral hygiene
- Choose the CORRECT answer. What method was used to analyse the open-ended data?
 - Content analysis
 - Deductive analysis
 - Thematic analysis
 - Reflexive analysis

- Select the CORRECT answer. Which soft skills satisfied patients' experiences with the treatment provided by students?
 - Time management
 - Respect
 - Time management and respect
 - Communication, time management, respect, and punctuality
- Which statement is CORRECT. The study recommended the following:
 - Advice dental institutions to restore clinical learning outcomes
 - To allocate specific time in the curriculum for patient feedback
 - Patient feedback be integrated into clinical assessments
 - To introduce patient feedback into preclinical assessments

Dental fear and anxiety of patients visiting selected oral health centres in Gauteng

- Select the CORRECT answer. Dental fear, also referred to as dentophobia or dental anxiety, can be defined as a,
 - Standard reaction to what one can perceive as a non-threatening encounter in a dental environment, and is regularly linked with some sense of being in control.
 - As a normal/abnormal reaction to what one can perceive as a menacing/threatening encounter in a dental environment, and is regularly linked with some sense of losing control.
 - As a normal/abnormal reaction to what one can perceive as a menacing/threatening encounter in a dental environment, and is regularly linked with some sense of being in control.
 - Irregular reaction to what one can perceive as a menacing/threatening encounter in a dental environment, and is regularly linked with some sense of losing control.
- Which answer is CORRECT. Which of the following four diagnostic types categorised according to the main source of their fear based on the Seattle System, is used for diagnosing dentally anxious individuals.
 - Type I (simple conditioned phobia), Type II (fear of distress), Type III (generalized anxiety) and Type IV (distrust of dentists).
 - Type I (simple unconditioned phobia), Type II (fear of catastrophe), Type III (generalized anxiety) and Type IV (distrust of dentists).
 - Type I (simple conditioned phobia), type II (fear of catastrophe), Type III (generalized anxiety) and Type IV (trust of dentists).
 - Type I (simple conditioned phobia), Type II (fear of catastrophe), Type III (generalized anxiety) and Type IV (distrust of dentists).
- Choose the CORRECT option. What type of study design was employed in this study?
 - Cohort
 - Case Control
 - Longitudinal
 - Cross-sectional

13. **Select the INCORRECT statement. One of the following is false.**
- Female participants were statistically more fearful and more reactive to environmental-related factors such as hearing the sound of the drill.
 - Female participants were statistically more fearful and more reactive to environmental-related factors such as awaiting the dentist (waiting for longer periods) and the smell of the dental room.
 - Female participants were statistically calmer and more responsive to environmental-related factors such as hearing the sound of the drill.
 - Female participants were statistically more fearful and more reactive to environmental-related factors such as being seated on the dental chair, when seeing the dentist walk in and sight of the needle than their male counterparts

Access to Emergency Drugs and Equipment Among South African Dentists

14. **Select the CORRECT statement. Diphenhydramine belongs to the following pharmacological classification:**
- Sympathomimetic agent
 - Corticosteroid
 - Antihistamine
 - None of the above
 - Glycogenolytic agent
15. **Select the CORRECT statement. The preferred emergent treatment of an unconscious hypoglycemic adult patient who is unable to swallow is:**
- Administer 0.3ml Adrenaline, IMI with autoinjector
 - Administer 10mg buccal Midazolam
 - 2 inhalational sprays of a β 2-adrenergic agonist
 - Administering 1mg Glucagon, IMI
 - 500ml cold Crystalloid bolus infusion
16. **Select the CORRECT statement. Which one of the following items, was most readily available among general dental practitioners and dental specialists?**
- Tranexamic acid
 - Lorazepam
 - Ringer's Lactate
 - Prednisone
 - Aspirin
17. **Select the INCORRECT statement. One of these statements is wrong.**
- A conscious patient which collapsed on the floor, should be placed in horizontally in a lateral position
 - It is acceptable to perform a blind finger sweep when attempting to clear an obstructed airway
 - An oro-pharyngeal airway set, forms part of recommended emergency equipment
 - Nitroglycerine is an effective vasodilator to manage angina pectoris until advanced life support arrives
 - The study assessed responses from general dental practitioners and dental specialists in both public-and private sectors in all provinces in South Africa
18. **Select the CORRECT statement. The use of an Automated External Defibrillator (AED) is effective in managing:**
- Cardiac arrest in an unconscious patient
 - A patient suffering a stroke
 - Cardiac arrest in a conscious patient
 - Severe anaphylactic shock
 - A choking patient in which the Heimlich Maneuver has failed

What's new for the clinician – summaries of recently published papers

19. **Choose the CORRECT answer. In the current literature, two methods are described in the literature for evaluating the accuracy of full-jaw datasets. These are:**
- A best-fit algorithm and Digital modelling
 - A best-fit algorithm and a metrical analysis of real geometric values
 - A metrical analysis of real geometric values and Digital modelling
 - Digital modelling and scanning software
20. **Select the CORRECT answer. In the Hançer Sarca et al trial, for the outcome "surface gloss", which material achieved the highest rating scores?**
- Clearfil
 - G-aenial
 - Filtek
 - All were equivalent

Ethics: "Emergencies: After-Hours Consultation"

21. **Select the CORRECT statement. What is the ethical obligation of a dentist when a patient from another practice contacts them with an emergency?**
- Refer them back to their regular dentist without assessment.
 - Offer immediate treatment, refer to another facility if unable to treat, or advise follow-up care with their regular dentist.
 - Refuse treatment as they are not the dentist of record.
 - Insist the patient must change dentists to be treated.
22. **Which of the following is CORRECT. What principle is the ethical obligation to provide emergency care based on?**
- Justice.
 - Autonomy.
 - Beneficence and non-maleficence.
 - Veracity.
23. **Choose the CORRECT answer. What should a dentist do if a patient wishes to switch from their regular dentist to their practice?**
- Deny the patient's request.
 - Begin treating the patient immediately without notifying their previous dentist.
 - Obtain written consent from the patient and notify their previous dentist about the change.
 - Inform the patient that switching is unethical.
24. **Select the CORRECT answer. According to the National Health Act, what is the dentist's obligation during emergencies?**
- Provide care only to patients who can afford the services.
 - Offer emergency care to all patients regardless of their ability to pay.
 - Refer all emergencies to a hospital.
 - Treat emergencies only during regular office hours.
25. **Which option is CORRECT. What is considered unprofessional conduct regarding emergency rosters?**
- Participating in an on-call group.
 - Being unavailable when on call for emergency duty.
 - Offering the same terms of payment as the patient's regular dentist.
 - Keeping treatment records for patients from another dentist's practice.

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1 Dorn RW, et al. Structural characterization of tin in toothpaste by dynamic nuclear polarization enhanced ¹¹⁹Sn solid-state NMR spectroscopy. Nat Commun. 2023;14:7423.

2 Hu D, et al. Stannous Fluoride vs Regular Fluoride Dentifrice in Plaque and Gingivitis Reduction. J Dent Res. 2022;101(Spec Iss A):0514.

3 Stellitano M, et al. Effect of a Stannous Fluoride Toothpaste on Supragingival Calculus Formation, submitted for 2025 AADOCR presentation



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