

## ***Mopane (Aka Butterfly Tree, Turpentine Tree) Colophospermum mopane***

Butterfly-shaped leaves make the deciduous mopane seem magical come autumn. After winter the bare branches fill up with small green flowers and new leaves. The Shona people were first to spot that the oblong-shaped leaves resemble butterfly wings, hence the Shona word for butterfly, mopane. The proudly South African tree can be a stout shrub (aka the mopane scrub) or a 25m-tall tree, depending on the soil and weather conditions. Elephants love mopane leaves, but their avid grazing often causes stunted growth.

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### Mopane (Aka Butterfly Tree, Turpentine Tree) *Colophospermum mopane*

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# Crafting the Future of Dental Education: Navigating the Nuances of Speaker Selection

SADJ APRIL 2024, Vol. 79 No.3 p127-129

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

In the dynamic field of dentistry, the pursuit of continuous education is paramount, impacting clinical practice and patient care profoundly. This commitment to lifelong learning ensures that dental professionals remain at the forefront of technological advancements, research breakthroughs and evolving clinical practices. The foundation of professional excellence in dentistry is significantly influenced by the continuous updating of knowledge through education, emphasising the need for a curriculum that supports comprehensive patient care models and integrates basic science with clinical relevance.<sup>1</sup>

The selection of speakers who convey critical, evidence-based information becomes a crucial task, bearing the responsibility not only of disseminating cutting-edge knowledge but also of maintaining the integrity of the content delivered and, by extension, the organisations represented. In an era characterised by the rapid exchange of information, the potential for the propagation of unverified or detrimental practices necessitates a stringent vetting process for educators. This ensures that only those with the most accurate and safe practices are given the platform to influence the next generation of dental practitioners.

A survey by Du Preez, Basson and Wolmarans<sup>2</sup> underscores the importance of continuing education courses attended by dental practitioners, noting the preference for courses in operative dentistry, aesthetic dentistry and fixed prosthodontics at the time. Since then interests and needs of dental practitioners have changed. This reflects the diverse interests within the dental community and the need for a broad spectrum of expert speakers to cater to these varied educational needs. Furthermore, the evolving landscape of dental education indicates a shift towards a more comprehensive approach in dental treatment planning and continuing education in general dentistry. This approach emphasises the importance of not only specialised knowledge but also a holistic understanding of dental practice.<sup>3</sup>

In this editorial, we delve into some of these critical considerations and touch on the rigorous criteria and thoughtful processes behind the selection of educators. The significance of this selection process cannot be overstated, as it directly influences the future of dentistry – a future that must be built on solid evidence-based practices and a steadfast commitment to patient care. This exploration serves not only as a guide for curating educational content but also as a reminder of the profound impact that knowledge dissemination has on the professional growth of dental practitioners and the health and safety of the patients they serve.

## The importance of esteemed speakers in dental education

The significance of esteemed speakers in dental education extends far beyond the mere delivery of content; their expertise and experience serve as a beacon, guiding the enhancement of dental practice standards and fostering a culture of excellence. Esteemed speakers, with their depth of knowledge and insight

into both the science and the art of dentistry, play a pivotal role in shaping the landscape of dental knowledge, encouraging a culture of curiosity, critical thinking and continuous improvement among practitioners and students alike. The direct correlation between the calibre of speakers and the enhancement of dental practice standards is well documented. The growing pressure on dental education and practice for quality assurance and improvement highlights the essential role of dental professionals in maintaining and enhancing the quality of oral healthcare. The incorporation of quality assurance and improvement tools in dentistry underscores the necessity for speakers who are not only experts in their fields but also adept in the ethical implementation of these practices.<sup>4</sup> Kamalkanthan and Kanthan (2020)<sup>5</sup> elaborate on the concept of healthcare quality within dental offices, illustrating how dental practitioners can integrate quality improvement measures into their practice. This study underscores the importance of continuous education and self-assessment in fostering a world-class quality practice in dentistry, again pointing to the crucial role of knowledgeable speakers in disseminating these concepts.

The evolving landscape of dental practice, particularly considering recent challenges such as the Covid-19 pandemic, has further highlighted the importance of adaptive, informed leadership within the field. Atchison et al. (2022)<sup>6</sup> provide insights into the changing face of dentistry, advocating for improvements in diagnostic coding and value-based care to enhance oral health outcomes. Esteemed speakers, by sharing their expertise and perspectives, can catalyse these necessary trends within the profession, ensuring that dental practitioners are equipped to respond effectively to evolving challenges and opportunities.

## Criteria for selecting speakers

Selecting the right speakers for dental education hinges on a multifaceted set of criteria designed to ensure that only the most qualified, knowledgeable and impactful individuals are entrusted with the responsibility of educating the next generation of dental professionals. These criteria are not just a checklist but a comprehensive approach to evaluating the potential contributions of a speaker to the dental community.

### i) Academic credentials

Academic credentials form the cornerstone of a speaker's qualifications, underscoring their formal training and understanding of dentistry and oral health. This includes degrees from accredited dental schools, postgraduate qualifications and any additional certifications that demonstrate specialisation and advanced knowledge in specific areas of dentistry. These credentials ensure that speakers have a solid foundation in the principles and practices of dental medicine.

### ii) Clinical experience

Clinical experience provides insight into a speaker's ability to apply academic knowledge in real-world settings. It enriches

the educational experience, offering nuanced perspectives on patient care, clinical decision-making and the practical challenges of dental practice. This experience is crucial for imparting practical skills and insights that are immediately applicable in clinical settings, bridging the gap between theory and practice.

### iii) Publication history

A robust publication history signals a speaker's active engagement with research and their contribution to advancing dental science. This includes peer-reviewed articles, books and other scholarly works that add to the body of knowledge in dentistry. Such contributions are indicative of a speaker's expertise and their commitment to evidence-based practices and innovation in the field.

### iv) Contributions to dental science

Beyond publications, contributions to dental science can include the development of new techniques, technologies or materials that advance dental care. It also encompasses involvement in professional organisations, dental education and mentorship roles that demonstrate leadership and a commitment to the future of dentistry.

### v) Diversity in expertise

Emphasising diversity in expertise ensures comprehensive coverage of dental topics, catering to the broad spectrum of interests and educational needs within the dental community. This diversity allows for a rich, multidisciplinary approach to dental education, exposing learners to a wide range of perspectives, techniques and innovations.

### vi) Rigorous vetting and peer-review processes

Finally, rigorous vetting and peer-review processes are essential for validating the reliability and validity of speakers. This includes scrutiny of their academic background, clinical experience, contributions to the field and ethical standards. Such processes safeguard the quality of knowledge dissemination, ensuring that dental education is guided by the highest standards of excellence and integrity.

### The process of vetting and selection of speakers

The vetting and selection process for potential speakers in dental education is meticulous, beginning with a thorough review of the candidate's academic and professional credentials. This initial consideration ensures that speakers possess a foundational knowledge base and formal training essential for delivering high-quality education in dentistry and oral health. Peer recommendations offer invaluable insights into the candidate's expertise and reputation within the dental community, providing a layer of validation for the candidate's professional standing and ability to contribute positively to the educational landscape.<sup>7</sup>

Reviews of past presentations are scrutinised for content quality and audience engagement, ensuring that speakers can effectively communicate complex dental topics in an accessible and engaging manner. This aspect of vetting is crucial for identifying speakers who not only possess deep knowledge but are also capable of delivering it in a way that resonates with and educates the audience. Central to this process is the alignment with evidence-based practices, guaranteeing that the content delivered is both current and scientifically validated. Such alignment fosters an environment of continual learning and professional development, ensuring that dental education remains at the forefront of clinical and scientific advancements.<sup>8</sup>

The selection process must navigate challenges such as maintaining diversity of thought without sacrificing scientific accuracy, ensuring a broad spectrum of perspectives within the bounds of evidence-based dentistry. Balancing established voices with emerging talents is crucial, as it promotes a dynamic learning environment while fostering the next generation of dental professionals. This equilibrium encourages innovation and the sharing of cutting-edge research, ensuring the dental community remains at the forefront of clinical excellence and scientific discovery. The development of a guide to dental assessment based on a comprehensive literature review aids in this process, offering a framework for evaluating the competencies and contributions of potential speakers to dental education.<sup>9</sup>



Ensuring speakers are competent in comprehensive dental care and capable of addressing identified practice gaps further enhances the vetting process. This consideration ensures that dental education is not only grounded in current knowledge but is also responsive to the evolving needs of the profession and the communities it serves.<sup>10</sup>

### Challenges and considerations

Navigating the selection process for dental education speakers involves confronting challenges such as ensuring diversity of thought without compromising scientific accuracy. This balance is crucial for fostering a broad spectrum of perspectives within the confines of evidence-based dentistry. The necessity to maintain this equilibrium presents a complex challenge, as highlighted by Robertson, who underscores the critical forces affecting dental education, including shifting demographics and the patterns of oral disease, which demand a diversified yet scientifically rigorous approach to education.<sup>11</sup>

Moreover, the balance between established voices and emerging talents in the dental field is paramount. This fosters an environment of innovation and knowledge sharing, ensuring that the dental community remains at the forefront of clinical excellence and scientific discovery. Masella and Thompson delve into the divide between traditional teaching methods and evidence-based educational practices in dental education, emphasising the importance of bridging this gap to enhance the learning environment. Their work suggests that integrating research-based practices can address some of the challenges in selecting speakers by ensuring that the content delivered is both innovative and grounded in scientific evidence.<sup>12</sup>

Livingston et al. highlight another critical consideration: the ageing and diminishing dental faculty, which underscores the urgency of incorporating new talents into the educational framework. Their analysis sheds light on the demographic challenges facing dental education, emphasising the need for a strategic approach to faculty recruitment and development to ensure a vibrant and diverse educational community.<sup>13</sup>

Addressing these challenges requires a concerted effort to enhance the selection process, ensuring it is inclusive, scientifically rigorous and forward-thinking. Baum et al. further support this notion by discussing the importance of making research advances relevant for dental students and faculty alike, advocating for global networks and dedicated funding to overcome individual institutional limitations.<sup>14</sup> These considerations underscore the multifaceted nature of selecting speakers for dental education, highlighting the importance of strategic planning and innovation to address the evolving needs of the dental community.

### Conclusion

In the realm of dental education, the meticulous selection of speakers transcends the mere act of filling a speaking slot; it embodies a commitment to advancing the field through a rich tapestry of knowledge, innovation and diversity. The process, as explored in this editorial, underscores a deliberate and thoughtful journey towards curating a line-up that not only disseminates cutting-edge scientific discoveries but also nurtures the growth of dental professionals at every stage of their careers. The challenges and considerations we've navigated – balancing diversity of thought with scientific rigour, marrying established expertise with fresh perspectives – serve as a beacon, guiding our collective efforts to elevate dental education to new heights.

As we move forward, it is paramount that we embrace these complexities as opportunities to enrich our educational offerings. The convergence of evidence-based practices with the dynamic energy of emerging talents offers a unique alchemy for innovation and excellence in dental education. By fostering an environment that values inclusivity and scientific integrity, we pave the way for a future where dental professionals are not only skilled practitioners but also lifelong learners and pioneers at the forefront of oral health.

Let this editorial serve as a call to action for all stakeholders in dental education to engage in the continuous refinement of our speaker selection processes. Together, we can ensure that our educational platforms are arenas for intellectual rigour, inspiration and the relentless pursuit of knowledge. In doing so, we honour the legacy of those who have laid the foundations of dental science, while charting a course for a future replete with possibilities yet to be imagined.

In conclusion, the art of selecting speakers for dental education is a testament to our dedication to the highest standards of excellence in the dental community. It is through this lens of commitment, creativity and collaboration that we will continue to curate educational experiences that not only inform but also inspire, ensuring that the dental profession remains at the cutting edge of medical science and patient care. Let us move forward with the resolve to embrace these challenges, turning them into stepping stones for the advancement of dental education and, ultimately, the betterment of patient outcomes worldwide.

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# A happy mouth is key to overall health and wellbeing

SADJ APRIL 2024, Vol. 79 No.3 p130

Mr KC Makhubele – CEO, South African Dental Association

Nearly 3.5 billion people suffer from oral diseases, according to the World Health Organization (WHO). The most common oral illnesses are tooth decay, severe gum disease, tooth loss and oral cancers, with untreated tooth decay affecting nearly 2.5 billion people.

“Oral health has long been neglected in global health, but many oral diseases can be prevented,” said WHO Director-General Tedros Adhanom Ghebreyesus.

World Oral Health Day, observed annually on March 20, is a significant global initiative dedicated to promoting awareness and education about the importance of oral health. Spearheaded by the FDI World Dental Federation, this day serves as a rallying point for healthcare practitioners, policymakers and communities worldwide to emphasise the critical role of oral health in overall wellbeing.

Healthcare practitioners play a pivotal role in advancing oral health education and care. Dentists, dental hygienists and other oral healthcare professionals serve as frontline workers and educators, providing crucial information and guidance on maintaining optimal oral health.

In 2024, for World Oral Health Day the SADA Young Dentists Council put its dentists where the mouths are!

In South Africa, more than 60% of primary school children suffer from tooth decay. More concerning is that more than 80% of these students remain untreated.

Members of the Young Dentists Council made a difference by visiting schools in five provinces in South Africa. Colgate Oral Health Kits were delivered to 5,388 students and oral hygiene education given to the students and teachers from each school. The education encompasses a range of essential practices aimed at promoting good oral health habits – from proper brushing and flossing techniques to advice on diet and lifestyle choices.

The Young Dentists Council collaborated with Clicks Radio Station, reaching 1.2 million listeners daily, educating them on “A happy mouth is a happy body!”.

For the whole of March 2024, the Young Dentists Council present oral health webinars to dental professionals and educational TikTok videos on brushing techniques and oral health to the public.

By empowering individuals with knowledge and guidance, we contribute to improving oral health outcomes and fostering healthier communities worldwide.

Together, let's make oral health a priority and celebrate World Oral Health Day!

**Dr Robyn Kearney**

YDC President

## NOTICE OF POSTPONEMENT OF THE SOUTH AFRICAN DENTAL ASSOCIATION (SADA) 2022 ANNUAL GENERAL MEETING

The SADA FYE 2022 Annual General Meeting (AGM), previously set for 25 April 2024, is postponed due to finalisation of the auditing procedures. The majority of the work has been finalised, but the last parts are only being finalised in early April 2024. A new date will be communicated soon. We apologize for any inconvenience.

Dr N Osman

SADA Board of Directors

2 April 2024



**SADA**  
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DENTAL ASSOCIATION



# Physiotherapy students' oral health-related knowledge, attitudes and practices at an identified institution of higher learning in KwaZulu-Natal, South Africa

SADJ APRIL 2024, Vol. 79 No.3 p131-136

T Nadasan<sup>1</sup>, S Maharaj<sup>2</sup>, S Singh<sup>3</sup>

## ABSTRACT

### Background

Oral self-care health is integral to general health. However limited studies reflect physiotherapy students' dental practices such as frequency of toothbrushing, toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids or knowledge of dental plaque.

### Study objectives

This study assessed knowledge, perceptions and oral self-care practices among physiotherapy students.

### Method

This descriptive cross-sectional survey recruited second-, third-, and fourth-year physiotherapy students at an identified training institution in South Africa by means of a self-administered questionnaire

### Results

A total of 137 students participated in the study with a response rate of 83%. Participants indicated that 58%

(n=79) had good knowledge and 85% (n=117) reported oral self-care practices. Almost all participants (99%; n=136) used a brush with toothpaste; 76% (n=104) brushed twice daily; 53% (n=72) replaced their toothbrush every 3 months and 48% (n=66) rinsed their mouth after eating. More than two-thirds of the study sample (62%; n= 84) used an interdental aid and (37%; n=50) reported dental visits once a year with (74%; n=100) only when necessary. From these 96% (n=132) experienced barriers such as costs (54%; n=71) and inadequate time (42%; n = 55). The majority of participants (72%; n=98) supported oral self-care be included in the physiotherapy curriculum.

### Conclusion

Although there were inconsistencies in physiotherapy students' reported oral health-related knowledge, perceptions and self-care practices, the majority of participants supported the inclusion of dental health into the undergraduate physiotherapy curriculum. This will enhance interprofessional education and improve oral health outcomes for both students and patients.

### Keywords

Health, self-care, dental care, knowledge, interprofessional education

## INTRODUCTION

Oral hygiene practices and general health are interrelated.<sup>1-4</sup> Oral self-care practices, such as the frequency of toothbrushing and toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids and understanding dental plaque have been proven to be an effective preventative measure at an individual level to maintain good oral health status as part of general health care.<sup>1,4</sup> Poor oral health status can lead to oral pain resulting in poor eating ability, and oral diseases which impact negatively on self-esteem, impair social interactions and result in overall poor quality of life for the individual.<sup>1</sup> The World Health Organization (WHO) advocates the integration of oral health education and promotion into general health care because health professionals interact daily with patients and this can be an effective strategy to improve oral health outcomes.<sup>1,5-6</sup> Likewise, there is a need for extensive educational programmes to encourage and promote good oral health practices.<sup>4,7</sup>

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1. T Nadasan – data collection, manuscript preparation and editing
2. S Maharaj –draft manuscript preparation and editing
3. S Singh – data analysis, manuscript preparation and editing

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### Conflict of interest

The authors declare that there is no conflict of interest.

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Based on the dynamic relationship between oral and general health which can be influenced by an individual's personal attributes, behaviours and perceptions, there is a need to determine whether health professionals have the relevant and necessary knowledge and behaviour to impart positive oral health information to patients. This is supported by international guiding documents such as the Ottawa Charter on Health Promotion (1986)<sup>8</sup> which advocates health professionals to focus on the prevention of diseases and promotion of a healthy lifestyle, as well as the WHO Global Oral Health Programme, which highlights the need to facilitate, improve and promote oral health and integrate these into chronic disease prevention and health promotion.<sup>9,10</sup> Thus there is a need for all health professionals to ensure that their own knowledge of oral health self-care practices are sound when educating and advocating oral health.<sup>1,5,11</sup>

In addition, a study by De Oliveira Diniz et al.<sup>12</sup> identified knowledge gaps in health professionals' (doctors, nurses, physiotherapists, audiologists, pharmacists, psychologists and others) oral self-care practices such as their consumption of sugary diet, poor brushing techniques and inadequate access to additive fluoride uptake.

Despite the known linkages between oral health status and systemic disorders such as cardiac diseases and diabetes, not much is known on the extent to which such information is covered in health sciences curricula at a higher education level.<sup>1,4</sup>

Additionally, from an undergraduate learning perspective, collaboration and interprofessional partnership between dental and physiotherapy students as well as qualified health professionals (dentists and physiotherapists) are required. The benefit of interprofessional relationships is learning from each other in that way, developing greater respect for each other's profession. By learning together and about each other they could improve undergraduate as well as postgraduate working relationships and the value of a team approach and the holistic management of patients. Moreover, the experience of learning together can break down professional walls, change attitudes and reduce stereotypes. Interprofessional education can be an effective tool for developing collaboration and improving professional practice among health professionals.<sup>13</sup>

Despite the value of interprofessional education, there is little evidence that physiotherapy training includes elements of oral health care, although PHC principles are included in the physiotherapy curriculum.<sup>1,4,12</sup> To our knowledge, this is the first study to examine oral health self-care practices among undergraduate physiotherapy students in South Africa. This study can therefore raise awareness of the need to ensure that the undergraduate physiotherapy curriculum is reviewed and designed in a manner to facilitate a multidisciplinary approach that includes oral health care. To initiate this process, the first step is to determine the relationship between oral hygiene and oral self-care which are influenced by personal attributes, behaviours and perceptions. Therefore, the primary purpose of this study was to determine the knowledge, perceptions and oral health self-care practices of undergraduate physiotherapy students at an identified institution in South Africa. This is a four-year programme offered in the School of Health Sciences and the training focuses primarily on the comprehensive management of health issues to restore the optimal function of individuals and the wider society.

## METHODOLOGY

### Study design

This was a descriptive cross-sectional study.

### Study populations (including sample determination if done, sampling etc)

A whole population approach was used to identify full-time undergraduate physiotherapy students (n=169) at the identified training institution. Four students did not meet the study criteria and were excluded from the study; hence the sample size was 165. The study population was further stratified according to the year of study and students registered in the 2nd (n=60), 3rd (n=61) and 4th levels (n=48) of the physiotherapy programme were included in the study. The inclusion criteria for participation in the study were that students should be engaging and interacting with patients in hospitals, clinics and health centres. The study excluded first-year students because these students do not engage in clinical-based training.

### Data collection (instruments used, validation, reliability)

A self-administered questionnaire was used to collect data and permission was obtained from Oberoi et al.<sup>14</sup> to adapt and use their questionnaire. The first section of the questionnaire focused on the participant's sociodemographic information. The second section focused on the student's oral self-care knowledge, attitudes and practices related to oral health care such as the frequency of toothbrushing and toothbrush replacement, use of oral rinses, dental flossing, use of interdental aids and understanding dental plaque and the relationship between oral and general health. Questions were also designed to elicit information on dental visits, barriers to accessing dental care and perceptions of self-reported dental health status.

The questionnaires were administered in English which is the university's medium for teaching and learning in health sciences.

### Pilot study

The questionnaire was validated in a previous study that examined dental students' attitudes and practices toward oral care and was found to be reliable, having a Chronbach alpha coefficient of 0.73.<sup>15</sup> The questionnaire was also piloted with third and fourth-year Occupational Therapy students to ensure the relevance and coherence of the questions posed. The questionnaire was also reviewed carefully to avoid any ambiguity in participants' responses to the questions posed and to minimise any potential bias that could occur as a result of missing data in the datasets for analysis. The questionnaire was finalised after reviewing and making the necessary corrections.

### Participant recruitment

As part of the recruitment process, meetings were set up with relevant classes in the undergraduate physiotherapy programme to inform students of the purpose of the proposed study. Students were informed of the voluntary nature of the study. The researchers ensured that the questionnaires were left with the class captains for distribution and completed questionnaires were collected from these identified students. A follow-up was done after one month and all outstanding completed questionnaires were collected.

### Ethical considerations

Ethical clearance for the study was obtained from the Human

Table 1: Perceptions of oral health status

	Year								p value
	Second (n=48)		Third (n=42)		Fourth (n=47)		Total (n=137)		
	n	%	n	%	n	%	n	%	
<b>What is the perception of your oral health status?</b>									
Excellent/good	25	52%	27	64%	27	57%	79	57%	0.53
Fair/poor	23	48%	15	36%	20	43%	58	43%	
<b>Do your gums bleed during flossing?</b>									
Yes	20	42%	22	52%	33	70%	75	55%	*0.01
No	28	58%	20	48%	14	30%	62	45%	
<b>Do you have halitosis?</b>									
Yes	4	8%	2	2%	4	9%	10	6%	0.55
No	44	92%	40	98%	43	91%	127	94%	
<b>Is mouth hygiene important?</b>									
Yes	48	100%	42	100%	47	100%	137	100%	na
No	0	0%	0	0%	0	0%	0	0%	

\*Denotes significance

Social Sciences Research Ethics Committee (HSSREC) at an institution of higher learning in KwaZulu-Natal (KZN), South Africa (HSS/1539/01) and the necessary gatekeeper permissions from the Registrar at the same institution in KZN and the Academic Leader of Physiotherapy were sought to access the study population. Written consent was obtained from all study participants and participants were informed of their rights to withdraw from the study at any point without any negative consequences. All data was anonymised and reported in an aggregate format to protect the identity of the participants. The institution's name was also anonymised as per the condition stipulated in the gatekeeper's permission letter. The raw data was stored safely in a locked cupboard and the electronic data was password protected with access being granted only to the research team and the approving research ethics committee.

#### Data analysis (tests used and software used)

The data was first cleaned for any outliers and missing data was excluded from the analysis – for example, a row with missing values was deleted. The data was then coded and analysed using SPSS version 29.0 (IBM Corp, USA). The study included univariate descriptive statistics such as frequency and mean distribution for the categorical data. The Likert scales were dichotomised into two categories of strongly agree/agree and neutral/disagree/strongly disagree. The Pearson's Chi-squared test was used to assess for a possible relationship between the independent variables (age, gender and year of study) and the dependent variables such as frequency of toothbrushing and use of interdental aids. Ordinal data such as the number of dental visits were compared using the Kruskal-Wallis test. A probability level of  $p < 0.05$  was used to indicate significance in the data presented. The open-ended questions were first recorded in a narrative format and were coded. Thereafter, the data was grouped according to the broad themes and then further analysed for emergent themes.

## RESULTS

A total of 165 questionnaires were distributed with 137

completed and analysed for data, reflecting an 83% response rate. The responses according to the year of study were: 2nd 48 (35%); 3rd 42 (31%) and 4th 47 (34%) respectively. The participants were predominantly female 104 (76%) with no statistical association found between the level of study and gender.

#### Knowledge and perceptions of oral health status

Dental plaque as indicated by 117 (80%) of participants was: dirt on teeth, 76 (65%); bacteria on teeth, 33 (28%); other 8 (12%) with 15% (n=20) of participants having no knowledge of dental plaque.

Seventy-nine (58%) participants indicated their oral health status to be good or excellent. However, 75 (55%) indicated their gums bled during flossing with the highest percentage being the 4th year students 33 (70%) compared to 22 (52%) and 20 (42%) of 2nd and 3rd year students respectively (0.01). All respondents agreed that oral hygiene was important for general health (Table 1).

#### Reported oral health self-care practices

Almost all participants 136 (99%) reported using a toothbrush and toothpaste to clean their teeth with the duration of brushing varying between 1-2 minutes 57 (42%); 3-5 minutes 73 (53%) and more than 5 minutes 7(5%). One hundred and four (76%) participants brushed twice daily and 72 (53%) changed their toothbrush after every 3 months. Sixty-six (48%) participants rinsed their mouth after meals; 53 (39%) rinsed once only in the morning; 70 (51%) used a mouthwash; 124 (91%) brushed their tongue routinely. Eighty-four (62%) participants used an interdental aid; 64 (76%) a toothpick and 39 (46%) dental floss (Table 2).

#### Access to dental services

There were varying responses with regard to participants accessing facility-based oral health services. This ranged from once a year 50 (37%) to twice a year 20 (15%) with 59 (43%) not having any dental consultations in the past year. More than two-thirds of the study sample 100

Table 2: Oral self-care practices

	Year								P value
	Second (n=48)		Third (n=42)		Fourth (n=47)		Total (n=137)		
	n	%	n	%	n	%	n	%	
<b>Device to clean teeth</b>									
Toothpaste & brush	48	100%	41	98%	47	100%	136	99%	0.38
Other	0	0%	1	2%	0	0%	1	1%	
<b>Cleaning time</b>									
									<b>5</b>
1-2 min	24	50%	15	36%	18	38%	57	42%	0.44
3-5 min	21	44%	24	57%	28	60%	73	53%	
> 5 min	3	6%	3	7%	1	2%	7	5%	
<b>Frequency of cleaning</b>									
Once a day	11	23%	9	21%	5	10%	25	18%	0.41
Twice daily	35	73%	31	74%	38	81%	104	76%	
Three or more times	2	4%	2	5%	4	9%	8	6%	
<b>Changing toothbrush</b>									
Once a month	1	2%	7	17%	6	13%	14	10%	0.34
Every 3 months	29	60%	22	53%	21	45%	72	52%	
Every 6 months	13	28%	12	30%	17	36%	42	31%	
Every year	5	10%	1		3	6%	9	7%	
<b>Rinsing mouth with water</b>									
Always after meals	25	52%	21	50%	20	43%	66	48%	0.71
Once in the morning	16	33%	16	38%	21	45%	53	39%	
Always before meals	0	0%	0	0%	1	2%	1	1%	
Never	7	15%	5	12%	5	11%	17	12%	
<b>Use of commercial mouthwash</b>									
Yes	21	44%	24	57%	25	53%	70	51%	0.40
No	27	56%	18	43%	22	47%	67	49%	
<b>Cleaning tongue</b>									
Tooth brush	44	92%	38	90%	42	89%	124	90%	0.61
Tongue cleaner	3	6%	3	7%	2	5%	8	6%	
Nothing	1	2%	1	2%	3	6%	5	4%	
<b>Interdental aid</b>									
Toothpick	18	35%	16	38%	11	23%	45	33%	0.52
Dental floss	9	19%	3	7%	7	15%	19	14%	
Pick & floss	5	10%	6	14%	6	13%	17	12%	
Floss & brush	1	2%	0	0%	0	0%	1	1%	
Pick & brush	0	0%	1	2%	0	0%	1	1%	
All	0	0%	2	5%	0	0%	2	1%	
Nothing	15	31%	14	33%	23	49%	52	38%	

(74%) reported seeking dental care only if required. An overwhelming majority of participants 132 (96%) reported barriers to accessing dental care with the following challenges: high cost 71 (54%); not enough time 55 (42%) and fear of a dental visit 19 (14%).

## DISCUSSION

This study's findings indicated that physiotherapy students had varying levels of knowledge related to dental health such

as their knowledge of dental plaque (biofilm). Additionally, although students reported having good oral health status almost half of the study sample 75 (55%) reported their gums bled during flossing. This finding is consistent with the findings reported by Singh and Pottapinjara who also noted that although participants in their study reported good oral health status, a third of their participants reported gingival bleeding during dental flossing.<sup>15</sup>

Generally bleeding gums is a sign of poor gum health, indicating that our sample did not have good oral self-care. Although knowledge does not automatically lead to better self-care behaviour it is possible that those having the relevant knowledge of oral health may adopt these practices and be able to transfer this knowledge to others – for example, physiotherapy students to their patients. Health professionals are expected to serve as role models to their patients and, accordingly, are expected to follow healthy lifestyles and practices and engage in positive self-care recommendations for their own behaviour. Generally, students in the health professions are expected to have good knowledge and practices related to health and one assumes that a similar understanding of dental care related to their knowledge, oral hygiene and self-care practices be relatively good. This is based on the premise that these are related to and influence health which has a direct bearing on health professionals when engaging and inculcating improvements or lifestyle changes for patients. The challenge arises when there is an expectation that health education will inculcate positive notions of the concept of health but it cannot be assumed that students will readily integrate these concepts into their theoretical and practical knowledge.<sup>16-17</sup> This finding is further supported by Raval and Shaikh<sup>4</sup> who concede the need for educational programmes to encourage good oral health and practices among health professionals.

This study also indicated that participants reported using toothbrushes and toothpaste for cleaning their teeth at least twice daily (104,76%). A similar finding of 121 (70%) was found in a study conducted with nursing students by Kerr and Singh.<sup>18</sup> These findings are much higher than those reported by Onwubu et al., where only 56.2% of their participants brushed their teeth twice daily.<sup>19</sup> Further, only 53% of the participants in this study changed their toothbrushes after 3 months. This finding is supported by Tadin et al., who reported that 59.7% of their study participants reported replacing their toothbrushes after 3 months; however, only 26.7% of their study sample reported the use of dental floss compared to 46% of participants in this study.<sup>20</sup> Likewise, Okoroafo et al. and Kerr and Singh also reported low use of dental floss in their studies.<sup>18,21</sup> This suggests that the use of dental floss be encouraged in the future when advocating oral self-care.

From the responses of the participants in this study it was evident that participants were aware that brushing one's teeth was not the only effective way to remove dental plaque, but this had to be augmented by using interdental dental aids and having visits to a dentist when additional interventions were required.<sup>22</sup> It should be noted that the participants in this study did not consider the role of diet in oral hygiene self-care practices. The results from this study, however, correlate to the findings by De Oliveira Diniz et al.<sup>12</sup> where although participants had good knowledge and oral self-care practices there were gaps in certain aspects of their oral hygiene knowledge and practices. We support this as the participants in this study indicated gaps in their oral health practices by their responses as the data show they lacked knowledge related to dental plaque, correct use of dental aids and the importance on regular dental consultations. They also lacked knowledge on the use of toothpicks as they did not know that the use of toothpicks was contraindicated in areas with tight interdental contacts and that its use would depend on the interdental spaces,

papillae and tooth crowding. Also using toothpicks in areas where the spaces between the teeth are limited was not recommended by dentists or oral hygienists. The reason for this is that there is a risk of toothpicks breaking during usage and that the broken fragments could get lodged between the teeth and damage the gingiva and surrounding tissues leading to pain, inflammation and discomfort. The correct use of interdental aids is not only relevant for health professionals, but physiotherapists and physiotherapy students as well, because they can educate their patients on the correct use of toothpicks such as the triangular low surface ones which will benefit those with tight interdental spaces.<sup>23-24</sup>

This study showed that regular visits by physiotherapy students to a dentist were poor and some would only seek dental services when there was pain or other oral symptoms. These were similar findings in other studies where dental visits were motivated by the need to relieve pain and discomfort.<sup>18, 25-26</sup> The reported barriers to dental consultations by participants were predominately the cost of dental care and limited time to visit the dental practitioners which concur with the findings as reported by Singh and Pottapinjara as well as Kerr and Singh.<sup>15,18</sup> Perhaps these findings relate to physiotherapy students having lectures and clinical interactions with patients almost the entire day leading to students indicating that their physiotherapy programme was “loaded” and they had time constraints for dental consultations. The “limited” time factor also related to students being constrained to and not being able to engage in part-time activities to supplement their income so “cost” of or payment for dental visits was also a challenge. Although the students reported good oral self-care the large number reported to having bleeding gums and limited knowledge of dental plaque was a concern. It is generally known that most oral health-related habits are established early in life and are mediated by parental behaviour to encourage oral self-care.<sup>27</sup> Perhaps this aspect is neglected during the formal university programme as students have a “loaded” programme and could lead to students neglecting their oral care and failing to integrate their environmental, social and personal resources and abilities.<sup>28</sup> These may be additional reasons to include dental and oral self-care practices in the physiotherapy curriculum because oral self-care practices established early in life can be reinforced and maintained. Further, the advantage of formally introducing oral hygiene and oral self-care into the physiotherapy curriculum could reinforce pre-existing knowledge and build on promoting healthier lifestyle choices for both students and their patients.

## STRENGTHS AND LIMITATIONS OF THE STUDY

Since this was an initial study, the data offers useful insight into physiotherapy students' knowledge of mouth hygiene and oral self-care practices but the authors concede some limitations with the study. The first is the use of a single site hence the findings are only generalisable to the identified site. A second limitation is that the researchers could not differentiate the possibility of bias as self-reported responses can sometimes reflect what the participants considered to be ideal rather than what they really practiced. Despite these limitations, the study provides valuable baseline data that could inform curriculum review in physiotherapy in the identified institution. At the same time, the study could be replicated in other universities offering physiotherapy

curricula as well as other health science training programmes. More research is recommended to explore health science academics for the inclusion of oral hygiene self-care in undergraduate physiotherapy curricula.

## CONCLUSION

The study findings indicate that physiotherapy students had inconsistent reported knowledge, perceptions and oral health-related practices. This further iterates the need to support, through the learning process, oral health self-empowerment, where the individual student takes responsibility for his/her own oral health. Such efforts could reap better oral health outcomes for both students as well as the communities they serve.

## Acknowledgment

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This study did not receive any funding.

## Conflicts of interest

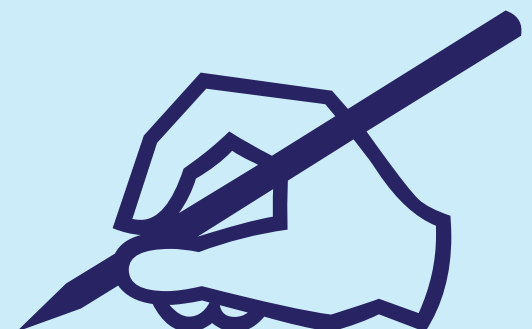
The authors declare no conflict of interest.

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## CPD questionnaire on page 174

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.



# Knowledge and attitudes of oral health care workers on HIV-associated oral lesions: A study at PHC facilities in Gauteng

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## ABSTRACT

### Background

Oral health care workers (OHCWs) are critical in providing holistic treatment and preventing the spread of HIV disease. They are uniquely placed to identify, diagnose, manage and treat HIV-related oral lesions.

### Aim

To determine oral health clinicians' knowledge and attitudes towards HIV-associated oral lesions.

### Methodology

A descriptive cross-sectional survey was conducted at Gauteng's primary health care (PHC) facilities. Data collection targeted the three categories of OHCWs – dentists, dental therapists and oral hygienists.

### Results

The response rate was 67.5% (n=110), majority of the participants, 76.4% (n=84), were female. Nearly all participants, 91.8% (n=100), agreed that oral lesions are common in people living with HIV and AIDS (PLWHA) and that early diagnosis of HIV/treatment increases PLHIV's life expectancy. More than three-quarters (80%) reported that they had no problem treating patients diagnosed with HIV. Almost a third, 36.4% (n=40), listed necrotising periodontal conditions and oral candidiasis 34.5% (n=38) as the most common oral manifestations. Most respondents correctly identified oral candidiasis (92.7%), Kaposi sarcoma (84.5%) and necrotising ulcerative periodontal conditions (80.9%).

### Conclusion

Although OHCWs had sound knowledge of oral manifestations of HIV, training programmes must be prioritised for knowledge transfer. Dental facilities can be used as a health-promoting platform and a viable location for provider-initiated testing and counselling (PICT) and client-initiated counselling and testing (CICT), also known as voluntary counselling and testing (VCT). The use of HIV rapid testing kits is an option to be explored in the dental facility by OHCWs.

### Keywords

Oral health clinicians (OHC), oral manifestations, HIV, AIDS, knowledge and attitudes

## BACKGROUND

The mouth is perceived as the mirror of a patient's overall health; it may manifest with symptoms that alert a clinician to an underlying systemic condition such as diabetes, sexually transmitted infections, anaemia and Sjogren's syndrome.<sup>1</sup> Literature has shown that Human Immunodeficiency virus (HIV) infection causes oral lesions.<sup>2</sup> An estimated 67% of the 38.4 million people living with HIV (PLWH) globally in 2021 were from Sub-Saharan Africa. Sub-Saharan Africa was responsible for 670,000 of the 1.5 million new infections and 280,000 of the 650,000 AIDS-related deaths reported globally in 2021.<sup>3</sup> With an estimated 7.8 million people living with HIV in 2023, South Africa has the world's largest and most visible HIV epidemic.<sup>4</sup> There were 160,000 new HIV infections in South Africa in 2022, and 45,000 people died from AIDS-related illnesses.<sup>5</sup> The prevalence of HIV in South Africa remains high with the infection stratified according to gender. The most pronounced differences in HIV prevalence by gender were seen among younger populations which calls for focused interventions. Compared to males of the same age groups, HIV prevalence was approximately two-fold in females aged 15-19 years (5.6% vs 3% respectively) and 20-24 years (8% vs 4% respectively) and three-fold higher in females aged 25-29 (20% vs 6% respectively).<sup>4</sup>

Despite the abundance of literature on HIV oral manifestations, literature is scant on oral health care workers' (OHCWs) knowledge and the efficacy of their management of oral HIV lesions in a country like South Africa. Oral health care workers ought to have knowledge of the HIV disease process, its oral manifestations and modes of transmission as they are strongly associated with patient readiness to receive treatment and management thereof.<sup>1</sup>

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There is a link between oral health and systemic infections, and that has prompted a call for all healthcare providers to increase their knowledge of oral health; thus the World Health Organization (WHO) oral health programme has emphasised the importance of oral examinations for all patients to reduce common health problems, such as HIV disease.<sup>2,6</sup> Between 70% and 90% of HIV-infected people will have at least one oral manifestation during the infection, and OHCWs regularly encounter patients with oral lesions associated with HIV and require adequate knowledge of these conditions for diagnosis and management.<sup>1,7</sup>

Oral lesions associated with HIV presenting in undiagnosed individuals may indicate early clinical signs of HIV infection; they also predict disease progression and may be indicative of HAART non-compliance and are clinical markers for HIV staging and classification.<sup>2,7</sup>

In 1994, the European Economic Community-Clearinghouse (EEC-Clearinghouse) on oral problems related to HIV infection and the WHO Collaborating Centre on oral manifestations of the human immunodeficiency virus classified these lesions into three distinct groups and in 1993 revised their classification, which is currently in use.<sup>8-10</sup>

#### **Group 1 Lesions that are strongly associated with HIV infection:**

- Oral candidiasis (erythematous, pseudomembranous and angular cheilitis)
- Oral hairy leucoplakia
- Periodontal diseases (linear gingival erythema, necrotising gingivitis and periodontitis)
- Non-Hodgkin's lymphoma
- Kaposi sarcoma

#### **Group 2 Lesions less commonly associated with HIV infection:**

- Melanotic hyperpigmentation
- Ulcer not otherwise specific
- Herpes simplex virus infection
- Herpes zoster
- Decreased salivary flow rate

#### **Group 3 Lesions seen in HIV infection:**

- Recurrent aphthous ulcers
- Molluscum contagiosum
- Lechenoid reactions
- Facial palsy
- Erythema multiform

Care providers' negative attitudes and biases toward people living with HIV are reported across the world with care providers also admitting reluctance among some to provide adequate care to people who are HIV positive.<sup>11</sup> Oral health care workers' attitudes towards patients living with HIV are formed primarily through a learning process which can take several forms, including classical conditioning, operant conditioning, observational learning and imitation.<sup>12</sup> It is therefore important that the knowledge and attitudes of OHCWs towards HIV be assessed in clinical settings in South Africa. The study, therefore, sought to determine the knowledge and attitudes of oral health clinicians on HIV-associated oral lesions in primary health care (PHC) facilities in Gauteng. To the authors' knowledge, this study has never been undertaken in PHC facilities in Gauteng.

## **MATERIALS AND METHODS**

### **Study design and population**

Ethical approval was obtained from the University of the Witwatersrand Johannesburg human research ethics committee (Ref M210831A). No personal details of the participants were disclosed, and all information was strictly confidential and anonymous. A descriptive cross-sectional study was conducted at primary health care facilities across Gauteng province in 2022. The survey population included dentists, dental therapists and oral hygienists referred to as oral health care workers. The Gauteng province is divided into five districts namely Tshwane, Ekurhuleni, West Rand, Joburg Metro and Sedibeng and the populations of the study were invited from all the five districts.

The recently updated estimates of OHCWs in Gauteng indicated a total of two hundred and eighty (280). The Raosoft software was used for computing the sample size (Raosoft,2004).<sup>13</sup> With the margin of error of 5% and the confidence level at 95% a representative sample was calculated to be 163 participants. The ages of the participants were grouped into three, being 21-30, 41-40 and >40 age groups.

### **Data collection**

A pretested, self-administered questionnaire was used to collect information on the sociodemographic characteristics, knowledge and attitude of oral health care workers regarding HIV-associated oral lesions.<sup>11</sup> Participants were, for example, asked to list five common oral lesions associated with HIV, given pictures of HIV-associated lesions for identification and asked if they could get infected with HIV from a needle stick injury, to test their knowledge. To test their attitudes, questions were asked such as can they safely treat patients with HIV, whether they fear or are concerned with treating patients with HIV because of fear of infection, and if they think patients infected with HIV should have their files specifically marked so that they as health workers should be aware to take specific protective measures.

The analytical tool used was SPSS Version 28 software. Quantitative variables were summarised as proportions, frequencies and mean with standard deviations, ranges and percentages. A Chi-squared test was utilised to test the association between variables. The level of significance was set at  $p \leq 0.05$ .

## **RESULTS**

### **Demographic profile of participants**

Out of the estimated representative sample of 163, there was a 67.5% (n=110) response rate. The majority of participants (76.4%) were female. The majority age range of the participants was the >40 age group. Nearly two-thirds (65.5%) were dentists. Just over half (53.6%) had work experience of fewer than 10 years. More than a third (35.5%) worked in the Tshwane metropolitan area, and nearly half (44.5%) were practising in clinics. Nearly all (95.5%) of the participants worked full time. Other demographic features are listed in Table 1.

### **Knowledge**

The majority of respondents (91.8%) agreed that oral lesions are common in people living with HIV and AIDS (PLWHA) and that early diagnosis/treatment increases PLWHA's life expectancy. More than a third (36.4%) listed necrotising periodontal conditions and oral candidiasis (34.5%) as



Table 1: Demographic profile of participants (n=110).

Demographic characteristics		Frequency (n/%)
Gender	Male	26 (23.6)
	Female	84 (76.4)
Age group	21-30 years	30 (27.3)
	31-40 years	39 (35.5)
	>40 years	41 (37.3)
Occupation	Dentist	72 (65.5)
	Dental therapist	21 (19.1)
	Oral hygienist	17 (15.5)
Position	Full time	105 (95.5)
	Part time	5 (4.5)
Experience	0-5 years	32 (29.1)
	6-10 years	19 (17.3)
	>10 years	59 (53.6)
District	Tshwane	39 (35.5)
	Ekurhuleni	25 (22.7)
	West Rand	11 (10.0)
	Johannesburg Metro	19 (17.3)
	Sedibeng	16 (14.5)
Area	Clinic	49 (44.5)
	Community health centre	34 (30.9)
	Hospital	27 (24.5)

the most common oral manifestations observed. Most respondents correctly identified oral candidiasis (92.7%), Kaposi sarcoma (84.5%), necrotising ulcerative periodontal conditions (80.9) and nearly a third (27.3%) correctly identified Non-Hodgkin's lymphoma. The most common lesions seen in the participants' area of work can be seen in Table 2.

Dentists generally managed to correctly identify all the lesions except for Non-Hodgkin's lymphoma, as only 29% correctly identified it. Ninety-five percent (95%) of dental therapists managed to identify oral candidiasis lesions correctly. Oral hygienists (94%) also correctly identified oral candidiasis. See Table 3.

Table 2: Five common lesions associated with HIV frequently seen in your area of practice (n=110).

Common oral lesions	Frequency (n/%)
Kaposi sarcoma	11 (10)
Necrotising periodontal conditions	40 (36.4)
Non-Hodgkin's lymphoma	0 (0)
Linear gingival erythema	4 (3.6)
Oral candidiasis	38 (34.5)
Oral hairy leucoplakia	4 (3.6)
Other lesions	6 (5.5)
Unanswered	7 (6.5)

Table 3: Frequency of oral lesions correctly identified by category of clinicians (n=110).

Category	Lesions (n/%)						
	*KS	*NUG	Non-Hodgkin's Lymphoma	Linear erythema	Candidiasis	*NUP	Hairy leukoplakia
Dentist n=72	67(93)	60 (83)	21 (29)	54 (75)	66 (92)	62 (86)	57 (79)
Dental therapist n=21	14 (67)	13 (62)	3 (14)	11 (52)	20 (95)	16 (76)	14 (67)
Oral hygienist n=17	12 (71)	14 (82)	6 (35)	12 (71)	16 (94)	11 (65)	15 (88)

\*KS (Kaposi sarcoma), \*NUG (Necrotising ulcerative gingivitis), \*NUP (Necrotising ulcerative periodontitis)

Table 4: Additional questions on knowledge of clinicians on HIV/AIDS.

Question	Response (n/%)
<b>Western blot is a definite test for HIV/AIDS diagnosis</b>	
Yes	35 (36.5)
No	24 (25)
I don't know	34 (38.5)
<b>Saliva can be a vehicle for the transmission of HIV/AIDS (n=110)</b>	
Yes	17 (17.7)
No	75 (78.1)
I don't know	4 (4.2)
<b>Oral health care workers can act as an intermediary for the transmission of HIV (n=96)</b>	
Yes	56 (58)
No	31 (32)
I don't know	9 (10)
<b>Needle stick injury can transmit HIV</b>	
Yes	94 (97.9)
No	1 (1)
I don't know	1 (1)
<b>HIV can be transmitted through aerosols by handpieces</b>	
Yes	24 (25)
No	70 (72.9)
I don't know	2 (2.1)

Nearly two-thirds (63%) perceived the risk of contracting HIV in the dental clinic to be high. Nearly all participants (97.3%) think needlestick injury can transmit HIV. Most of the participants (80%) think the dental staff are more prone to cross-contamination.

#### Attitudes

More than three-quarters (80%) reported that they had no problem treating patients diagnosed with HIV, 8% were uncomfortable treating the patients and 12% reported not being sure. The majority (80.9%) felt that all patients with HIV-associated oral lesions must be referred to the relevant department and handled by dental staff.

More than two-thirds of respondents (70.9%) thought introducing HIV testing in the dental facility was feasible and would improve the patient's prognosis. Close to half of the participants thought rapid HIV testing and HIV counselling needed to be routine in the dental facility, 41.8% and 47% respectively. See Table 5.

#### Associations concerning knowledge

The association between correctly identifying the lesion and the category of the clinician can be seen in Table 6.

Significantly more dentists were able to correctly identify Kaposi sarcoma, followed by oral hygienists,  $p=0.001$ . As far as linear gingival erythema was concerned significantly more dentists, followed by oral hygienists, were able to correctly identify it as compared to dental therapists,  $p=0.002$ . For both lesions dental therapists performed the least. As far as necrotising gingivitis, Non-Hodgkin's lymphoma, oral candidiasis, necrotising ulcerative periodontitis and hairy leukoplakia there was no difference in correctly identifying the lesions whether one was a dentist, oral hygienist or dental therapist,  $p>0.005$ .

There was no association between knowledge and area of practice, knowledge of the testing for HIV, age category and length of experience,  $p>0.005$ .

#### Associations concerning attitude

Association between attitude and the level of experience of the clinician in connection with the need to avoid treating an HIV positive patient and sending them elsewhere can be seen in Table 7.

Statistically more than half the clinicians with more than 10 years of experience had a positive attitude of treating the patients who are HIV positive and not sending them away to someone else to avoid treating them,  $p=0.005$ . Twenty-nine percent (29%) of the respondents with 0-5 years of experience would like to send HIV-positive people to be treated by someone else in order to avoid treating them.

#### Association between attitude and category of staff who wanted files to depict HIV status

There was no association between attitude and category of staff who wanted patients' files marked with HIV status,  $p=0.521$ . This is despite the fact that the majority of staff who thought this was not a good idea participated (61%). See Table 8.

## DISCUSSION

Oral health care workers play an essential role in the management of HIV/AIDS. Oral manifestations are frequently the first signs of HIV infection and play a crucial role in predicting disease progression. Oral health care workers ought to enhance their knowledge about the disease, its oral manifestations and management to provide effective clinical management. Appropriate knowledge may also instil confidence in the ability of the oral health clinician to manage oral manifestations of HIV/AIDS.

Table 5: Attitudes of OHCW on HIV/AIDS patients.

Question	Response (n/%)
<b>Introducing HIV testing in the dental facility is feasible and will assist the patient's prognosis (n=110)</b>	
Yes	78 (70.9)
No	12 (10.9)
I don't know	20 (18.2)
<b>Rapid HIV testing on dental patients' needs to be a standard procedure performed by oral health clinicians (n=110)</b>	
Yes	46 (41.8)
No	38 (34.5)
I don't know	26 (23.6)
<b>Need for formal training (n=96)</b>	
Yes	91 (95)
No	1 (1)
I don't know	4 (4)
<b>Counselling to be introduced as a routine (n=96)</b>	
Yes	45 (47)
No	27 (28)
I don't know	24 (45)
<b>Marking of files to depict HIV status (n=96)</b>	
Yes	25 (26)
No	63 (66)
I don't know	8 (8)
<b>Confidence in treating HIV-positive patients (n=96)</b>	
Not much	4 (4)
Average	59 (62)
Very confident	33 (34)
<b>Patients with HIV-associated oral lesions must be referred to the relevant medical speciality and not handled by dental staff (n=110)</b>	
	<b>Yes</b> <b>No</b> <b>I don't know</b>
0-5 years of experience	2      25      5      32 (29)
6-10 years of experience	5      13      1      19(17)
More than 10 years of experience	6      51      2      59 (54)

Not all respondents responded to all questions and therefore the different populations (n) for different questions.

About half (53.6%) of the participants in the study had work experience of >10 years in public service. This may be because most qualified oral health practitioners stay in public service for various reasons, including job security and comfort.<sup>14</sup> Yet the gaps identified warrant the need for an urgent invention in the continued professional development of oral manifestations associated with HIV/AIDS.

## KNOWLEDGE

Overall, respondents in this study illustrated sound knowledge of oral manifestations of HIV/AIDS. However, there were some significant yet disturbing gaps in knowledge as 40.9% of the respondents did not know that western blot is a definite test for HIV/AIDS diagnosis and 23.6% of the participants agreed that HIV could be transmitted

Table 6: Association between correctly identifying lesions and the category of the clinician (n=110).

Category	Lesions (n/%)						
	KS	NUG	Non-Hodgkin's	Linear	Candidiasis	NUP	Hairy leukoplakia
Dentist n=72	67 (93)	60 (83)	21 (29)	54 (75)	66 (92)	62 (86)	57 (79)
Dental therapist n=21	14 (67)	13 (62)	3 (14)	11 (52)	20 (95)	16 (76)	14 (67)
Oral hygienist n=17	12 (71)	14 (82)	6 (35)	12 (71)	16 (94)	11 (65)	15 (88)
p-value	0.001	0.218	0.113	0.002	0.396	0.326	0.08

Table 7: Association between level of experience and the need to treat HIV-positive patients and not to refer them somewhere else (n=110).

Experience	Yes	No	I don't know	(n/%)	P-value
0-5 years of experience	2	25	5	32 (29)	0.005
6-10 years of experience	5	13	1	19 (17)	
More than 10 years of experience	6	51	2	59 (54)	
Total n(%)	13 (12)	89 (81)	8 (7)	110 (100)	

by aerosols through handpieces. Aerosol transmission is considered the least likely cause of infection as it does not lead to any HIV seroconversion.<sup>15</sup> Similarly, a study conducted among medical professionals in India revealed that there was a significant level of incomplete knowledge of HIV/AIDS infection.<sup>15</sup>

However, the study revealed that participants had significant knowledge about the transmission of HIV and the modes of transmission as 75.5% of the participants did not agree that saliva can be a vehicle for the transmission of HIV/AIDS.<sup>16</sup> Saliva has a relatively low viral load; thus, OHCWs have a lower risk of being infected with HIV through saliva.<sup>17</sup> Some study participants (58%) believed that OHCWs can act as intermediaries for the transmission of HIV. This general misconception is consistent with other studies.<sup>18-20</sup>

The most commonly observed oral lesion was necrotising ulcerative gingivitis (seen by 36.4% of respondents), followed by oral candidiasis at 34.5%. Contrary to other studies, oral candidiasis was the most commonly observed oral lesion in HIV-infected patients.<sup>20-21</sup> Oral candidiasis is the most common lesion linked to HIV disease progression. Candidiasis presents on the oral mucosa during the early stages of HIV and may indicate early HIV infection. It may also be a warning sign of immunological and virologic failure in patients receiving highly active antiretroviral therapy (HAART).<sup>22</sup>

To further test the participants' knowledge, they were asked to identify seven unlabelled photographic images depicting lesions strongly associated with HIV. More than three-quarters of the participants correctly identified the two lesions strongly associated with HIV, Kaposi sarcoma (84.5%) and oral hairy leucoplakia (78.2%). Nearly all participants in the present study correctly identified oral candidiasis as the most common oral HIV lesion, similar to other studies.<sup>21-22</sup> Regardless, this shows that OHCWs need more training in recognising such lesions to avoid delayed diagnosis, which can result in poor health and quality of life due to discomfort, dysfunction and impairment.<sup>14, 25</sup>

### Attitudes

While numerous studies have been conducted on the knowledge, attitudes and practices of dentists concerning HIV/AIDS, few have focused on other OHCWs such as dental therapists, oral hygienists and dental assistants.

The present study found that an overwhelming majority did not mind treating PLWHA. This might be related to the high prevalence of HIV in South Africa and the frequency of dental care provision to PLWHA. These are commendable findings and suggest the level of trust between the patients and the OHCWs and their knowledge of the disease process.<sup>26</sup> A Canadian study by McCarthy et al. (1999) indicated adequate knowledge of HIV/AIDS and awareness of the ethical responsibility to treat (all) patients as factors associated with willingness to treat patients.<sup>27</sup> The high response on willingness to treat concurred with other studies,<sup>19,28-32</sup> but is contrary to a much earlier South African study in which only 45% reported willingness to deliver dental care to HIV-positive patients.<sup>22</sup> In 2006, a study also reported that although there was a growing acceptance to the management of PLWHA, dentists still experienced a moderate to extremely high fear and anxiety of transmitting HIV to oneself or other patients.<sup>33</sup> This difference in the findings may be explained by the current wealth of knowledge on HIV and its transmission routes, which was very low in the early 1990s. The high willingness reported in the present study may indicate that OHCWs are aware of their ethical obligation to provide treatment to all patients.

### CONCLUSION

Overall, participants in this study illustrated sound knowledge of oral manifestations of HIV/AIDS. However, there were some significant gaps in knowledge. The study also revealed that participants had sufficient knowledge about the transmission of HIV and the modes of transmission.

While most OHCWs showed a willingness to treat HIV/AIDS patients and displayed good attitudes in managing oral lesions associated with HIV, specific considerations such as the patient's referral for further management may be made due to the patient's compromised immune state. However, training programmes should continue to prioritise knowledge transfer on basic HIV/AIDS concepts, particularly transmission. Based on the increase in the prevalence and incidence of HIV cases, oral healthcare workers are likely to be exposed to oral manifestations. Improving OHCW skills in diagnosing and managing HIV/AIDS oral manifestations cannot be overstated. There is a need to increase awareness of clinical signs and symptoms of underlying infection and the ability to detect them and refer patients for additional testing.

Table 8: Association between attitude and category of staff pertaining to marking of files (n=110).

Files marked	Dentist	Dental therapist	Oral hygienist	Frequency (%) (n=110)	P-value
Yes	24	6	3	33 (30)	p=0.521
No	42	14	11	67 (61)	
Not sure	6	1	3	10 (9)	
Total	72	21	17	110 (100)	

In a nutshell, better-structured education targeted at all healthcare professionals working in both rural and urban hospital settings, apart from classroom teaching, in the form of health talks/seminars, in-service training, continuing medical education, quizzes and debates would improve the HIV/AIDS knowledge of health care providers most efficiently and effectively but also contribute towards ending the HIV/AIDS epidemic.<sup>16</sup>

## LIMITATIONS

While KAP methodology surveys help research general public health information on knowledge and treatment practices, it has been criticised for several reasons, including its ability to measure attitudes and practices. Often participants gave responses that they believed were acceptable to the researcher resulting in acquiescence bias. Therefore, the answers may not have been a true reflection of the actions of OHCWs. The KAP methodology has also been criticised for the rigid nature of the questionnaire design with very few open-ended questions. In some instances, participants had few choices with the closed-ended questions and were limited in their responses. The colour photographs used to depict oral lesions were not accompanied by patients' medical histories and may have limited diagnostic abilities. Also, cross-sectional studies' limitation includes their inability to assess the incidence and make causal inferences.

## RECOMMENDATIONS

The study provides additional insight into the knowledge and attitudes of this critical group of health care workers. Particular emphasis should be placed on developing skills for OHCWs in the areas of communicating with and counselling HIV/AIDS patients. Integrating these topics into undergraduate curricula, induction workshops and continuous professional programmes would be advantageous.<sup>34</sup>

HIV risk assessments of OHCWs frequently focus solely on the occupational risk of transmission, ignoring other potential contributory factors such as gender. The dental surgery should be used as a health-promoting platform and a viable location to investigate preventive strategies such as voluntary counselling and testing (VCT) as well as provider-initiated testing and counselling (PICT).<sup>16</sup> The use of HIV rapid testing kits is an option to be explored in the dental facility by OHCWs.

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# Assessment of teaching strategies and learning style preferences of lecturers and oral hygiene students at a higher education institution in South Africa

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## ABSTRACT

### Introduction

Lecturers and students at tertiary institutions have different teaching strategies and learning styles (TS&LS) and it is essential to align these strategies and styles to ensure that students understand the concepts they are taught. This study was conducted to assess and compare the TS&LS preferences among lecturers and undergraduate oral hygiene students at a university in South Africa.

### Methods

A cross-sectional study was conducted, inviting all full-time lecturers (35) and undergraduate dental hygiene students (40) registered for the 2021 academic year to participate. The visual, auditory, reading and kinesthetic (VARK) teaching and learning questionnaires (version 7.8) for lecturers and students respectively was utilised to capture the necessary information. This is a validated questionnaire and consists of a variety of questions which students complete using a multiple-choice approach. SPSS statistical package, version 27 was used for statistical analysis with a significance of  $p \leq 0.05$ .

### Results

Twenty-seven (27) lecturers (77%) and 40 students (100%) completed the questionnaire. The highest mean teaching scores were in visual (6.44) and auditory (6.22) teaching styles. The highest mean learning scores was auditory (6.43) and visual (5.98). The kinesthetic sensory modality constituted the lowest mean score in both lecturers and students. The majority of lecturers (63%) preferred using a single mode of teaching while 77% of students preferred learning using a multimode approach.

## Conclusions

The most common teaching and learning scores corresponded with each other. The preferred teaching strategy of lecturers was unimodal while the majority of students preferred a multimodal means of teaching. As a result, to improve student understanding and learning lecturers should use multimodal means of teaching.

## Keywords

Learning styles, oral hygiene students, teaching methods, teaching styles, visual, aural, read/write and kinesthetic questionnaire.

## INTRODUCTION

The emergence of numerous teaching strategies and learning styles (TS&LS) has brought increasing attention to the idea that students learn in diverse ways and that one approach to teaching does not work for every student or even most students.<sup>1</sup> A learning style is defined as "characteristic cognitive, effective and psychosocial behaviours that serve as relatively stable indicators of how learners perceive, interact with and respond to the learning environment".<sup>2</sup> It is therefore essential to determine the TS&LS of lecturers and students to ensure that effective learning takes place. A mismatch between TS&LS can lead to discouragement of the course, less effective learning and underperformance by students.<sup>3</sup>

In modern education, there has been a paradigm shift from a focus on teacher-centred learning to student-centred learning. This curriculum change places a greater emphasis on lecturers to implement learning activities based on students' preferred learning styles, rather than their own preferred teaching method.<sup>4</sup> After a thorough literature review, and based on the lack of a gold standard, the VARK survey was chosen as the measurement tool. VARK was developed in the 1990s based on the premise that humans accumulate and identify environmental knowledge through: visual (observing), auditory (listening), reading (reading and writing) and kinesthetic (tactile sensory involvement).<sup>5</sup> The VARK questionnaires have been used in previous studies to help lecturers identify their preferred teaching styles and to improve on their least preferred teaching styles.<sup>6,7,8</sup> The VARK approach has been shown to be effective in determining the TS&LS and is considered one of the most acceptable means when collecting data on teaching and learning, and allows lecturers to be more flexible in their teaching and adapt their teaching style to their audience of learners.<sup>7,9</sup> For this reason, lecturers need evidence-based data to support modifications in curricular design, including

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teaching methods that will not only enhance student learning but also find the balance between each learning dimension. In addition, it will also promote opportunities for a learning environment that is sensitive to different styles and not simply reflect how they or their students like to learn.<sup>10</sup> Although many studies have been conducted on TS&LS of medical and nursing students, there are few studies conducted on dental hygiene students using the VARK questionnaire.<sup>11,12</sup>

There are two types of the VARK questionnaire: one for lecturers and one for students. These questionnaires are based on interactions and responses to the teaching and learning environment of lecturers and students and it attempts to categorise them into four categories: Visual (teach and learn by observation and visual presentation, such as diagrams, pictures and figures); Aural or auditory (teach and learn through listening and verbal instructions); Reading/writing (those who teach and learn best by notes or reading written or printed texts); and kinesthetic (those who teach and learn by practical examples through gaining of experience and by manipulation of objects during a physical process).<sup>13</sup> These questionnaires have been used in previous studies and have shown to be both valid and reliable.<sup>12,14,15</sup>

This study was conducted at a higher education institution in South Africa. The dental hygiene degree, Bachelor of Oral Hygiene (BOH), is a full-time three-year degree which entails didactic teaching, outreach activities, clinical service rendering, research and seminar presentations. The oral hygienists are trained on the same platform as dentists and, as a result, the teaching staff comprise dentists, dental hygienists and dental specialists.

The students who attend the higher education institution come from a variety of diverse backgrounds and cultures. Many students from very low socioeconomic backgrounds and limited educational resources are combined with students from high socioeconomic backgrounds and this impacts on their learning styles and interactions with fellow students. As a result, it is important to identify the learning styles of undergraduate students to assist those who are facing challenges when trying to cope at a higher educational institution.

The present study was carried out to identify the diversity of TS&LS preferences among lecturers and registered undergraduate dental hygiene students at one institution in South Africa. In addition, to determine the prevalent TSs in order to guide staff to improve the students' learning experience.

Thus, this study will have a great impact on both South African and international research by increasing the body of knowledge of the heterogeneities in TS&LS and the implications on students and teachers. Lecturers can apply these results in their own settings as developing countries have students from diverse backgrounds.

## MATERIAL AND METHODS

This was a descriptive cross-sectional study completed in 2021. The sample included all lecturers who taught the dental hygiene students (n=35) and all of the dental hygiene students (n=40) registered for the BOH degree in the 2021 academic year. The questionnaire and informed consent were hand delivered to lecturers and students in person

together with an information letter explaining the purpose of the study and their right to voluntary participation. Those willing to participate were informed that there were secured boxes placed outside the researcher's office in which to return the questionnaire and the signed forms. No names were required on the questionnaire and these papers could be dropped off at any time at their convenience.

Data was collected using the English version of the visual, aural/auditory, read/write and kinesthetic (VARK) teaching and learning questionnaires (version 7.8) for lecturers and students respectively (Fleming, online). Each questionnaire consisted of 16 multiple-choice questions, each having four choices. These choices correspond to the four sensory modalities which are measured by VARK. The participants could select one or more of these choices, based on the sensory modalities which are preferred by them, to either teach or learn new information. According to individual preference to TS&LS, a person can be classified as unimodal if they show predominantly one T&L preference (eg only visual) or multimodal if they prefer two or more TS&LS. Some individuals prefer to teach or learn with a combination of two (bimodal) or three (trimodal) TS&LSs. Multimodal lecturers and learners do not have a dominant preference for any single method; instead, they use all of the four modes (Fleming).<sup>5</sup> In addition to the VARK questionnaire, demographic data comprising age, year of study for students and years of experience for lecturers was also collected.

## DATA ANALYSIS

Data was entered and processed by using the Statistical Package for the Social Science (SPSS) software, version 27. Data was reported as percentages of lecturers and students in each category of TS&LS preference. Quantitative variables were summarised as proportions, frequencies and means with their standard deviations, range and percentages. The level of significance was set at  $p \leq 0.05$ .

The study was approved by the research and ethics committee of the institution (264/2021) and written informed consent was taken from all participants before enrolling them for the study. The questionnaire data was kept confidential and respondents were assured of their right to withdraw from the study at any time without negative consequences.

## RESULTS

A total of 27 lecturers and 40 students completed the questionnaire (response rate was 77% and 100% respectively). The demographic data of lecturers and students is reported in Table 1.

Table 1. Demographic data of participants.

Students (n=40)	
Age in years	20.38 ( $\pm 1.6$ )
Year of study	
First year	n=20
Second year	n=11
Third year	n=9
Lecturers (n=27)	
Age in years	44.5 ( $\pm 9.76$ )
Experience in years	10.19 ( $\pm 5.8$ )

Table 2. Mean modal scores for lecturers and students.

Mode	Lecturers mean (±Std dev) score (n=27)	Students mean (±Std dev) score (n=40)
Visual	6.44 (±2.38)	5.98 (±2.57)
Auditory	6.22 (± 2.68)	6.43 (±2.88)
Read & write	5.07 (±2.73)	4.83 (±2.04)
Kinesthetic	4.96 (±1.81)	4.70 (±2.67)

The mean modal scores for students and teachers are shown in Table 2. The highest mean score for students was via the auditory route and the lowest mean score was for the kinesthetic route. For lecturers, the highest mean score for teaching was through visual means followed closely by the auditory route. The kinesthetic mode scored the lowest mean scores for both lecturers (4.96) and students (4.70). The most common VARK mode distribution among students was bimodal (32%), followed by both trimodal and quadmodal with (23%) respectively. Three-quarters (77%) of the students preferred using a multimodal learning style with 9 out of the remaining 31 (29%) being able to learn with all four modes. The majority of lecturers (63%) preferred unimodal (single) sensory modality for teaching, while of the remaining 37%, 22% preferred teaching incorporating all four modes (Table 3).

Table 3. Frequency of different learning styles among students and learners.

Modal	Lecturers % (n=27)	Students % (n=40)
<b>UNIMODAL</b>		
V	5 (19)	1 (3)
A	6 (22)	7 (17)
R	3 (11)	1 (3)
K	3 (11)	0
<b>Total Unimodal % (n)</b>	<b>17 (63)</b>	<b>9 (23)</b>
<b>BIMODAL</b>		
V+A	1 (4)	7 (17)
V+R	2 (7)	1 (3)
A+K	0	3 (8)
R+K	0	1 (3)
V+K	1 (4)	0
A+R	1 (4)	1 (3)
<b>Total Bimodal % (n)</b>	<b>5 (19)</b>	<b>13 (33)</b>
<b>TRIMODAL</b>		
V+A+K	0	2 (4)
V+R+K	0	2 (4)
V+A+R	1 (4)	5 (13)
<b>Total Trimodal % (n)</b>	<b>1(4)</b>	<b>9 (23)</b>
<b>QUADMODAL</b>		
V+A+R+K	4 (15)	9 (23)
<b>Total Quadmodal % (n)</b>	<b>4 (15)</b>	<b>9 (23)</b>
<b>TOTAL % (n)</b>	<b>77 (27)</b>	<b>40 (100)</b>

The correlations between age and modal categories yielded no significant differences ( $p>0.05$ ).

## DISCUSSION

A total of 40 students and 27 lecturers completed the questionnaire (response rate=100% for students and 77% for lecturers). The high student response rate achieved could be due to the fact that the researcher visited each class after lectures and reminded students to complete the questionnaire. The response rate from the lecturers was relatively high as well and this could be due to numerous reminders sent to lecturers to complete the questionnaire. The constant feedback and the initial explanation of the study rationale also proved a positive means of increasing the response rate. It is therefore suggested that if academics want to carry out research among staff and students, regular briefing sessions should be held to inform participants of the study, to answer questions and to offer questionnaires on a repeated basis.

The mean auditory (6.43) and visual (5.98) scores were the highest for students. This implied that most students prefer to learn through listening and with visual aids. Among the lecturers, the highest mean score was observed in visual (6.44) followed by auditory (6.22). This showed that there is a strong alignment between TS&LSs of the lecturers and the students. The common combination of learning modalities among the bimodal and trimodal group was highest for visual and auditory (17.5%). This showed that most learning occurred through PowerPoint or video presentations. This could be due to the historical teaching that occurs throughout the learner's education journey from school to higher training institutions; however, more research is required on this matter. Most of the lecturers who preferred to teach using two modes chose Visual and Reading (7.2%). This indicated these lecturers would use visual aids and hand out notes for students to read. It placed emphasis on the students to go and read through the notes to understand concepts they may have not grasped.

The trimodal learning preference showed the highest (12.5%) in a Visual + Auditory + Read/write (VAR) combination. However, in other similar studies, among the trimodal learning styles, VAK<sup>10</sup> and ARK<sup>16</sup> were the most preferred. This could be due to the sample population and types of students included in those studies. It was surprising to note that very few students preferred to learn through the kinesthetic modality, given that oral hygiene is a degree in which students need to learn practical techniques and clinical skills. This could be due to the historical teaching and learning they were exposed to during their primary and high schooling years. Only 4% of lecturers reported to use a trimodal approach using V+A+R. This confirms that lecturers prefer having didactic lectures with visual aids and handing out notes for students to read through. The majority of students were multimodal learners (77%) with 23% of them preferring to learn using all of the four learning modalities (quadmodal). These findings are similar to other studies that have reported a predominant multimodal style of learning among medical and allied health students across the world.<sup>3,10,16</sup> The kinesthetic modality of learning constituted the lowest mean score in both lecturers and students. This was in contradiction to other similar studies on dental students which reported that dental students preferred the kinesthetic as a single mode of learning, followed by multiple modes.<sup>11,15</sup>

Being able to learn using multimodal techniques is useful as students are exposed to a variety of lecturers who might use



a single mode of teaching and this could negatively impact on the students' progress and understanding.<sup>17,18</sup>

## CONCLUSION

The majority of students preferred to learn using the auditory route. For lecturers, the majority reported to teach using the visual means followed by the auditory route, for example demonstrating and PowerPoint presentations. The kinesthetic mode scored the lowest mean scores for both lecturers and students. The preferred teaching style of lecturers was unimodal while the majority of students preferred a multimodal means of teaching. As a result, to improve student understanding and learning lecturers should use multimodal means of teaching. Students should be taught using different methods to ensure that they understand and comprehend the content and skills expected of them.

## RECOMMENDATIONS

Students should receive orientation on the types of TS&LS when they register at higher learning institutions. This could better prepare them for self-understanding and realisation regarding their own LSs and what is most appropriate for them. The programme should include assessments such as the VARK, to identify their learning preferences and to empower them to use different learning preferences. This would improve their learning skills and create more competent students and lifelong learners. This will further assist them as they progress and prepare them for different types of lecturers and different types of learning modalities. Lecturers should also receive regular workshops to identify their teaching styles and to provide support in order for them to expand their type of teaching modes. This will assist them in reaching out to more students and ensuring more students can grasp and apply the content they are teaching. Lecturers should also identify weak students and assist them in their learning and understanding to ensure students from different backgrounds are accommodated. Test marks (assessments) could be used as indicators to identify weak students early on in their academic careers and initiate teaching programmes to assist them. These could include peer mentoring, tutorial sessions, one-on-one sessions and additional resources.

The realisation that people learn habits and practices in different ways is essential when providing oral health education and instructions to patients and communities.

Oral health practitioners must be aware that patients/communities learn using different methods and, hence, they should provide health education using different mediums. Pamphlets, posters, videos and hands-on methods should be combined when offering health education. This would ensure patients, irrespective of their learning style, will be accommodated.

## CONFLICT OF INTEREST

The authors declare there are no conflicts of interest.

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## CPD questionnaire on page 174

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.



# Factors influencing dental practitioners' decision to perform interceptive orthodontic treatment in public and private practice settings in the Tswane metropole, South Africa

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## ABSTRACT

### Introduction

General dentists are often reluctant to perform interceptive orthodontic treatment (IOT) in their practices. As IOT can be of great benefit to some patients, the study aimed to explore the factors that influence the implementation of such treatment.

### Methodology

A sample of 24 general dental practitioners was selected. One-on-one interviews, guided by two questionnaires, were conducted with each of the participants at either their place of work or in a public location. They answered structured questions regarding the treatment plans for five paper patient scenarios to test their knowledge on interceptive orthodontics (IO). The knowledge scores were assessed according to whether the participants were in private or public practice and on a socioeconomic scale according to where they practiced. A second questionnaire focused on the patient confidence levels with respect to performing IOT as well as other practical issues that have a bearing on IOT.

## Results

All the participants in the study achieved a knowledge score over 70% with no statistically significant differences found between the private and public sectors. However, when compared according to the different socioeconomic areas, the practitioners from the middle-income socioeconomic area displayed a lower knowledge score that was statistically significant ( $p=0.029$ ). This group also performed significantly ( $p=0.001$ ) poorer than the other groups when "treating" Case 1.

Seventy-five percent of the participants were very confident regarding their IO diagnosis and treatment planning. However, this confidence was tempered by their confidence (42%) in their undergraduate orthodontic programme.

All the participants acknowledged the importance of timeous IOT, yet only 79% stated that they would have treated the "patients" in their own practices.

Factors affecting the non-delivery of IOT in practice showed that 50% of the dentists expressed no interest in orthodontics, 54% mentioned medical aid remuneration as a negative factor and 58% did not have the practice infrastructure to be able to perform IOT.

## Conclusion

The lack of interest compounded by the practical challenges of finances, practice infrastructure and lack of patient motivation and compliance are the real issues, with patients often being considered for treatment when it is too late for IOT.

Factors influencing dental practitioners' decision to perform interceptive orthodontic treatment in public and private practice settings in the Tshwane metropole, South Africa

## INTRODUCTION

Studies have shown that nearly 30% of the population have some form of malocclusion that warrants orthodontic treatment in order to improve the function and aesthetics of the dentition.<sup>1,2</sup> In the South African context, a 2004 study showed the need for definitive treatment to be 32.3% of 12-year-old children.<sup>3</sup>

Early orthodontic treatment may be deemed as either preventative or interceptive. Preventive orthodontics (PO) can be defined as the branch of orthodontics that prevents orthodontic problems from occurring.<sup>4</sup> Interceptive orthodontics (IO) is the branch of orthodontics concerned

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### Author's contribution

1. Dr A Hudson – writing article (20%)
2. Dr L Yeo – principal researcher (40%)
3. Prof A Harris – writing article, clinical input (20%)
4. Prof N Mohamed – writing article, editing (20%)

### Keywords

Dentist, interceptive orthodontics, knowledge, treatment, socioeconomic factors

### Conflict of interest

None

with the implementation of early interventions to reduce or eliminate minor occlusal problems (such as crowding loss of space, habits, developmental anomalies and retained primary teeth) that are currently present.<sup>4</sup> The general dental practitioner plays a key role in the timeous identification and diagnosis of orthodontic problems that could potentially benefit from interceptive orthodontic treatment. It has been suggested that if orthodontic problems are timeously intercepted and appropriately managed during the mixed dentition phase, up to 60% of these malocclusions may be corrected or reduced in severity, ensuring that later treatment is less costly and time consuming.<sup>5,6,7</sup>

Interceptive orthodontic treatment is within the scope of practice of the general dentist. Orthodontic treatment on the UK's NHS is free to everyone under the age of 18 years, if recommended by a dentist or orthodontist.<sup>8</sup> It has been suggested that general practitioners are not comfortable diagnosing and/or performing interceptive orthodontic treatment but they felt that they had the skills to correctly refer patients.<sup>4</sup> Although they had knowledge of the indications and limitations of removable appliances, they did not feel they had the clinical skills to implement the treatment modalities themselves. Thus, the lack of self-confidence, experience and operator skills led to minor interceptive orthodontic treatments (IOT) being referred, or sometimes left until a major malocclusion developed.<sup>4,5,9</sup>

A 2005 survey found that 63% of Irish general dentists were satisfied with the academic component of their undergraduate orthodontic course while only 54% were satisfied with the clinical component.<sup>9</sup> However, 24% of those surveyed would attempt to correct an anterior crossbite while only 15% would fit a space maintainer, suggesting a discrepancy between knowledge and clinical application of interceptive and preventative orthodontic treatment.<sup>10</sup>

A 2009 British survey to assess how general dentists refer patients showed that 52% of dentists were correct in assessing the need for treatment, but only 20% of general practitioners referred patients at the correct time. This study highlighted the fact that there was no proper understanding or insight into suitable case selection or the optimal treatment timing for the implementation of IOT in general dental practice.<sup>11</sup>

Various studies have assessed the orthodontic curriculum at undergraduate level in dental schools across Britain. It was found that there was a significant difference in the content covered, course length in terms of hours dedicated to orthodontics, as well as the way students were assessed and examined across different universities.<sup>4,12,13</sup>

The aim of the current study was to understand the factors that influence the decision of general dentists in the public and private sectors to provide IOT services to their patients in the metropolitan area of Tshwane, South Africa.

The hypothesis was that knowledge, confidence of self-efficacy, attitude, socioeconomic area and certain other factors do play a role in general dental practitioners' decision to perform IOT themselves or whether they refer their patients to an orthodontist.

## METHODOLOGY

### Study sample

A quantitative survey was conducted on a convenience

sample of 24 dentists representing an equal number in the public and private settings with four from each of the three socioeconomic areas. Practicing dentists in the areas were identified from a register and were invited to participate in the research. The first four respondents from each area were included in the study sample. The sample was also selected to represent an equal spread of professional experience (1 to 5, 6 to 10, 11 to 15 and 16 to 20 years, respectively) in each of the areas where the survey was undertaken, namely Danville, Riveria and Waterkloof. Each of these areas represented a different socioeconomic grouping: Danville (lower), Riveria (middle) and Waterkloof (higher).

Five clinical patient paper cases/scenarios and a questionnaire that was adapted from an earlier study<sup>4</sup> was compiled in consultation with an experienced academic specialist orthodontist to test the interceptive orthodontic knowledge of the dentist. An "answer sheet" or memorandum of possible outcomes for each of the scenarios was also drafted (Table 1).

Table 1: Questionnaire 1: the five clinical scenarios/paper cases presented to each participant to test the knowledge component. Each participant completed a separate answer sheet for every scenario.

Paper cases:		
1.	During a routine dental check-up of a 9-year-old patient you notice an anterior crossbite of the 12 and 42. The parents are unaware of the crossbite.	
2.	A 10-year-old scholar presents to you with an increased overjet and a Class II molar relationship. He is also complaining of cold sensitivity on the mesial aspect of all the first primary molars.	
3.	A 10-year-old patient presents to the practice with an anterior open bite and a thumb sucking habit.	
4.	A 13-year-old girl presents to the practice with the 75 still present and not mobile. The 35 is unerupted and the 45 fully erupted. The 75 is in infraocclusion.	
5.	A 10-year-old girl presents with the early loss of the second upper primary molar on the right-hand side. No space maintenance was done for the child.	
Answer sheet (one for each of the five cases)		
	Yes	No
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

A follow-up questionnaire that was also adapted from an earlier study,<sup>4</sup> was posed to the practitioners to obtain information on their thoughts regarding their confidence of self-efficacy, attitude as well as practical factors that may play a role in the decision-making process of whether or not to treat a patient with interceptive orthodontics. The participants were also given the opportunity to comment on other factors that they felt affected the implementation of IOT (Table 2).

Table 2: Questionnaire 2: questions posed to assess confidence levels, attitude, practical issues and other factors that may influence the decision to perform IOT (adapted from an earlier study).<sup>4</sup>

Factor	Question	Not confident	Unsure	Very confident
Confidence of self-efficacy	How confident are you that you have designed the correct treatment plan for the patients?			
	How confident are you that you can carry out the treatment plan for the patients?			
	How confident are you that the chosen treatment option(s) is the correct one?			
	How confident are you that your undergraduate training is sufficient to manage IOT?			
		Yes	No	Why?
Attitude	Would you have treated any of the paper patient cases in your practice?			
	Would you consider it important to carry out IOT in general dental practice?			
	Do you think the patients will be worse off if no IOT is done?			
		Yes	No	Why?
Practical issues	Do you have a keen interest in orthodontics?			
	Does the monetary amount paid by Medical Aids affect your decision to perform IOT?			
	Does the practice's infrastructure support the implementation of IOT?			
<b>Are there any other concerns or reasons that influence your choice to perform IOT in your practice? Please specify:</b>				

## DATA COLLECTION

In order to assess the practitioners' knowledge, one-on-one interviews lasting 30 minutes were conducted with each participant using questionnaire 1 (Table 1). Knowledge was assessed with the question: "Which procedures do you think should ideally be carried out for this patient?". Each scenario offered the possibility of 10 behaviours and, to each, the practitioner had to answer either yes or no. The responses were compared to those of the expert. No negative marking was implemented. The interviews were conducted by the researcher at the respondent's place of work or in a public location. To ensure anonymity, no personal information or information regarding the participants' practices were recorded. The interviews were identified via a numbering system and stored in a secure, online location to further ensure anonymity.

Confidence of self-efficacy, attitude and other factors pertaining to the delivery of IOT were assessed via questionnaire 2 (Table 2).

## DATA ANALYSIS

For the assessment of the dentists' knowledge levels, one point was allocated for each correct response. When the selected answers were incorrect, no points were allocated.

This was converted to a percentage for each dentist and was called the knowledge score. For each scenario, the percentage of the overall knowledge score across the sample was calculated as the overall percentage of correct answers given, together with a 95% confidence interval. A knowledge score of higher than 50% was rated as good while 50% was regarded as average. Below 50% was regarded as poor. The overall knowledge across all five scenarios and across the sample was calculated in a similar way, together with a 95% confidence interval. The outcome measure (dependent variable) was the intention to provide the correct behaviour (by selecting the correct procedure to be done), as measured by the knowledge score. The knowledge scores from each scenario were combined into a global knowledge score. Statistical analysis was performed on SAS (SAS Institute Inc, Carey, NC, US), Release 9.4.

Confidence of self-efficacy, attitude and other factors were assessed for each individual based on the answers provided by the general practitioners. Responses were summarised using frequency counts and percentage calculations.

The performances of the dentists in the public and private sectors were compared.-

## RESULTS

Table 3: The knowledge score achieved by each dentist for the 5 paper cases.

Dentist	Percentage correct answers for paper cases					Average across cases
	Case 1	Case 2	Case 3	Case 4	Case 5	
<b>Private sector</b>						
1	80	70	80	60	30	64
2	90	90	60	70	90	80
3	80	50	70	50	60	62
4	100	100	80	100	100	96
5	50	60	80	80	80	70
6	60	70	40	80	60	60
7	50	70	50	40	70	56
8	60	90	60	60	60	66
9	100	50	70	90	60	74
10	70	100	70	90	50	76
11	60	80	60	60	60	64
12	90	80	60	90	100	84
<b>Average</b>	<b>74.2</b>	<b>75.8</b>	<b>65.0</b>	<b>72.5</b>	<b>67.5</b>	<b>71.0</b>

<b>Public sector</b>						
13	60	80	50	70	40	60
14	90	70	70	50	70	70
15	100	80	100	50	60	78
16	80	90	60	70	60	72
17	100	90	80	80	60	82
18	70	90	70	80	70	76
19	50	80	60	50	50	58
20	50	80	50	80	60	60
21	70	90	70	70	60	72
22	90	90	80	60	80	80
23	70	90	70	50	60	68
24	90	80	70	70	60	74
<b>Average</b>	<b>76.7</b>	<b>84.2</b>	<b>69.2</b>	<b>65.0</b>	<b>59.2</b>	<b>70.8</b>
<b>P value*: Private vs Public</b>	<b>0.764</b>	<b>0.146</b>	<b>0.583</b>	<b>0.265</b>	<b>0.228</b>	<b>1.000</b>

\*Fisher's Exact test

Table 4: The knowledge score per paper case across the 3 areas surveyed.

Dentist	Percentage correct answers for paper cases					Average across the cases
	Case 1	Case 2	Case 3	Case 4	Case 5	
<b>Waterkloof area: Higher socioeconomic class</b>						
1	80	70	80	60	30	64
2	90	90	60	70	90	80
3	80	50	70	50	60	62
4	100	100	80	100	100	96
13	60	80	50	70	40	60
14	90	70	70	50	70	70
15	100	80	100	50	60	78
16	80	90	60	70	60	72
<b>Average</b>	<b>85.0</b>	<b>78.8</b>	<b>71.3</b>	<b>65.0</b>	<b>63.8</b>	<b>72.8</b>

Riveria area: Middle socioeconomic class						
5	50	60	80	80	80	70
6	60	70	40	80	50	60
7	50	70	50	40	70	56
8	60	90	60	60	60	66
17	100	90	80	80	60	82
18	70	90	70	80	70	76
19	50	80	60	50	50	58
20	50	80	50	80	40	60
<b>Average</b>	<b>61.3</b>	<b>78.8</b>	<b>61.3</b>	<b>68.8</b>	<b>60.0</b>	<b>66.0</b>
Danville area: Lower socioeconomic class						
9	100	50	70	90	60	74
10	70	100	70	90	50	76
11	60	80	60	60	60	64
12	90	80	60	90	100	84
21	70	90	70	70	60	72
22	90	90	80	60	80	80
23	70	90	70	50	60	68
24	90	80	70	70	60	74
<b>Average</b>	<b>80.0</b>	<b>82.5</b>	<b>68.8</b>	<b>72.5</b>	<b>66.3</b>	<b>74.0</b>
<b>P value*: All three classes</b>	<b>0.001**</b>	<b>0.810</b>	<b>0.378</b>	<b>0.611</b>	<b>0.734</b>	<b>0.029**</b>

\* Fisher's Exact test

\*\* Statistically significant (p value <0.05)

Table 5: The knowledge score per scenario based on years of experience.

Dentist	Percentage correct answers for					Average across all cases
	Case 1	Case 2	Case 3	Case 4	Case 5	
<b>1-5 years of experience</b>						
1	80	70	80	60	30	64
13	60	80	50	70	40	60
9	100	50	70	90	60	74
21	70	90	70	70	60	72
5	50	60	80	80	80	70
17	100	90	80	80	60	82
<b>Average per case</b>	<b>76.7</b>	<b>73.3</b>	<b>71.7</b>	<b>75.0</b>	<b>55.0</b>	<b>70.3</b>
<b>6-10 years of experience</b>						
2	90	90	60	70	90	80
14	90	70	70	50	70	70
10	70	100	70	90	50	76
22	90	90	80	60	80	80
6	60	70	40	80	50	60
18	70	90	70	80	70	76
<b>Average per case</b>	<b>78.3</b>	<b>85.0</b>	<b>65.0</b>	<b>71.7</b>	<b>68.3</b>	<b>73.7</b>
<b>11-15 years of experience</b>						
3	80	50	70	50	60	62
15	100	80	100	50	60	78
11	60	80	60	60	60	64
23	70	90	70	50	60	68
7	50	70	50	40	70	56
19	50	80	60	50	50	58
<b>Average per case</b>	<b>68.3</b>	<b>75.0</b>	<b>68.3</b>	<b>50.0</b>	<b>60.0</b>	<b>64.3</b>

16-20 years of experience						
4	100	100	80	100	100	96
16	80	90	60	70	60	72
12	90	80	60	90	100	84
24	90	80	70	70	60	74
8	60	90	60	60	60	66
20	50	80	50	80	40	60
<b>Average per case</b>	<b>78.3</b>	<b>86.7</b>	<b>63.3</b>	<b>78.3</b>	<b>70.0</b>	<b>75.3</b>
<b>P value*: All years</b>	<b>0.552</b>	<b>0.169</b>	<b>0.781</b>	<b>0.005**</b>	<b>0.284</b>	<b>0.017**</b>

\* Fisher's Exact test

\*\* Statistically significant (p value <0.05)

Table 6: Confidence of self-efficacy of the participants.

Question	Number (%)			
	Very confident	Not confident	Unsure	Total
How confident are you that you have designed the correct treatment plan?	18 (75)	-	6 (25)	24 (100)
How confident are you that you can carry out the treatment plan?	18 (75)	1 (4)	5 (21)	24 (100)
How confident are you that you have chosen the correct treatment option?	18 (75)	-	6 (25)	24 (100)
How confident are you that your undergraduate training is sufficient to manage IOT?	10 (42)	9 (38)	5 (21)	24 (100)
<b>Collective confidence</b>	<b>64 (66.7)</b>	<b>10 (10.4)</b>	<b>22 (22.9)</b>	<b>96 (100)</b>

Table 7: Participants' attitude towards the implementation of IOT.

Question	Number (%)		
	Positive Attitude	Negative attitude	Total
Would you have treated any of the paper patient cases in your practice?	19 (79)	5 (21)	24 (100)
Do you consider it important to carry out IOT in general practice?	24 (100)	-	24 (100)
Do you think patients will be worse off without IOT?	24 (100)	-	24 (100)
<b>Collective attitude</b>	<b>67 (93.1)</b>	<b>5 (6.9)</b>	<b>72 (100)</b>

Table 8: Practical issues affecting the implementation of IOT.

Question	Number (%)		
	Yes	No	Total
Do you have a keen interest in orthodontics?	12(50)	12(50)	24(100)
Does the monetary amount paid by medical aids affect your decision to perform IOT?	13(54)	9(46)	24(100)
Does the practice's infrastructure support the implementation of IO?	14(58)	10(42)	24(100)

## DISCUSSION

The knowledge scores were calculated for all 24 dentists individually, for all five paper cases (Table 3). The average knowledge scores of dentists in the private and public sectors (71.0% and 70.8% respectively) did not differ significantly (Table 3). Only three private and two public sector dentists scored below 50% on one of the five paper cases. Three of these questions related to case 5 which stated: "A 10-year-old girl presents with early loss of the

second upper primary molar on the right-hand side. No space maintenance was done for the child. What would you do for this child?". The correct answer would be to distalise the maxillary first permanent molar on the right-hand side if it was established that space was lost. This could easily be done with a removable distalisation appliance. Subsequently, space maintenance would be needed until the second premolar erupted. Based on the questionnaire, it is possible that the general practitioners who scored

poorly on this case did not think that any treatment or space maintenance was needed, which was clearly not the case. The possibility exists that the dentists might have thought that fixed orthodontic treatment would be needed eventually, once the child is older.

The knowledge scores from Table 3 were re-arranged according to the three areas surveyed and summarised in Table 4. For paper case 1, the knowledge score for the Riveria (middle income) group (61.3%) differed significantly ( $p=0.001$ ) from both the Waterkloof (high income) group (85.0%) and the Danville (low income) group (80.0%). There could possibly be numerous reasons why general practitioners practising in the Riveria area had a significantly lower knowledge score than the other dentists, the most obvious being the small sample size of this study and this may have been compounded by inexperience and/or a lack of interest in the field of orthodontics. However, no statistically significant differences were found between the three areas surveyed in respect to the average percentage of correct answers for cases 2 to 5. The average percentage across all the cases showed that the scores for the Riveria (middle income) group was significantly ( $p=0.029$ ) lower than for the Danville (low income) group (Table 4).

The results of this study correlate closely with the results of a British study in 2016<sup>14</sup> that reported a sufficient level of knowledge of the participants. However, various other studies have concluded that the lack of knowledge was a major reason why dentists did not implement IOT in their practices.<sup>4,9,11</sup> One of these studies showed that 11% perceived themselves to have a good level of knowledge. Some 59% thought their knowledge was average and 30% felt that it was poor.<sup>9</sup>

#### Knowledge vs experience

Table 5 shows that there were no statistically significant differences in the overall knowledge scores between the various categories of experience for cases 1, 2, 3 and 5. However, for case 4, the group with 11-15 years of experience scored 50% which differed significantly ( $p=0.008$ ) from the group that had 1-5 years of experience (score of 75%) and the group ( $p=0.002$ ) with 16-20 years of experience (score of 78.3%). The average knowledge score across all cases also showed that the percentage for the 11-15 years of experience group (64.3%) was significantly ( $p=0.004$ ) lower than the percentage for 16-20 years of experience group ( $p=75.3%$ ). The overall knowledge scores per experience category were as follows:

- 1 to 5 years of experience: 70.3%, with a 95% confidence interval (64.9% to 75.2%)
- 6 to 10 years of experience: 73.7%, with a 95% confidence interval (68.4% to 78.3%)
- 11 to 15 years of experience: 64.3%, with a 95% confidence interval (58.8% to 69.5%)
- 16 to 20 years of experience: 75.3%, with a 95% confidence interval (70.2% to 79.9%)

Knowledge, experience and confidence play a huge role in the management of IOT cases. Borrie et al. (2014)<sup>4</sup> found that of those who felt their knowledge of orthodontics was poor, 28% felt it was due to a lack of clinical practice or experience. Jauhar et al. (2016)<sup>14</sup> reported that final-year students felt that they did not have enough experience to implement orthodontic treatment when they entered practice the following year. Fifty-six percent of the group felt

they needed more exposure and experience to perform fixed orthodontic treatment while 41% wanted more exposure to removable appliances.<sup>14</sup>

#### Knowledge vs confidence

The knowledge scores reflected in Table 3 were lower than the confidence levels with regard to the correctness of the treatment option, the treatment plan and the ability to perform the IOT (Table 6). Table 6 revealed that in 75% of the responses, the dentists indicated that they were very confident that their treatment plans and treatment options were correct and were able to carry out the treatment. Fleming and Dowling (2005)<sup>9</sup> interviewed general dentists and found that:

- 69% felt they could adequately complete an orthodontic assessment
- 96% felt they were capable of referring patients appropriately
- 76% felt they had the knowledge to use removable orthodontic appliances.

However, only 24% of these dentists would attempt to correct an anterior crossbite while 15% would be prepared to fit a space maintainer.<sup>10</sup> This may suggest a lack of confidence which could probably be an important reason for dentists not implementing IOT as part of their normal scope of practice. It also correlates with the findings of Borrie et al. (2014)<sup>4</sup> who reported on practitioners' reluctance to implement IOT due to a lack of confidence.

#### Attitude towards IOT

The findings of this study revealed that in 93.1% of the responses, the dentists expressed a positive attitude towards the implementation of IOT as part of their normal scope of practice (Table 7). The first attitude question asked the participants whether they would have treated any of the paper cases in their own practices. Of the 24 participants, 19 responded positively and 5 negatively. Reasons for answering yes included the following:

- Ease of execution (42%)
- The treatments will be quick to complete (21%)
- They had the skill-set to perform the treatment (13%)
- IOT should be done by a general dentist and not by a specialist (4%)

Only 13% of respondents perceived themselves clinically capable to perform the necessary IO treatment while 63% felt that the treatment would be easy and quick to complete. This compares favourably to the findings in Table 6 which illustrates that 75% of respondents were confident in their diagnosis, treatment plan and treatment. Reasons for answering no included the following:

- Lack of interest in orthodontics (13%)
- Lack of confidence (4%)
- Lack of knowledge (4%)

The second attitude question explored whether the participants considered it important to carry out IOT in a general dental practice. All 24 participants answered yes to this question. Reasons given included:

- A reduction in the complexity of treatment needed at a later stage (38%)
- IOT prevented future orthodontic problems (33%)



- IOT prevented referral of patients outside of the practice (17%)
- It reduced the financial burden on the patients (8%)
- It kept patients and parents happy by attempting to resolve the problems early (4%)

The third attitude question attempted to determine whether general practitioners thought that the patients would be worse off if no IOT was done. All 24 participants answered yes to this question. Reasons given included the following:

- Fixed orthodontic treatment at a later stage is expensive and more complex (25%)
- Orthodontic problems tend to worsen with age (75%).

Jayaprakash et al. (2019)<sup>15</sup> found that practitioners who implement orthodontic treatment in their practices have a better attitude and interest toward the speciality compared to those who do not implement the discipline in their practices.

### Undergraduate training

The knowledge scores may indicate that undergraduate training across all dental schools at South African universities may be adequate; unfortunately, no comparative South African studies could be found. However, only 42% felt that their undergraduate training prepared them sufficiently to manage IOT in practice (Table 6). The remainder of the respondents indicated that they were either not confident (38%) or unsure (21%) with respect to providing IOT. This lack of confidence in their orthodontic grounding may well play a role in quantifying the imbalance between confidence and knowledge. This is well supported by a 2006 British survey of dentists that evaluated undergraduate curricula pertaining to orthodontic knowledge and skills.<sup>16</sup> The study showed that:

- 58% felt the theoretical information they received was adequate
- 45% felt that their practical experience had been relevant to their current practice
- 46% felt that they would be able to treat simple cases with removable appliances
- 40% felt that their undergraduate course could have been improved by gaining more clinical experience

### Other factors influencing the implementation of IOT

Only 50% of the respondents expressed a keen interest in orthodontics (Table 8) yet 75% of them were confident enough to treat the paper cases (Table 6). The reasons why they expressed an interest in orthodontics included the following: they loved working with children (17%), they had success with past treatments and the results were life-changing for the patients (13%), it kept patients in their practices (4%), it was an interesting field (17%). The reasons why they had no interest in orthodontics included the following: they felt that it was difficult to understand the field (21%), it was time-consuming (8%), they did not like orthodontics (8%), or they did not like children (8%).

Forty-two percent of the practitioners were in practices that did not have the infrastructure to support the implementation of IOT, while 58% of respondents reported that they had infrastructural support (Table 8) in the form of good laboratory services, instruments and the radiographic equipment needed to treat IO cases. Unfortunately, questionnaire 2 did not differentiate between the public and private sectors, so no comparisons could be made regarding the infrastructure in the public and private sectors.

Many of the middle-income practices may depend on medical aid schemes which are governed by different rules and regulations. Some medical aids do not cover IOT whereas others may require time-consuming administration in order to approve treatment that is not remunerated to the satisfaction of the practitioner, if remunerated at all. Patients might also be reluctant to cover any costs that the medical aid does not cover in full. Medical aid funding was found to affect the decision to implement IOT in 54% of the responses (Table 9). This confirms the results of other studies that found that financial outcomes played a significant role in the long-term plans of newly qualified dentists and the types of clinical work on which they chose to focus.<sup>17,18</sup> Due to these financial limitations, increased pressure is placed on the dentists to perform simple interceptive procedures early, suggesting that there is a greater need for IOT among patients from the lower socioeconomic group.<sup>19,20</sup>

Furthermore, another important reason for not implementing IOT was a perceived lack of patient compliance and patient fatigue (25%). Sixteen percent of participants felt that the long period of time over which the income is generated made IOT not worthwhile. Patient finances and a low dental IQ of patients were mentioned in 12% of responses. The finding correlated Brattström et al. (1991)<sup>21</sup> findings that the main reason patients terminated treatment was the lack of motivation, while Mussig et al. (2008)<sup>22</sup> stated that socio-emotional factors influenced patient compliance significantly. Factors that were found to influence compliance positively include female patients, individuals with high self-esteem, high achievers and optimistic patients.<sup>23</sup>

### LIMITATIONS

The study only focuses on three areas in Tshwane; researching a broader geographical base will reflect more accurately on the South African situation. The sample size of participants is small; however, to achieve the correct sector and experience spread, a large number of potential participants had to be screened.

The questions and responses to questionnaire 2 did not reflect the experience of the participants or whether they were public or private sector workers.

### CONCLUSION

The knowledge levels of the dentists surveyed were good but inconsistent where confidence levels were concerned. However, all of the respondents understood the value of timeous IOT.

The practical issues such as practice infrastructure, financial remuneration, patient motivation and compliance are the real issues that play a role in the general practitioners' decision to implement IOT on a daily basis.

Half of the dentists surveyed expressed no interest in orthodontics. It may be concluded that because of this lack of interest, which is compounded by the practical challenges, patients are often considered for treatment when it is too late for IOT, resulting in the need for comprehensive orthodontic treatment in the permanent dentition.

Undergraduate programmes need to place increased emphasis on the clinical component of the orthodontic module to reduce the disparity between theory and clinical application. In view of the proposed National Health Insurance legislation, prevention and interception of early orthodontic malocclusions will decrease the orthodontic burden of care.

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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.



# A framework to guide oral healthcare at long-term care facilities in the eThekweni district

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## ABSTRACT

### Introduction

Oral healthcare is an important aspect of the general healthcare of individuals residing in long-term care (LTC) facilities. However, it is often neglected in these settings and contributes to oral health disparities and oral diseases among residents. The World Health Organization promotes the reduction of health disparities and diseases through health promotion as an ethical obligation. The utilization of frameworks to promote oral health provides a structured approach to the design, implementation, and evaluation of oral health promotion programs.

### Aim and objectives

This study proposed a framework to guide the development, implementation, and review of an oral health promotion intervention, so as to ensure that a systematic and evidence-based approach is used for the delivery of oral health promotion activities.

### Methods

The framework comprised three stages: needs analysis, implementation and review of an oral health intervention, which was guided by the Precede-Proceed model and Intervention mapping. The empirical aspect involved a 4-phased mixed method exploratory study, based on action research and the plan-act-observe-reflect cycle, which illustrated how the framework was operationalized.

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### Keywords

oral healthcare, conceptual framework, interventions, long-term care facility, oral health promotion

### Results

The oral health intervention indicated positive outcomes with regard to knowledge and attitudes among caregivers.

### Conclusion

The framework incorporated the key components that influenced oral health provision at LTC facilities.

### Keywords

oral healthcare, conceptual framework, interventions, long-term care facility, oral health promotion

## INTRODUCTION

Oral health is a fundamental part of general health, as it impacts on important daily functions of individuals, such as eating, swallowing, speaking, and smiling, among others.<sup>1</sup> The prevalence of oral disease remains high globally and is associated with increased morbidity and a lower quality of life, especially among vulnerable populations.<sup>1</sup> Institutionalized residents at long-term care (LTC) facilities such as the elderly and frail, abandoned and orphaned children, and people with physical and cognitive limitations, constitute a marginalized and vulnerable population.<sup>2</sup> These individuals are more susceptible to oral diseases than the general public, due to their unmet oral health needs at LTC facilities.<sup>3,4,5,6</sup> Physical, mental, and visual impairments represent challenges faced by residents in performing adequate oral hygiene practices independently and can lead to a deterioration of their oral health and the development of oral diseases.<sup>7</sup> Common oral diseases among residents include periodontal disease, dental caries, and loss of teeth, among many others, which also impact the general health of residents.<sup>5</sup>

Oral hygiene forms part of the package of care that caregivers provide to residents. However, numerous studies have found that inadequate oral health-related knowledge, attitudes, and practices among caregivers, as well as a lack of hands-on skills experience, were significant limiting factors to providing optimal oral healthcare to residents.<sup>5,6,8</sup> Additionally, some LTC facilities lack proper oral healthcare policies and protocols, which contributes to the neglect of oral healthcare provision by caregivers due to high workloads, insufficient time, a view that oral healthcare is an unpleasant task, and inadequate understanding of the importance of oral health among caregivers.<sup>9</sup> The unmet oral health needs of the residents may also be attributed to barriers such as limited access to oral healthcare services, including cost, transport, and lack of awareness among family members and caregivers on the importance of oral hygiene and dental aids.<sup>10</sup>

In South Africa, inequitable healthcare services remain a major challenge for the country's health system, which further potentiates health disparities, especially among vulnerable populations, such as institutionalized residents.<sup>11</sup> Limited resources and infrastructure, low dentist-to-population ratio, relatively low awareness surrounding oral health, and the lack of adequate access to oral healthcare services, exacerbate the oral disease problem on the heavily burdened public health sector in the country.<sup>12,13</sup> This deprives the institutionalized elderly, disabled, chronically ill, and vulnerable children of crucial oral healthcare services.<sup>12</sup>

De Mello and Erdmann (2007), refer to oral healthcare as an ongoing and dynamic process which recognizes the impact of oral diseases on the various aspects of an individual's life, thereby acknowledging the need to optimize oral health promotion.<sup>4,14</sup> Noting the high incidence of oral diseases among residents in LTC facilities, the unmet need for increased oral healthcare, and the neglected state of oral healthcare in LTC facilities, the need for improvement strategies is critical. Health promotion is a well-recognised strategy for improving the health of a population, by providing individuals with guidelines and tools to increase control over and improve their health and well-being.<sup>15</sup> The main goal of promoting oral health at LTC facilities is to bring about positive changes and prevent ill health, by addressing the broader determinants of oral health, namely social, political, institutional, biological, and environmental factors, among others.<sup>3,15</sup> Hence, the long-term care setting provides an ideal opportunity to provide optimal oral healthcare to socially disadvantaged, and vulnerable individuals.

Healthcare frameworks have been used to promote oral health in hospitals, schools, workplaces, and communities. Frameworks support evidence-based practice, facilitate collaboration, enhance program evaluation, and improve sustainability.<sup>16</sup> Previous studies have proposed frameworks to understand the determinants of oral health to improve access among vulnerable populations through oral health promotion.<sup>4,17</sup> A study conducted by Kumar & Dasu (2019) applied the Spectrum of Prevention framework developed by Cohen and Swift (1999), for improving oral health among older adults.<sup>18</sup> This framework considered the interaction and influence of systems, structures, and individuals to support positive oral health change. Therefore, action and behavioural changes are required on an individual, organizational, physical, administrative, and management level at LTC facilities. In this way, oral health promotion can improve residents' access to oral health services within LTC facilities, and synergize the principles of health promotion.

This article highlights the different components of the framework, theoretical underpinnings, and the use of empirical data to illustrate how the framework was operationalized. The proposed systematic approach to planning and implementing oral health promotion activities is more likely to provide an evidence base for the appropriate use of limited resources.

## METHODS

### Development of the framework

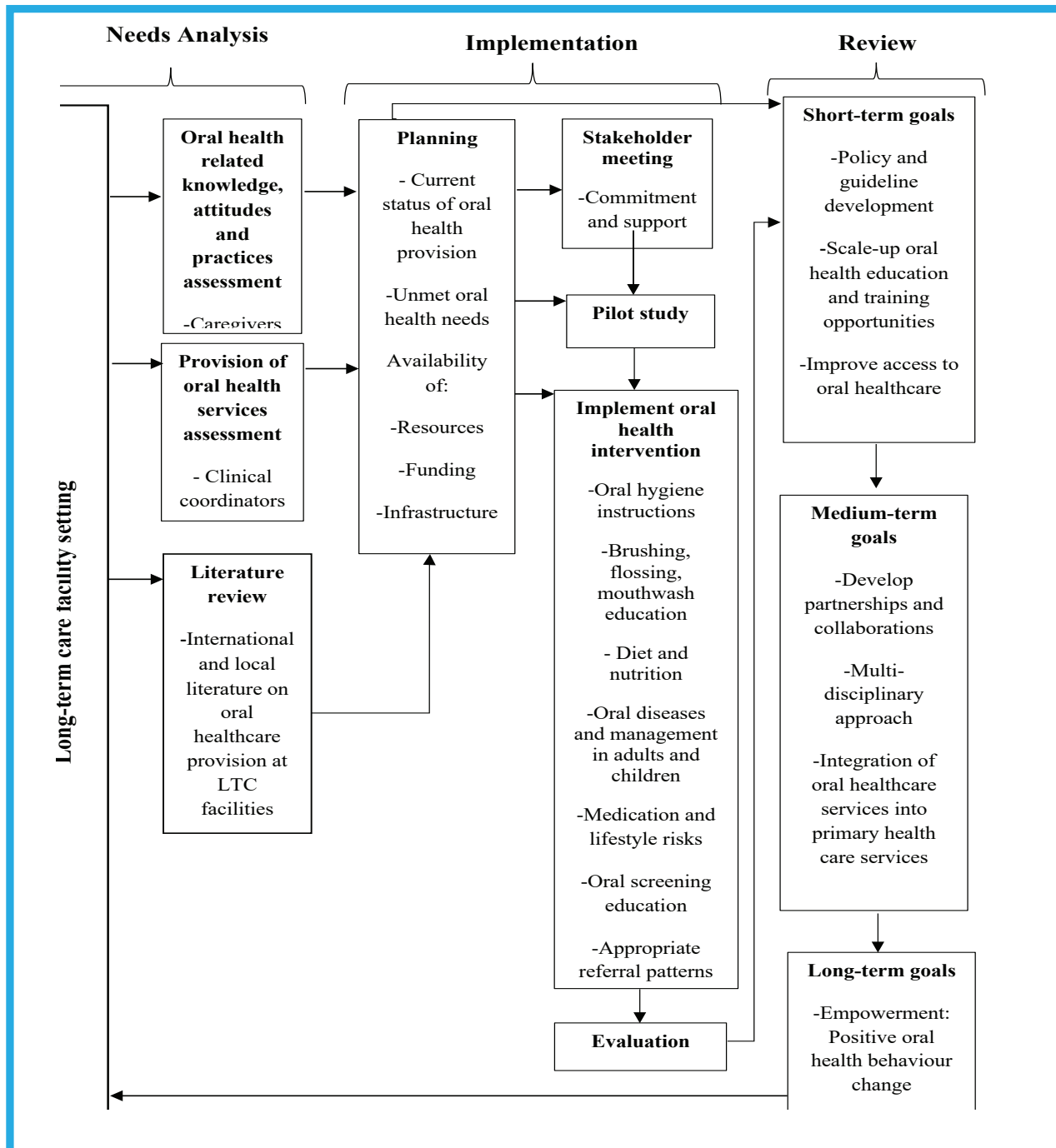
Based on the Precede-Proceed model, the framework comprised a three-stage plan, which included a needs analysis (Stage 1), implementation of an intervention (Stage 2), and a review of the intervention (Stage 3), illustrated in Figure 1. Consistent with the 'Precede' component of this

model, this framework first considered the socio-ecological factors among coordinators and caregivers, as well as administrative and policy factors (Stage 1), to develop an appropriate intervention to improve oral health provision at LTC facilities. The 'Proceed' component involved the implementation of the intervention and identification of desired outcomes through process, impact, and outcome evaluations (Stage 2 and 3).

Empirical data was collected and analyzed to illustrate how the framework was operationalized. For this purpose, participatory action research was utilized in a 4-phased mixed method exploratory study, based on the plan-act-observe-reflect cycle.<sup>19,20</sup> In the planning phase, the researcher initially identified the problem to be addressed and proceeded to collect information through a process called 'reconnaissance'.<sup>21</sup> A literature review was also conducted, which provided a theoretical context to oral health provision at LTC facilities, such as the social justice theory, institutional theory, and theory of self-determination. The planning process facilitated the clarification of research questions, the development of an appropriate research design, and the selection of suitable research methods for data collection, prior to the implementation of the action plan.<sup>19</sup>

The empirical study was conducted at n=7 LTC facilities, of which n=6 were old age homes and n=1 was a children's home. The old age homes provide residential and frail care to independent and dependent elderly residents, whilst the children's home accommodates orphaned, abandoned and vulnerable juvenile population from 2 years to 18 years of age. Study sites were purposively selected from 'eThekweni health and well-being service provider directory 2018' and a website called 'Senior service retirement places' on search engine company Google. The first phase of the 4-phase study involved conducting self-administered questionnaires among n=188 caregivers and n=14 semi-structured interviews with coordinators (managers and nurses). The questionnaire comprised 30 items divided into three sections. The first component included biographical questions pertaining to age, gender, level of education, work experience, and self-reported oral symptoms experienced such as toothache, halitosis, bleeding gums etc. The second component focused on participants' oral health knowledge based on defining dental terms, identifying oral conditions, as well as pathology of oral disease. With regards to oral health practices, questions focused on participant's dental habits, frequency of dental visits, as well as dietary habits. Questions on participant's attitudes were posed in the form of a Likert scale, which elicited responses pertaining to prioritization of oral health practices and training among participants, job satisfaction and barriers encountered in treating residents at long-term care facilities. With regards to the semi-structured interviews with coordinators, open-ended questions were posed to the participants, such as "What oral health initiatives exist at your long-term care facility?" and "Do you have any future oral health plans or interventions in the pipeline?" Participants were given the opportunity to share their experiences and views on oral health education and training for caregivers, support from the private and public dental sectors, existing oral health policies, the feasibility of implementing oral health workshops, and their perception on improving oral health at long-term care facilities. The evidence from the first phase provided empirical data for the need's analysis stage of the framework.

Figure 1. Conceptua framework



The implementation stage of the framework involved the planning of the oral health intervention, the pre/post-test approach, and the evaluation of the intervention. Phase 2 of the study involved conducting a pre-test self-administered questionnaire among n=145 caregivers to gain baseline quantitative data. In conjunction with the data from the needs analysis, the researcher compiled, questioned the evidence, and developed an appropriate action plan. After 4 weeks, the action plan was implemented in the form of an online oral health intervention. Phase three of the study was conducted after 6 months and involved an evaluation of the intervention using a post-test self-administered questionnaire, which was conducted among n=145 caregivers, who participated in the pre-test questionnaire.

Phase 4 of the study, involved observation, an important aspect of action research. Using this process, the researcher

was able to develop an evidence-based framework for the provision of oral health at LTC facilities. The process entailed the analysis of evidence, collation of findings from the previous phases of the study, and discussions with co-researchers and colleagues. This allowed for interpretation, answers to research questions, development of recommendations, and sharing of the findings with stakeholders and peers through manuscripts and published articles.<sup>22</sup> In the review stage of the framework, the data was analyzed, and short, medium, and long-term recommendations were made for the provision of oral healthcare at LTC facilities.

Reflection is an important step in action research and is typically applied at the end of the cycle. The researcher engaged in reflection at each step of the study to continuously monitor the progress of the action research. This allowed the researcher to make decisions and revisions to the process

throughout its implementation, thereby allowing for flexibility and adaptation of procedures as required.<sup>23</sup> The reflective process allowed the researcher to review the oral health intervention, determine its effectiveness, and make decisions about possible revisions for future implementations of the intervention. Due to the cyclical nature of action research, another cycle of planning, acting, observing, and reflecting may be necessary to refine the action plan.<sup>20</sup>

### Ethical considerations

Ethical clearance was granted by the Biomedical Research Ethics Committee of the University of KwaZulu-Natal. Participants were informed that the study was voluntary and could withdraw at any stage. Written informed consent was subsequently obtained from participants. Questionnaires and interviews were conducted in English after confirming that all the participants were comfortable with the language. Confidentiality and anonymity were maintained throughout the study.

## RESULTS

### Stage 1: Needs analysis

Studies indicate that a needs analysis is an important step prior to any planned health intervention.<sup>24</sup> In healthcare, a needs analysis represents a systematic method for reviewing the health issues facing a population, leading to agreed priorities and appropriate resource allocation to improve health, and reduce inequalities.<sup>25</sup> This approach is underpinned by the social justice theory on fairness, equal access to health, and social freedoms, with a strong emphasis on upholding human rights and improving the lives of disadvantaged and marginalized populations.<sup>26</sup> Institutionalized residents are recognized as a marginalized population, with unmet oral health needs.<sup>6,27</sup> Additionally, the institutional theory was used to explain how LTC facilities exist as independent organizational structures with an anticipated set of rules, norms, and oral care policies to guide the social behaviour and oral healthcare practices of the caregivers employed there. Given that these residents are unable to practice self-care independently or sometimes with limited ability, the role of the caregiver becomes critical in facilitating and supporting healthcare delivery. However, the attitudes, level of health literacy, and support from the organization will collectively determine the extent to which caregivers are able to meet their mandate of oral healthcare delivery for these residents.<sup>6,27</sup>

Therefore, this component of the study focused on gathering baseline data from caregivers and oral health coordinators at the seven identified facilities. For this purpose, a self-administered questionnaire was used to gather data from n=188 caregivers who provided custodial and healthcare services and had direct contact with the residents. Semi-structured interviews were also conducted among n=14 coordinators, of which n=4 were nurses and n=10 were managers, who were directly involved in the planning and implementation of oral healthcare services. A purposive snowball and criterion sampling technique was utilized to recruit participants.

The results of the current study indicated that coordinators shared challenges in oral health provision at LTC facilities, resulting in limited access to comprehensive oral healthcare services, and unmet needs among residents. These challenges included a lack of comprehensive oral healthcare practices, insufficient oral health prioritization, inadequate

support from the dental sector, limited funding for oral health initiatives, and challenges associated with Covid-19.<sup>28</sup>

Coordinators reported that their oral health policies were either poorly formulated or non-existent and that there was no designated budget for oral health education and training of caregivers.<sup>28</sup> As a result of the incomprehensive oral health policies and lack of oral health education and training initiatives at the LTC facilities, the findings of the self-administered questionnaires indicated that caregivers' knowledge and practice were not optimal. Only 8 caregivers (4.3%) comprehensively reported that the cause of tooth decay was multifactorial (poor diet, poor oral hygiene, and causative bacteria), and the majority of caregivers (n = 144; 76.6%) reported visiting the dentist only when they had experienced dental pain.<sup>29</sup> Previous studies found that inadequate oral health knowledge among caregivers, is due to insufficient education and training.<sup>27</sup> Similarly, coordinators acknowledged a gap in oral healthcare at LTC facilities, and the need for a scale-up in oral health.<sup>28</sup>

On the other hand, the overall attitudes of the caregivers' were positive, as the majority (n = 173; 92%) were keen to improve their oral health knowledge and skills towards better oral health outcomes for themselves and residents under their care. In keeping with the theory of self-determination, intrinsically motivated behaviour is more likely to produce sustained self-motivated, or self-determined behaviour among the caregivers.<sup>30</sup> Caregivers are thus able to set oral health goals, master their practice, and motivate each other and the residents under their care to practice better oral health habits.<sup>30</sup> Liu et al. (2017) postulated that good knowledge encourages a positive attitude, which has the potential to lead to better oral health behaviour.<sup>8</sup>

The framework guided the collection of the key findings from the needs analysis i.e. insufficient oral healthcare practices and prioritisation, poor support from the dental sector, as well as limited funding. The framework therefore includes focus areas such as prioritisation, the training needs of caregivers, and the specific type of training required. These findings further demonstrate the importance of the needs analysis, which is invaluable to interventions such as oral healthcare frameworks to improve oral healthcare. The data from the needs analysis could also facilitate the institutions (LTC facilities) to make informed decisions about future oral health training programmes in the district. Long-term care facilities should continuously monitor the social, institutional, and behavioural determinants of oral health, as described in the framework, as well as the oral health status of residents through oral assessments, which may provide relevant and up-to-date data for priority setting, resource allocation, and the planning of oral health education programmes.

### Stage 2: Developing the intervention

The next stage of the framework comprised the development of an intervention, which was based on the outcome of the needs analysis. This stage involved setting out clear adoption and implementation outcomes, determining performance objectives for coordinators and caregivers, identifying the determinants of oral health provision, and developing objectives for change. Stakeholders at LTC facilities have a better understanding of the strengths and challenges in the provision of oral health and therefore were best suited to suggest appropriate ways to implement oral

health promotion strategies, in keeping with the posits of the institutional theory. Engaging with stakeholders at LTC facilities was an iterative process, whereby knowledge and expertise were drawn from different experiences and perspectives, around a common goal, in order to make relevant, transparent, and effective decisions in the planning of the intervention.<sup>31</sup>

The planning of the oral health intervention took into consideration the following factors that arose from the needs analysis i.e. current status of oral health provision, unmet oral health needs, availability of resources, funding, and infrastructure. Theoretical, and evidence-based methods were used to identify the determinants, which focused on an individual level (improving knowledge, attitudes, and skills of caregivers), and organizational level (increasing awareness, knowledge, and addressing attitudes), to create institutional commitment and strong organizational leadership.<sup>32</sup> In order to determine the organizational preparedness, and to influence the organizational level, regular meetings were held with stakeholders and coordinators to ensure proper participation from the LTC facilities.<sup>32</sup>

Coordinators reported that funding for oral health interventions was not permissible as the majority of the LTC facilities were non-profit organizations subsidized by the government. Budgetary allocations were therefore reserved for priority areas of care.<sup>28</sup> Additionally, coordinators indicated that oral health interventions would need to be implemented at suitable times to accommodate caregiving duties, and not compromise resident care.<sup>28</sup>

This research study was the first oral health initiative in the identified facilities, in which coordinators had participated, and were thus enthusiastic and optimistic about improving oral health provision for residents at LTC facilities, supporting the theory of social justice.<sup>28</sup> The participatory engagement with stakeholders and coordinators encouraged discussion regarding priority setting and resource allocation for oral health within the LTC facility setting.<sup>28</sup> Coordinators expressed their commitment to improving oral healthcare at LTC facilities, by offering logistical support for the implementation of the oral health intervention, thereby enhancing organizational preparedness.<sup>28</sup>

A pre-test self-administered questionnaire was distributed among n=145 caregivers employed at the identified LTC facilities, to determine their oral health knowledge and attitudes before receiving the oral health intervention. Four weeks later, an oral health intervention was implemented at each participating LTC facility. The intervention used in this study was an online oral health education and training presentation, which was developed: (1) Based on the comprehensive findings from the current research study which involved caregivers and coordinators, and (2) on oral health guidelines outlined by the World Health Organization.<sup>33</sup> Due to the emergence of the recent global pandemic COVID-19, and strict lockdown protocols, site access was prohibited to the public, as well as the researcher, and thus the online platform was used to deliver the oral health intervention. The online oral health intervention was beneficial as it reduced the logistic burdens of a site visit, time constraints faced by coordinators, physical space to conduct the intervention, and reduced cost and the use of resources.<sup>34</sup> According to Gregory et al. (2018), online education programmes have the ability to increase participant outreach, and balance

educational time constraints and clinical responsibilities of the caregivers.<sup>34,35</sup> The use of visual animations in the online oral health intervention enhanced digital story-telling which engaged and motivated the participants to learn new skills and reduce the anxiety associated with a new experience.<sup>36</sup>

### Implementation of the intervention

The oral health intervention was presented as a 45-minute PowerPoint® presentation, which was developed and narrated by the researcher. The online intervention was presented to caregivers with the assistance of their coordinators using a large TV screen in a board room at each respective LTC facility. The presentation was conducted over 2 shifts (day and night), to accommodate the caregivers' duty schedule, and not compromise resident care. The intervention focused on creating an understanding that residents may not be able to perform oral care independently or adequately and thus highlighted the important role caregivers play in maintaining optimal oral hygiene for residents under their care, in keeping with the principle of social justice. In light of the institutional theory, the concept of oral health and prioritization of oral hygiene was emphasized as mandatory norms within LTC facilities, as well as the impact of oral disease on residents' overall quality of life. The online intervention included visual representations of commonly occurring oral diseases and conditions experienced by institutionalized residents (adults and children), as well as treatment, management, and prevention measures. The role of the caregiver in maintaining good diet and nutrition for residents, as well as denture care, was also included. Animated video clips demonstrating feasible brushing and flossing techniques, as well as the use of other dental aids, were detailed in the presentation. Finally, an oral health assessment tool<sup>3</sup> was included, which provided caregivers with a guide on how to perform oral examinations for residents, and time frames for referral for further dental care to the dentist. Participants received toothbrushes, toothpaste, flossing aids, and pamphlets on oral hygiene education to enhance the effectiveness of the online oral health education intervention.

Six months following the oral health intervention, a post-test self-administered questionnaire was distributed among the same caregivers (n=145) who participated in the pre-test questionnaire. The pre/post-test questionnaires were coded to correspond with participating caregivers, who signed the data collection list on completion.

### Stage 3: Review of the intervention

The evaluation was used to assess the extent to which the implementation of the intervention fitted within the context, delivered fidelity, and addressed the identified needs.<sup>37</sup> The oral health intervention was evaluated, which allowed the researcher to gauge the level of success of the intervention in achieving the desired outcomes and objectives; refine content, and implement strategies for improvement.<sup>37</sup> The pre/post-intervention evaluation revealed positive changes in caregivers' oral health knowledge.<sup>38</sup> This finding concurs with a similar study which reported improved knowledge among caregivers, following an oral health intervention.<sup>39</sup> Less than half of the caregivers (n=68; 46.9%) in the pre-intervention phase, agreed that loose teeth can sometimes be a sign of gum and bone disease, compared to 89% of caregivers (n=129) in the post-intervention phase who

agreed with the statement.<sup>38</sup> Additionally, very few caregivers (n=17; 11.7%) in the pre-intervention phase reported that regular flossing was an important part of the oral hygiene regime, and that initial bleeding of the gums was normal, compared with 81 caregivers (55.9%) in the post-intervention phase who agreed.<sup>38</sup>

With regards to caregivers' attitudes, the pre-intervention evaluation revealed that 86.9% of caregivers (n=126) expressed compassion and optimism to improve the oral health status of the residents under their care, whilst 91% of caregivers (n=132) in the post-intervention phase shared the same sentiment.<sup>38</sup> This finding highlights the caregiver's perceived duty to provide equitable oral healthcare services to the residents, thereby upholding social justice. The majority of the caregivers (n=124; 85.5%) in the pre-intervention phase indicated that caregivers should be trained to perform oral screenings and provide oral health education to the residents, compared to almost all participants (n=136; 93.8%) in the post-intervention evaluation phase.<sup>38</sup> Therefore, in keeping with the institutional theory, the incorporation of oral health education and training should be well integrated into oral health policy, as a set guide and norm, thus influencing positive oral health behaviour among caregivers. The evaluation results of the current study, revealed the effectiveness of the intervention, indicating that externally regulated forms of motivation (oral health intervention) may promote short-term positive behaviour change among caregivers. However, continual oral health education and training is necessary as it has a longer-lasting effect on facilitating behavioural maintenance, which is the posits of the self-determination theory.<sup>40</sup>

Short, medium, and long-term goals arose from the review component of the framework. The short-term goals include: developing oral health policy and guidelines on an institutional and national level; a scale-up in oral health education and training opportunities for caregivers, and improved access to oral healthcare services for residents. The medium-term goals include developing partnerships and collaborations, using a multi-disciplinary and sectoral approach, and integrating oral healthcare services into primary healthcare services. The long-term goals are to empower all individuals at LTC facilities towards positive oral health behaviour change, which involves continual monitoring and evaluation, as oral health provision at LTC facilities is dependent on continually changing social, institutional, and behavioural determinants. This process will allow for goal setting and making recommendations to stakeholders towards improved oral health outcomes at LTC facilities.

## DISCUSSION

### A critique of the framework

The framework took into account the social, economic, organizational, and behavioural factors that impact oral health provision. It thus provides a holistic approach, as it recognizes the importance of oral health as an integral component of overall health.

The needs analysis gathered information on "service readiness," which related to the understanding of the concept of oral health among caregivers and the types of procedures and services being provided; as well as "organizational readiness," which referred to the perceptions of service-specific needs, resources, and infrastructure.<sup>41</sup>

An understanding of these factors, assisted in the planning process of the intervention by enhancing the quality of the oral health content, to promote efficient oral health services.

This framework may be applied to settings where resources and funding are scarce. The online oral health intervention negated the costs involved in employing a professional oral health speaker. It further provided a convenient and effective way to deliver oral health promotion, as it limited logistical factors involved in presenting a conventional oral health intervention, and did not interrupt clinical caregiving duties.

This framework may be seen as valuable in informing stakeholders and oral health planners on oral health policy formation, and strategic planning involved in oral health service delivery, which could provide guidance for caregivers within the institution (LTC facility).

The application of this framework may be applied to other residential care environments. Utilization of the settings approach enables this framework to be optimized for specific contextual settings, which can be achieved through modification of the framework's goals, objectives, and strategies. The framework was operationalized through an action research study, which provides flexibility and adaptability to changing circumstances, and thus can be applied to other complex systems where there are multiple variables at play.

Notwithstanding the value of using such an approach for oral health promotion planning, implementation, and review, some limitations were noted, which need to be considered when planning and implementing oral health interventions.

The implementation of new behavioural or social interventions are sometimes met with resistance to change.<sup>42</sup> More research is required to assess the long-term effect of the intervention on cultural and social factors impacting behaviour change among caregivers, coordinators, and stakeholders.

Continuous monitoring and evaluation are necessary to determine the sustainability of the intervention, as social and behavioural interventions greatly depend on service and organizational readiness, sufficient funding and resources, and a supportive staff environment.<sup>41</sup> Therefore, it is important to first identify and address the strengths and deficiencies of the organization (LTC facility) in the planning stages of the intervention, to improve long-term sustainability.<sup>41</sup>

Organizational dysfunction may affect oral health initiative planning. Therefore, assessments may need to be conducted among coordinators, to help diagnose their personal and professional preparedness. Identifying and addressing the organizational problems may foster better preparedness among coordinators for the implementation of oral health interventions.<sup>41</sup>

More research is required to determine the cost-effectiveness of the intervention. Priority setting and resource allocations (for oral health aids, training and education, equipment, staffing, and infrastructure) are necessary, as they impact the equitable distribution and efficiency of oral healthcare services over time.

An evaluation of the oral health status and quality of life among residents may provide valuable epidemiological data,



which will enable the framework to be modified according to the specific oral health needs of the residents.

The framework was applied in selected LTC facilities in the eThekweni district, hence further research is required, where the framework can be applied on a larger or national scale to explore the complex interactions, relationships, and social determinants that influence oral health provision at LTC facilities.

## CONCLUSION

The framework provided a systematic, evidence-based approach to the development, implementation, and review of an oral health promotion intervention, to guide oral health provision at LTC facilities in the eThekweni district. The components of this framework considered critical social, behavioural, and organizational factors such as attitudes, preparedness, level of literacy, and support that influence oral health provision at LTC facilities. The framework also assisted in identifying the relevant sectors, the necessary resources, effective strategies, and activities, which may bring about positive oral health behavioural, institutional, and social changes in LTC facilities. The intervention provided a cost-effective, practical, and effective way of delivering oral health promotion, thereby deeming the LTC setting more conducive to promoting oral health and achieving equitable oral health access and services to residents.

## Competing interests

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## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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

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## 1. Photobiomodulation therapy (PBMT) in recurrent herpes labialis management: a randomised controlled trial

Herpes labialis is an infection with herpes simplex virus type 1 (HSV-1) with initial episodes presenting as asymptomatic or symptomatic small blisters or sores on the skin near the site of infection. When the initial infection heals, the virus spreads to sensory nerve cells, where it remains dormant until reactivation occurs. Recurrent herpes labialis (RHL) is a viral disease caused by the reactivation of herpes simplex virus type 1 (HSV-1) which lies dormant in the sensory neurons after the initial infection.<sup>1</sup> HSV-1 reactivation occurs due to various factors such as physical or emotional stress, hormonal imbalances, bacterial infections and suppression of immunity.<sup>1</sup>

The disease progression in recurrent herpes simplex labialis (HSL) typically incorporates multiple stages. During the precursor stage, perceptions of pain, tingling or burning may transpire in the affected area, followed by the development of vesicles. Rupturing of the vesicle leads to soft scab formation which is subsequently replaced by a hard scab. Periodically, the scab abates and falls off, allowing the lesion to completely heal without scarring. Throughout this healing process, symptoms such as pain and discomfort ensue, and complete healing may require seven to 10 days. According to the World Health Organization (WHO), about 3.7 billion individuals under the age of 50 are affected by HSV-1, which accounts for 67% of the global population.<sup>1</sup>

Acyclovir and its derivatives are considered the standard antiviral drugs for treating herpes simplex virus infections. Skin lesions can be treated topically with cream or ointment form of the medication. The goal of topical treatment for herpes labialis lesions is to shorten healing time. However, acyclovir ointment has been reported to have moderate effectiveness, and repeated use is necessary to achieve the desired therapeutic effect.

Photobiomodulation therapy (PBMT), or what was previously known as low-level laser or cold laser therapy, has been considered as one of the treatment options for RHL. In RHL, PBMT is thought to reduce the pain intensity and increase the interval between recurrent episodes without side effects or drug interactions, which is particularly useful in elderly or immunocompromised patients. Gaizeh Al-Hallak et al (2024)<sup>1</sup> reported on a trial that sought to compare acyclovir cream and photobiomodulation therapy in the management of recurrent herpes labialis (pain index and clinical recovery index).

## METHODOLOGY

This was a randomised double-blind controlled clinical trial. According to the sample size calculation, 18 patients per

group were necessary to provide truly significant results (considering the standard  $\alpha$  error of 0.05 and a power of 0.95). Assuming a 10% noncompliance rate for follow-up evaluation, the sample size was increased to 20 patients. The study included 40 patients with recurrent herpes labialis who attended the Department of Oral Medicine at Damascus University. Patients were informed of the study's purpose and provided written consent before participating. The exclusion criteria for the study included were pregnant and lactating, individuals with diabetes, immunocompromised patients, those allergic to acyclovir, patients who had taken antiviral, anti-inflammatory or antibiotic medications within the month prior to treatment, smokers and those with lesions that had progressed to the crust stage. The inclusions were individuals in good health, were at least 18 years old, had a history of recurrent herpes labial and had at least one lesion in the vesicular stage.

The patients were randomly divided into two groups (20 patients in each group). The first group (control group) was treated with acyclovir (5%) five times a day for five days. A passive (placebo) laser application with the same irradiation time and number of sessions was used for the second group. The second group (PBMT group) was treated with a diode laser with parameters (wavelength 650nm, power 100mW and fluence 4.7J/cm<sup>2</sup>), continuous wave (CW) for 120s. The output was according to the display of the device. The treatment was conducted using the contact mode, yet the protective film was not utilised to avoid laser scattering. Instead, the probe was disinfected with alcohol after every use. The laser was applied using a circular probe on the first day and 48h after the first application. In addition, the patients received a placebo cream and applied it five times a day for five days; it was placed in similar containers as the acyclovir cream.

The lesions were diagnosed and treated by an oral medicine specialist, while the results were evaluated and recorded by another specialist who was unfamiliar with the type of treatment used.

The patient's pain levels were monitored and recorded at five time points.

- T0: Before taking any action in the first session.
- T1: After applying the laser (activated or placebo) in the first session.
- T2: The second session (after 48h) before applying the laser (activated or placebo).
- T3: The second session after applying the laser (activated or placebo).
- T4: Third session after 7 days.

The level of pain was measured through the visual analogue scale (VAS), which ranged from 0 representing no pain to 10

representing the worst pain ever. The day the patient noticed the complete disappearance of the pain was also recorded, as well as the day when the crust spontaneously fell off the lesion, which is considered a sign of clinical healing.

## RESULTS

Forty participants were divided into two groups. The PBMT group consisted of 5 males (25%) and 15 females (75%) with a mean age of  $25.80 \pm 6.56$  years, and the control group was treated with acyclovir consisted of 1 male (5%) and 19 females (95%) with a mean age of  $27.70 \pm 9.35$  years. There were no significant differences between the two study groups for either sex ( $p = 0.077$ ) or age ( $p = 0.820$ ).

Before starting treatment (T0), the average pain level according to VAS was  $4.6 \pm 2.70$  in the PBMT group and  $4.05 \pm 2.42$  in the control group, with no significant difference between the two groups ( $p = 0.555$ ).

At T3, there was a statistically significant difference in pain levels between the two study groups in the second session after laser application ( $p = 0.035$ ). The pain level in the control group was significantly higher than that in the PBMT group. The differences were not significant between the two groups at the evaluation times T0, T1, T2 and T4.

The results also showed there was a significant difference between the two study groups on the day of pain relief ( $p = 0.008$ ), as it was found the pain in the PBMT group disappeared faster than that in the control group. The difference was not significant on the day the crust fell off ( $p = 0.067$ ).

## CONCLUSION

The researchers concluded that photobiomodulation therapy could replace conventional medicine treatment of recurrent herpes.

## IMPLICATIONS FOR PRACTICE

PBMT showed better clinical outcomes than acyclovir. However, this therapy shows the greatest potential for efficacy among immunosuppressed patients who suffer from frequent recurrence, severe life-threatening infection and virus resistance to traditional medicines.

## REFERENCE

1. Gaizeh Al-Hallak MA, Calhoun K, Hsain JA, et al. Efficacy of photobiomodulation therapy in recurrent herpes labialis management: a randomized controlled trial. *Clin Oral Invest* 28, 157 (2024). <https://0-doi-org.innopac.wits.ac.za/10.1007/s00784-024-05541-5>

### 2. Comparison of efficacy of thermoplastic retainer with round and rectangular bonded lingual wire retainer in the mandible two years after orthodontic treatment: a randomised controlled trial

Following orthodontic treatment, retention is key for maintaining teeth in their corrected positions. Irrespective of the patient's age, underlying malocclusion or type of mechanotherapy used, retention is necessary to preserve the final alignment and occlusion.<sup>1</sup> Without retention, there is a natural tendency for teeth to relapse back towards the original malocclusion. The main goals of the retention phase following orthodontic tooth movement are to:

Allow for reorganisation of the gingival and periodontal tissues. Forces from the gingival and periodontal fibres

around the teeth tend to pull the teeth back towards their original positions.

Minimise changes due to growth and ageing. In late adolescence, continued growth in the patterns that contributed to the initial malocclusion can affect the stability of the orthodontic outcome. In addition, long-term studies have shown that very slow growth continues throughout adult life.<sup>1</sup> These age changes in the form of ongoing dentofacial growth and changes in the surrounding soft tissues can contribute to the deterioration of occlusal relationships and tooth alignment.

Maintain teeth in unstable positions. The teeth may be in an inherently unstable position after treatment sometimes necessary due to compromise or aesthetics.

Permit neuromuscular adaptation to the corrected tooth position. Continuous soft tissue pressures may more readily produce a relapse tendency.

Teeth are retained with removable or fixed retainers and fixed retention has been identified nowadays as the most popular choice in the mandible among orthodontists.<sup>1</sup> Removable retainers can be removed by the patient, which affords the advantage of being easier to fully clean around the teeth to maintain proper oral hygiene. Part-time or full-time wear may be prescribed; however, it has been shown that, in many cases, removable retainers need only be worn at night to maintain dental stability.<sup>1</sup> Typically, removable retainers are made by softening a clear thermoplastic polymer sheet through heat and then moulding it over working models of the teeth by either vacuum or pressure thermoforming. The thin and transparent design makes them a discreet retainer option that is well accepted by patients from a comfort and aesthetic perspective. Excellent compliance is essential with removable retainers and, if consistent wear is overlooked, relapse can occur.

Fixed retainers are bonded to the teeth and are in place permanently which reduces the demands on patient compliance. However, as they cannot be removed for cleaning, they are more prone to plaque and calculus accumulation and may hinder a patient's oral care practices. Often wires are bounded from canine to canine (round or rectangular wires) to maintain the anterior teeth in position.

Ugrin and Špalj (2024)<sup>1</sup> reported on a trial that sought to compare therapeutic and post-therapeutic changes in dentition, the success of maintaining the condition achieved by orthodontic treatment after two years using three types of retention appliances (thermoform removal retainer, rectangular fixed, round wire fixed retainer), and to determine the impact of orthodontic appliances on gingival health. The null hypothesis was that removable and fixed retainers are equally successful in maintaining the results achieved by orthodontic therapy and have similar effects on gingival health.

## METHODOLOGY

This was a randomised controlled trial with three parallel groups. With a hypothetical difference in incisor irregularity of 2mm between the two retention protocols and a standard deviation of 3 in each group, a minimum sample size of 36 subjects in each group, ie a total of 108, was calculated. The number was increased to allow for a drop-out rate

of 40%. Therefore, 152 patients aged 11-18 years before starting orthodontic treatment were recruited.

The criteria for inclusion were patients with permanent dentition without hypodontia and tooth loss prior to orthodontic treatment, with a healthy periodontium in the lower front, dental class I or mild class II and III. Exclusion criteria were extraction cases or orthognathic surgery cases. Comprehensive treatment with a multibracket fixed appliance (MBT 0.022) was performed on all patients.

After removing the fixed orthodontic appliances, the subjects were divided into three groups. All three groups had thermoplastic vacuum-formed removable retainers in the maxilla made of thermoplastic foil with a thickness of 1mm but the retention protocols were different for the mandible. In the first group, a rectangular passive steel wire measuring  $0.673 \times 0.268$ mm ( $0.027 \times 0.011$  inches) composed of eight flattened and braided wires was placed in the lower jaw. The second group received a round steel wire in the lower jaw with a diameter of 0.406mm (0.016 inches) composed of 6 thinner twisted wires. All retainers were adapted to the plaster models and attached with an adhesive technique to the lower canines and incisors lingually, for each tooth separately. All wires were adapted and bonded using flowable composite and adhesive. The third group was the control group, without wires, and the subjects received a vacuum-formed retainer for the mandible.

The same oral hygiene regime was given to all patients which included brushing of the teeth, flossing of the interdental spaces and avoiding interdental brushes to prevent retainer debonding. The duration of orthodontic therapy was recorded. The irregularity of the position of the lower incisors and intercanine width before therapy, after removal of the fixed orthodontic appliance and after two years of retention, and the frequency of wire detachment/breakage/loss of retainer, were monitored. Subjects who showed a debonding were not excluded but the retainer was rebonded. Also, a new retainer was made for those who broke/lost the removable retainer. All measurements were made on the plaster models using a digital calipers just after completion of orthodontic therapy and after two years. The Little's Irregularity Index was used to measure the irregularity of the position of the lower incisors, and it measures the distance between the contact points of each mandibular incisor. It represents the sum of all distances. Intercanine width was recorded as the distance between the tips of the lower canines. Plaque Control Record (PCR) was used for the assessment of biofilm accumulation, Calculus Surface Index (CSI) for calculus accumulation and Bleeding on Probing (BOP) for the extent of gingivitis. PCR, CSI and BOP indices were assessed with a periodontal probe after 6 months and 2 years in retention in 4 places (mesial, distal, buccal and lingual) and the value per subject expressed in the proportion of affected measurement sites (0-100%).

## RESULTS

In two years of retention, 61% of patients responded to check-ups. Those who came to the final check-up were matched according to the initial Little's index by retention groups to obtain an equal number of patients per group with a uniform degree of initial crowding. Thus, out of 100 patients, the sample for analysis consisted of 66 patients aged 11-18 years (median 14; interquartile range 14-16; 68% women). Therapies lasted 12-34 months (median

20.5; interquartile range 16.5-25.3; average  $21.4 \pm 5.4$ ). The Little's incisor irregularity range at the beginning of therapy was 0.4-11.2mm (median 3.2; interquartile range 1.4-4.9mm; average  $3.5 \pm 2.4$ ). The intercanine width at the beginning of the therapy was 20.4-30mm (median 26.1; interquartile range 24.6-27.4; average  $26.1 \pm 2.0$ ).

With the therapy, incisor irregularity was corrected in the range 0-11.2mm (average  $3.1 \pm 2.4$ mm) and mandibular intercanine width 3.3-4.7mm (average  $0.7 \pm 1.4$ mm). There were no significant differences between the groups formed for retention. Therapeutic change of intercanine width linearly inversely moderately correlated with therapeutic change of Little's ( $r = -0.362$ ;  $p = 0.003$ ). As the intercanine width increased, the irregularity of the incisors decreased. In the retention phase, a round wire debonded/broke more often than a rectangular wire (incidence 41 vs 36% of cases, average 0.5 vs 0.4 times). In comparison, a removable retainer was lost/broken in 27% of cases (0.3 times) but without statistically significant differences between groups.

The post-therapy change in the irregularity of the mandibular incisors was in the range of 0-4.2mm. Relapse was more common when there was no bonded retainer (incidence 68.2%; severity  $0.7 \pm 1.0$ mm) than with a round ( $36.4\%$ ;  $0.5 \pm 1.2$ mm) or rectangular retention wire ( $13.6\%$ ;  $0.1 \pm 0.1$ mm;  $p = 0.001$  for incidence and  $p = 0.049$  for severity). The amount of change was significant in the group with a round retainer ( $p = 0.012$ ;  $r = -0.538$ ) and without a bonded retainer with a larger effect size for the latter ( $p = 0.001$ ;  $r = -0.729$ ). The difference was significant between the group without a bonded retainer and with a rectangular one with a large effect size ( $p < 0.001$ ;  $r = -0.581$ ).

All subjects in the rectangular retainer group who did not have retainer failure had no relapse, while 38% of those who had rebonded retainer had some relapse ( $p = 0.036$ ;  $V = 0.526$ ) with an average severity of  $0.1 \pm 0.2$ mm. The difference was not significant in the round retainer group (56% of cases with relapse in the rebonded group (average severity  $1.1 \pm 1.8$ ) vs 23% in the non-failure group (average severity  $0.1 \pm 0.3$ ) or removable retainer group (50% of cases with broken retainer (average severity  $0.3 \pm 0.3$ ) vs 75% without broken retainer (average severity  $0.9 \pm 1.1$ )). The incidence of relapse when failure occurred did not differ significantly between retainer groups.

The post-treatment change in mandibular intercanine width was in the range of -0.7-2.2mm. The intercanine width decreased more often and more intensively without a bonded retainer (incidence 68.2%; severity  $0.5 \pm 0.7$ mm) and with round more often and more intensively ( $45.5\%$ ;  $0.5 \pm 0.7$ mm) than with rectangular ( $27.3\%$ ;  $0.1 \pm 0.3$ mm; Figs 5, 6 and 7). The difference was not significant for severity, but it was for incidence ( $p = 0.025$ ). The amount of change was significant in the group with round retainer ( $p = 0.006$ ;  $r = -0.587$ ) and without bonded retainer ( $p = 0.002$ ;  $r = -0.657$ ). The difference is significant between the group without a bonded retainer and with a rectangular one with a moderate effect size ( $p = 0.004$ ;  $r = -0.430$ ).

There were no significant differences between the groups in the accumulation of biofilm, calculus or the extent of gingivitis 6 months and 2 years after completion of orthodontic therapy. Calculus accumulation significantly increased during retention (between 6 months and 2 years) in all three groups, but

statistically significantly only in the group with a rectangular retainer ( $p=0.009$ ) and without a bonded retainer with the latter having a larger effect size ( $p=0.003$ ). The groups did not significantly differ from each other in terms of increased calculus accumulation. Biofilm accumulation and the extent of gingivitis did not change significantly.

### CONCLUSION

The researchers concluded that a rectangular wire bonded on each tooth from canine to canine in the mandible was the more effective retention procedure after orthodontic treatment when compared to bonded round wire and vacuum-formed removable retainer. The impact of all retention appliances on gingival health was similar.

### IMPLICATIONS FOR PRACTICE

Evidence based data showing superiority for clinical outcomes that favours using a rectangular retainer which is bonded from canine to canine in the mandible compared to two other options is presented in this trial.

### REFERENCE

1. Kanizaj Ugrin S, Špalj S. Comparison of efficacy of thermoplastic retainer with round and rectangular bonded lingual wire retainer in the mandible two years after orthodontic treatment: a randomised controlled trial. Clin Oral Invest 28, 183 (2024). <https://doi-org.innopac.wits.ac.za/10.1007/s00784-024-05572-y>

## 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.



# Patients request for extractions

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## INTRODUCTION

Think about patient A, a 25-year-old who visits the oral surgeon requesting that all of her teeth be extracted due to a “passion gap” or dental anxiety, among other reasons. The patient has a perfectly sound, but little neglected, dentition. The oral surgeon chooses how to react to the patient’s request and opposes the extraction.

Patients frequently ask for their dentist or oral surgeon to remove a few teeth, or even their entire dentition, as in the case of patient A or the popular dental modification known as the “Cape Flats smile” or “passion gap”, which originated in Cape Flats, Cape Town, where people purposefully remove their upper front teeth for cosmetic and other reasons.

Even in cases where teeth are in good health, there is an increase in requests for tooth extractions due to patients’ increased assertiveness and autonomy. The majority of dentists do not always comply with such requests. Rather, the dentist’s own diagnostic assessment, conclusions and expert judgment should be taken into consideration when deciding whether to fulfil the patient’s request.

Dental professionals recommend extractions for a wide range of diagnostic findings, including caries, periodontal disease, tooth damage, orthodontic issues and many more.

After receiving sufficient information and the dentist’s diagnosis of the need for an extraction, the patient will agree to the suggested course of action. When the dentist determines that the patient’s teeth have a good or healthy prognosis and may be saved with alternative treatment options, there is a higher likelihood of conflict with the patient.

## Legal and ethical issues to consider

The health and welfare of their patients should always come first for dentists as it is their primary professional duty.

Dentists should evaluate a patient’s request for extraction in accordance with ethical standards, some of which are legally mandated. They have an obligation to uphold a quality of care that corresponds with what dentists with like training and experience would do in a like circumstance. Additionally, it is necessary to get the patient’s informed consent.

Dentists are not required by law or ethics to provide every therapy a patient requests. Patients are not entitled to all therapies they desire, even though they have the right to autonomy and informed decision-making. Dentists are required to treat patients only within the parameters of recognised procedures.

Due to their ethical obligations to uphold the principles of beneficence (behaving in the patient’s best interests) and

nonmaleficence (avoiding harm to the patient), dentists are not obliged to perform treatments that do not benefit the patient. One cannot force dentists to deviate from the accepted standard of care.

When a patient continues to insist on an extraction even after the dentist has fully explained why it might not be a good idea, it raises questions about the patient’s capacity to make decisions about their treatment. Even if this does not prove that the patient is incapable, the dentist should be aware of this.

## REQUESTS FOR EXTRACTION

Sometimes a patient will make a fair request to have a whole or partial extraction, such as when the patient’s oral health is seriously impaired and extraction is the only treatment choice left, or when the patient needs orthodontic work done.

In one such instance, the patient’s teeth are in such terrible shape that, from a dental standpoint, extraction is the only practical solution. It is unlikely that circumstances like this one would lead to significant arguments between dentists and their patients.

In more challenging scenarios, a patient may decline restorative dental treatment offered by the dentist, preferring to have their teeth extracted due to financial constraints or other valid reasons. Even when the patient is fully informed about the consequences, the dentist faces a dilemma whether to respect the patient’s decision as part of informed consent, which prohibits treatment against the patient’s will. Sometimes, to persuade a patient to undergo necessary restorative treatment, a practitioner might offer to perform the procedure for free or at a reduced cost. However, despite this commendable gesture, economic constraints often impede the dentist’s ability to provide such services consistently.

If a patient decides against the recommended restorative treatment from the dentist, the decision to extract teeth must be based on thorough scientific and clinical evaluations, considering factors like the condition of the affected teeth, the patient’s symptoms and overall oral health functionality.

The dentist’s approach should be to refrain from extracting additional teeth unless necessary. In such situations, the patient is then faced with the choice of either restoring the teeth at a later date when financial circumstances allow or managing with the deteriorating teeth until their condition warrants extraction.

When faced with requests for extraction that lack dental necessity but are influenced by the “passion gap” prevalent in the Cape Flats, practitioners should be aware that

refusing treatment could lead them to seek assistance from unlicensed and unqualified providers.

Dentists must follow established care standards and are not compelled to provide treatments outside accepted practices. They are not obliged to offer treatments that may not benefit or could harm patients.

### IRRATIONAL REQUESTS FOR EXTRACTION

In situations where a patient requests an irrational extraction, dentists should explain why the requested treatment may be detrimental and does not align with their care standards. Ideally, this clarification can discourage patients from seeking the extraction from unqualified individuals.

When faced with a patient who appears capable of providing informed consent but requests an irrational extraction, dentists encounter a challenging scenario. This situation may arise if the patient has extreme fear of dental treatment, PTSD, a somatoform pain disorder or a condition involving distorted body perception.

Requests for tooth extraction can sometimes be influenced by psychological factors rather than rational considerations. It is crucial to approach these requests differently depending on the patient's ability to provide informed consent. This involves assessing their comprehension of the diagnosis, prognosis and treatment outcomes, as well as their judgment of what is in their best interest.

#### Fear of dental treatment

Fear of dental treatment is a common concern for many people, often resulting in apprehension or anxiety. Typically, this fear does not hinder the patient's ability to discuss treatment options with the dentist and provide informed consent.

However, if a patient's fear of dental treatment becomes intensified due to previous unpleasant experiences, they may avoid seeking dental care altogether, including routine check-ups.

In cases where a patient has a specific phobia related to dental treatment, they may struggle to make decisions about their dental care.

Some mental illnesses can also impact a patient's ability to provide consent, requiring specialised psychiatric treatment rather than dental intervention alone. In such cases, dentists should offer support and assistance to the patient while striving to deliver effective oral healthcare without exacerbating their phobic fear.

Sedation or general anaesthesia can be utilised during dental procedures to manage pain or anxiety, but it is important to note that these interventions aim to facilitate dental care rather than address long-standing dental fear.

If a patient's request for tooth extraction is driven by extreme dental fear, dentists should consider discussing the option

of referral to a mental health professional to address the underlying phobia.

It is crucial to recognise that dental-care phobia is a treatable condition with a favourable prognosis, and seeking help from mental health professionals can lead to effective management and improved oral healthcare outcomes.

### PTSD

Posttraumatic stress disorder (PTSD) can lead to intense fear and anxiety, often stemming from traumatic experiences unrelated to dental care.

This fear can make it challenging for patients to undergo dental restorative treatment, leading them to perceive extraction under general anaesthesia as the only viable solution. While behavioural treatments may help alleviate these fears to some extent, addressing PTSD typically requires the expertise of a mental health professional.

It is important to recognise that dental care can be particularly difficult for individuals with PTSD due to their heightened sensitivity to stressors. Collaborative efforts between dental professionals and mental health professionals can provide comprehensive support and management for patients with PTSD, ensuring they receive the necessary care while addressing their psychological needs.

#### Somatoform pain disorder

In cases of somatoform pain disorder, a unique challenge arises when a dentist determines that no dental treatment is necessary, yet the patient insists on tooth extraction due to unexplainable pain originating from the teeth.

When the source of pain cannot be attributed to any organic cause, the dentist should refrain from performing dental interventions until investigating the possibility of a psychological component contributing to the pain.

Performing an extraction in such cases would be considered unnecessary and ineffective, potentially constituting malpractice.

#### Disorders of self-perception

Similarly, in cases involving disorders of self-perception, where patients view extraction as the only solution due to perceived defects in their appearance, dentists should exercise caution.

Patients may seek consultation from various healthcare professionals, including plastic surgeons, dermatologists, orthodontists or dentists, with requests to alter or remove the imagined defect.

In these situations, dentists need to consider referring the patient to a mental health professional before proceeding with any dental intervention. This collaborative approach ensures patients receive comprehensive care that addresses both their physical and psychological needs.

## CONCLUSION

In conclusion, if a dentist recommends extraction based on a thorough diagnostic and prognostic assessment, and the patient provides informed consent, extraction is both ethically and legally justifiable. This holds even if the patient initially suggests extraction, and the dentist subsequently determines it to be clinically justified.

However, more challenging situations arise when a patient's request for extraction is driven by financial constraints or cultural factors. While dentists cannot compel patients to undergo specific treatments, patients also cannot compel dentists to perform treatments that deviate from accepted standards or ethical principles.

When faced with requests for extraction outside of these frameworks, dentists should demonstrate empathy for the patient's needs and explain why extraction may not be feasible. They should then collaborate with the patient to develop an alternative treatment plan that aligns with accepted standards and meets the patient's needs to the best extent possible.

In cases where a mutually agreeable treatment plan cannot be reached, dentists are not obligated to perform extractions and should generally decline to do so. This approach ensures patient care remains within accepted standards while respecting the autonomy and wellbeing of both patients and practitioners.

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# Bilateral Gemination

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L Merbold<sup>1</sup>

## CASE

A 21-year-old male patient presented to the clinic with a main complaint of altered aesthetics of his front teeth. On clinical examination the patient presented with peg-shaped maxillary lateral incisors as well as macrodontia of the maxillary central incisors (Figure 1). Upon radiological examination, the microdont peg-shaped lateral incisors (12 and 22) were evident and the 11 and 21 presented each as a single enlarged tooth with a bulbous root and bifid crown with a cavitated central groove (Figure 2). The tooth count in the patient was normal, hence a diagnosis of bilateral gemination of the crowns of the maxillary central incisors were made. The patient was referred to the restorative department for further treatment.



Figure 1

**Figure 1:** 12 and 22 presenting as peg-shaped lateral incisors. The 11 and 21 macrodontic maxillary central incisor teeth with a cavitated central groove.

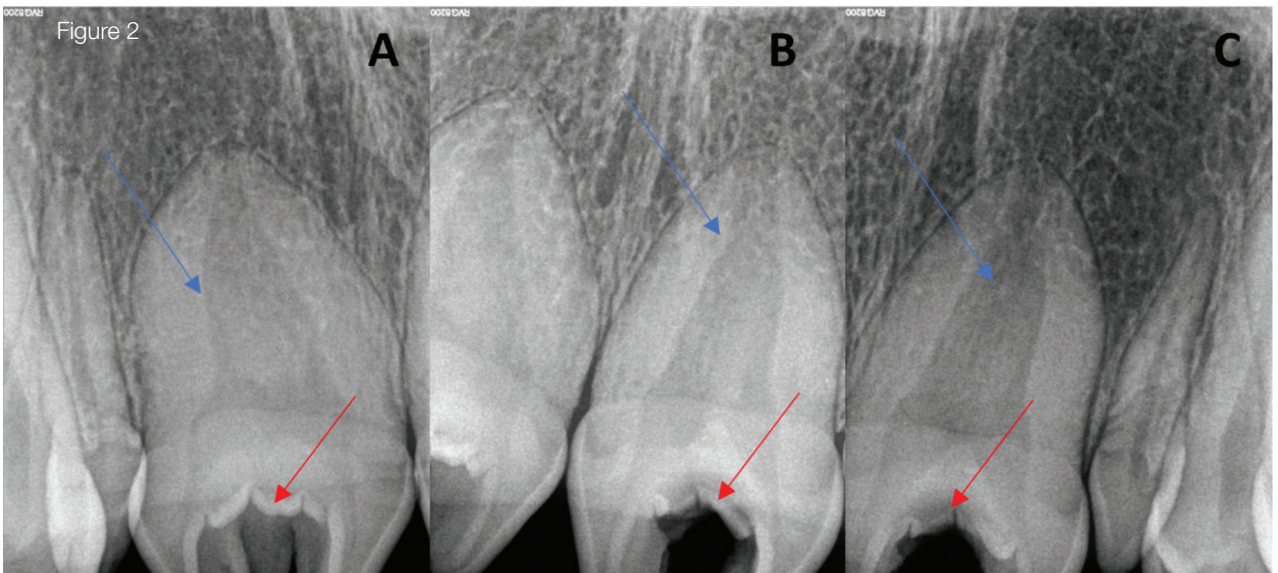


Figure 2

**Figure 2A-C:** Periapical radiographs presenting 12 and 22 microdont lateral incisor teeth, as well as 11 and 21 as geminated teeth with a single pulp chamber (blue arrow) and bicuspid crown (red arrow).

### Authors' information

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### Author contributions:

Lené Merbold: 100%

## INTERPRETATION

### Introduction

Gemination and fusion are developmental anomalies that result in altered morphology of the teeth and are characterised by the formation of an enlarged tooth.<sup>1</sup> Macrodonia is defined as a dental anomaly in which one or more teeth are larger than normal and may be mistaken for fusion and/or gemination.<sup>2</sup> In the case of macrodonia, the enlarged tooth has a normal crown and root.<sup>2</sup> In contrast, gemination occurs when a single tooth bud attempts to divide, resulting in an incompletely separated tooth.<sup>1</sup> Fusion occurs when two separate tooth buds fuse either completely or incompletely during any developmental stage resulting in a larger tooth.<sup>1</sup> Distinguishing between gemination and fusion can be difficult. Marder's 'two tooth' rule is a practical approach to use for this.<sup>2</sup> If the abnormal teeth are counted as one and the number of teeth in the dental arch is less than normal, it is called fusion. If the abnormal teeth are counted as one and the number of teeth in the dental arch is normal then it is considered gemination.<sup>2</sup>

### Aetiology and pathogenesis

Both gemination and fusion are more common in the primary dentition.<sup>1</sup> The area that is most commonly affected is the mandibular incisors.<sup>1</sup> The prevalence of fusion and gemination in the permanent dentition is 0.05% and is more frequently found unilateral.<sup>3,4</sup> Although the aetiology of gemination is unknown<sup>1</sup> multiple genetic-, endocrine- and environmental factors have been proposed.<sup>4</sup> Other suspected aetiological factors include trauma, hypervitaminosis-A during gestation, thalidomide embryopathy and viral infections.<sup>2</sup> Gemination and fusion can also manifest as part of a syndrome like osteopetrosis and focal dermal dysplasia.<sup>2</sup>

### Clinical and radiological features

Gemination is thought to be caused by the incomplete division of a single tooth germ, that starts at the incisal edge and ends before cleavage is complete.<sup>2</sup> On clinical examination, a geminated tooth resembles a bifid crown and often radiographically, a single root and pulp space can be seen.<sup>2</sup> Bilateral gemination of teeth in the anterior maxilla is very rare<sup>1</sup>.

### Classification

Gemination can be classified according to Aguiló *et al.* as follows:<sup>5</sup>

- Type 1: Enlarged crown with a notch on the incisal edge, pulp chamber can be bifid, normal radicular dimension, cervical widening of canal.
- Type 2: Straight/normal incisal edge, large pulp chamber and root canals with increased radicular dimension.
- Type 3: Two fused crowns, with complete or partial vertically running groove, which extends cervically. Coronal portion may or may not be symmetrical. Pulp chamber coronally can be fused or shared, but end as two separate canals.
- Type 4: Two separate crowns with separate root and canals (Twinning).

### Treatment options

Gemination is usually asymptomatic, but aesthetic concerns, caries susceptibility, periodontal destruction, impacted adjacent teeth and malocclusion may result.<sup>1</sup> Gemination can lead to crowding, ectopic eruption, deviation of the midline, delayed eruption of other teeth and a diastema.<sup>2</sup> This often results in challenges during treatment, necessitating a multidisciplinary approach tailored to the complexity of each individual case.<sup>6</sup>

Ultimately, the management of any dental anomaly is dependent on the crown, root and endodontic morphology, the type of dentition (primary, secondary, supernumerary), the orthodontic and periodontal status of the patient and the aesthetic expectations of the patient.<sup>2</sup> Functional and aesthetic concerns that can arise may require endodontic, restorative, surgical and/or orthodontic input as part of the management strategy and execution.<sup>4</sup> Geminated teeth usually have large pulpal chambers and simply reducing the size is limited since you can easily perforate the pulpal chamber.<sup>2</sup> A detailed clinical and radiological examination should be done followed by photographs and study models.<sup>2</sup> In the primary dentition, treatment is only required if the geminated tooth will interfere with the eruption of the permanent dentition. Thus, extraction and sealing of the grooves is usually the only treatment required in the primary dentition.<sup>2</sup>

### Conclusion

This highlights the importance of recognising dental anomalies followed by cognisance of the dentition affected, tooth morphology, cleanability, periodontal involvement, caries and orthodontic status for treatment planning.<sup>2</sup>

### Authors declaration

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**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Ethics approval:** This study was approved by the University of Pretoria Ethics Committee (Reference no.: 80/2024). All procedures followed the ethical standards of the Helsinki Declaration of 1975, as revised in 2013.

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# CPD questionnaire

## Knowledge and attitudes of oral health care workers on HIV associated oral Lesions: A Study at PHC Facilities in Gauteng.

1. **Choose the CORRECT answer. What was the aim of the study?**
  - A. To determine the participants' ability to test patients for HIV/AIDS
  - B. To determine the participants' knowledge of oral manifestations of HIV.
  - C. To determine the participants' knowledge and attitude towards HIV-associated oral lesions.
  - D. To determine the participants' attitudes towards people living with HIV and AIDS.
2. **Which of the following is CORRECT. Which study design was used for the study?**
  - A. Descriptive cross-sectional survey
  - B. Case study
  - C. Randomised controlled trial
  - D. Nested case-control study
3. **Select the CORRECT answer. According to the European Economic Community-Clearinghouse (EEC-Clearinghouse) classification, which group of lesions are strongly associated with HIV infection.**
  - A. Group 1(Oral candidiasis, Oral hairy leucoplakia, Periodontal disease, Non-Hodgkins lymphoma and Facial palsy)
  - B. Group 1(Oral candidiasis, Oral hairy leucoplakia, Periodontal disease, Non-Hodgkins lymphoma and Kaposi Sarcoma)
  - C. Group 1(Oral candidiasis, Herpes zoster, Periodontal disease, Non-Hodgkins lymphoma and Facial palsy)
  - D. Group1 (Oral candidiasis, Oral hairy leucoplakia, Erythema multiforme, Non-Hodgkins lymphoma and Facial palsy)
4. **How was the participants' knowledge of oral manifestations further tested?**
  - A. Identification of seven unlabelled photographic images depicting lesions strongly associated with HIV.
  - B. Identification of lesions during a clinical examination of seven patients with lesions strongly associated with HIV.
  - C. Identification of seven lesions less commonly associated with HIV during a video presentation.
  - D. Identification of seven unlabelled photographic images depicting all lesions associated with HIV
5. **Which of the options are CORRECT. The researchers obtained permission from Oberoi et al., (2014) to adapt and use their self-designed draft questionnaire which consisted of the following:**
  - A. Two sections and 25 items.
  - B. Three sections with 20 items.
  - C. Two sections with 25 items.
  - D. Three sections 25 items.
6. **Which of the following is CORRECT. The primary purpose of this study was to determine the following:**
  - A. Knowledge and oral self-care practices of undergraduate physiotherapy students based on their past-experience and exposure of dental and oral practices.
  - B. Whether dental and oral care should be included in the physiotherapy curriculum to facilitate patient's dental care and oral hygiene.
  - C. Knowledge, attitude and oral self-care practices of undergraduate physiotherapy students based on their past-experience and exposure of dental and oral practices.
  - D. Knowledge, attitude, perceptions and oral self-care practices of undergraduate physiotherapy students based on their past-experience and exposure of dental and oral practices.
7. **Choose the CORRECT statement. A significant finding of this study was that:**
  - A. Seventy percent (n=75) of the participants indicated their gums bled during flossing with the highest percentage being the 4th year 55% (n=33) compared to 52% (n=22) and 42% (n=20) of 2nd and 3rd years respectively with  $p=0.01$ .
  - B. Sixty five (n=75) of the participants indicated their gums bled during flossing with the highest percentage being the 4th year 70% (n=33) compared to 52% (n=22) and 42% (n=20) of 2nd and 3rd years respectively with  $p=0.01$ .
  - C. Fifty five percent (n=75) of the participants indicated their gums bled during flossing with the highest percentage being the 4th year 70% (n=33) compared to 52% (n=22) and 42% (n=20) of 2nd and 3rd years respectively with  $p=0.01$ .
  - D. None of the above is correct.

## A framework to guide oral healthcare at long-term care facilities in the eThekweni district

8. **Choose the CORRECT statement regarding the methodology in developing the framework.**
  - A. The framework comprised of three stages in the order: Implementation, review, and needs analysis.
  - B. The 'Precede' component involved the implementation of the intervention and identification of desired outcomes through process, impact, and outcome evaluations.
  - C. The 'Proceed' component considered the socio-ecological factors among coordinators and caregivers, as well as administrative and policy factors.
  - D. The empirical aspect involved a 4-phased mixed method exploratory study, based on action research and the plan-act-observe-reflect cycle.
9. **Which statement is CORRECT. A needs analysis:**
  - A. Is a brief overview of a problem affecting a specific population, in order to set priorities, allocate resources, improve the situation and reduce inequalities.
  - B. Is an important step in analysing a problem affecting a specific population, based on the theory of self-determination.
  - C. Is essential for reviewing a problem affecting a specific population, based on the theory of social justice.
  - D. Is not necessary when planning a health intervention.

## Physiotherapy students' oral health-related knowledge, attitudes, and practices at an identified institution of higher learning in South Africa

10. Choose the CORRECT statement regarding The Intervention.
- The intervention of the study was developed independent from the results of the needs analysis.
  - The intervention was based on the current status of oral health provision, unmet oral health needs, availability of resources, funding, and infrastructure.
  - Planning of the intervention did not require determining organisational preparedness.
  - Planning of the intervention did not require obtaining organisational commitment.
11. Which option is CORRECT. The evaluation phase of the study, revealed that:
- internally regulated forms of motivation may promote positive long-term behavior change among caregivers
  - externally regulated forms of motivation may promote positive long-term behavior change among caregivers
  - externally regulated forms of motivation may promote positive short-term behavior change among caregivers
  - internally regulated forms of motivation may promote positive short-term behavior change among caregivers
12. Choose the CORRECT statement with regards to the framework developed in this study:
- The framework was effective, but posed logistical issues and interrupted caregiving time.
  - The framework provided a cost-effective and convenient method of delivering health promotion.
  - The framework was beneficial to the caregivers, but it does not inform stakeholders and oral health planners on oral health policy formation, and strategic planning involved in oral health service delivery.
  - The framework is specific and may only be applied to the long-term care setting.
18. Which answer is CORRECT. In the Gaizeh Al-Hallak et al trial, statistically significant differences in pain levels between the two study groups occurred at which of the following time intervals:
- T1
  - T2
  - T3
  - T4
19. Select the CORRECT answer. In the Ugrin and Špalj et al trial, the sample size that was analysed and reported as results was:
- 66
  - 100
  - 108
  - 152
20. Which option is CORRECT. In the Ugrin and Špalj et al trial, the most breaks or debonding occurred in which of the following retainers
- Rounded wire retainer
  - Rectangular wire retainer
  - Thermoformed removed retainer
  - Rounded and rectangular retainers has the same number of breaks/debonding

### Ethics - Patients request for extractions

21. Select the CORRECT option. A dentist is obliged to extract teeth in good health:
- Patients have right of autonomy and can choose their treatment options.
  - Where patients are assertive and insist on extraction.
  - Patients requires it for cosmetic and other reasons.
  - None of the above
22. Which option is CORRECT. Dentists in terms of law and ethics:
- are obliged to provide every request for treatment patient requests
  - they are required to treat patients in terms of their request.
  - To provide patients with all therapies they want.
  - Are required to treat within parameters of recognised standards
23. Which answer is CORRECT. Dentists may extract teeth in circumstances where patients:
- Have a fear dental treatment resulting in apprehension or anxiety.
  - Are suffering from Post traumatic stress disorder (PTSD).
  - Insist on unexplainable pain originating from the teeth
  - Insist that extraction will improve their appearance
  - None of the above.
24. When requested by patients to extract healthy teeth, dentists acceding to this request
- are acting in the patient's best interests
  - are not obliged to adhere to normal standards of care
  - may deviate from a determined prognosis
  - as refusal will encourage treatment from unlicensed individuals
  - None of the above
25. Where the patient complains of pain emanating from the teeth
- Dentist must extract teeth although there is no organic cause
  - Extraction would not be considered unnecessary treatment if it is requested by patients
  - Extraction would constitute potential malpractice
  - Dentist should be empathetic to patient's complaints.

### Radiology Corner:

13. Select the CORRECT answer. What do we call the anomaly where two separate tooth buds' join either completely or incompletely during any developmental stage resulting in a larger tooth?
- Gemination
  - Fusion
  - Twinning
  - Macrodonia
14. Which of the following statements are CORRECT. Bilateral geminated teeth are
- Very rare
  - Very common
  - Normal variation
  - Never seen
15. Which answer is CORRECT. Radiographically, a geminated tooth resembles:
- only a single root
  - only a single pulp space
  - both a single root and pulp space
  - a single root and double pulp space
16. Which of the following is CORRECT. Gemination can lead to:
- crowding, ectopic eruption, deviation of the midline
  - faster eruption of other teeth, diastema
  - diastema, straight teeth
  - normal midline, ectopic eruption

### Evidence-based dentistry:

17. Choose the CORRECT option: Recurrent herpes labialis (RHL) is a viral disease caused by the reactivation of herpes simplex virus type 1 (HSV-1) which lies dormant in:
- The heart
  - The liver
  - The pancreas
  - The sensory neurons

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