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Aqualens Sphere Fountain

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The dentist has a responsibility to report child abuse and neglect

SADJ July 2022, Vol. 77 No. 6 p321

Prof NH Wood - MDent, PhD

South Africa is quite often lauded in the international community for having one of the most progressive and inclusive constitutions globally. This constitution protects even the most vulnerable of persons and ensures that even these vulnerable persons in our communities enjoy support and have the right to be protected. Section 28 of the Bill of Rights states that “every child has the right to be protected from maltreatment, neglect, abuse and degradation”. The Children’s Act No. 35 of 2005 further expands on the rights of minors, and relays principles relating to the care and protection of minors. However, to ensure that the constitution delivers on these promises, one must be able to identify the instances where there is a clear violation or even deprivation of these rights. In this editorial I am focusing on child abuse and neglect, and the role of the dentist in the identification and reporting thereof.

In broader terms, Childline defines child abuse as, “any interaction or lack of interaction by a parent or caretaker which results in the non-accidental harm to the child’s physical or developmental state”. The World Health Organization defines different types of abuse more specifically into the categories of physical abuse, sexual abuse, emotional abuse, and neglect. Physical abuse relates to direct damage or injury to the person of the child. The child is harmed in any number of ways from hitting, kicking, biting, shaking, and burning in an extensive list. Sexual abuse ranges in a spectrum from exhibitionism to rape and sexual assault. Emotional abuse can include things like verbal and mental abuse and is also referred to as psychological maltreatment. The outcomes of emotional abuse can include severe behavioural, cognitive or mental trauma. Neglect is frequently misunderstood and refers to the failure of parents or caregivers to provide for the basic needs of a child whether it be physical, mental, educational, or any other aspect of a child’s normal and healthy growth and development.

It must be noted that the dentist is in the perfect position to note and act on any signs of neglect and abuse towards a child. There are however concerns that dentists may not report on these matters as they should. Singh and Lehl ascribe this hesitation to factors that include the fear of involvement in prolonged legal proceedings, the possibility of losing patients, some may be ambivalent to the severity of the matter, concerns over threats to themselves or their livelihoods, or simply a lack of knowledge and understanding surrounding child abuse and neglect. It is therefore imperative that the dentist ensures they are up to date and well informed on the identification and reporting of child abuse and neglect. Two interesting papers are included in the list below for further reading and information.

Once identified, the suspected child abuse and/or neglect must be investigated and followed up. This must be handled with the utmost care and sensitivity. A report or case must be submitted to an appropriate authority such as a child protection service, the police or a provincial Department of Social Development. It is critical to maintain a follow-up with the responsible individuals within the relevant institution. The most notable of these institutions and their contact details are listed here:

South African Police Services (SAPS)

Emergency line: 10111

Child abuse reports: childprotect@saps.gov.za

LifeLine South Africa

Tel: 0861 322 322

Website: www.lifelinesa.co.za

The Child Emergency Line

Toll-free: 0800 123 321

Women and Men Against Child Abuse

Tel: 011 789 8815

Website: www.wmaca.org

Childline South Africa

Toll-free: 08000 55 555

Tel: 031 201 2059

E-mail: admin@childlinesa.org.za

Website: www.childlinesa.org.za

Child Welfare South Africa

Tel: 074 080 8315

E-mail: info@childwelfare.org.za

Website: www.childwelfare.org.za

Please enjoy the July issue of the SADJ and we look forward to receiving your further correspondence.

Further reading:

1. Mohammed N, Naidoo S. A review of child abuse and the role of the dental team in South Africa. SADJ 2014; 69:250-256.
2. Singh V, Lehl G. Child abuse and the role of a dentist in its identification, prevention and protection: a literature review. Dent Res J 2020; 17:167-173.

When the inevitable happens

SADJ July 2022, Vol. 77 No. 6 p322

Dr Nthabiseng Metsing, Head: Professional Development, SADA

The loss of colleagues can be especially throbbing when you knew each other well and felt like family. Paying tribute to a deceased associate shows respect and acknowledges the sadness that may flood the working industry. Taking time to celebrate the life of the fellow colleague offers an opportunity to share memories and recall stories of how the co-worker made a difference in the lives of others.

Death by definition is the irreversible cessation of all biological functions that sustain an organism. It can also be defined as the irreversible cessation of functioning of the whole brain, including brainstem. Brain death is sometimes used as a legal definition of death. The remains of a former organism normally begin to decompose shortly after death. Death is an inevitable process that eventually occurs in almost all organisms. (Anon., 2021)

According to the WHO there is a rise in the death rate for all top ten diseases except two, in high-income countries. Ischaemic heart disease and stroke are the only causes of death in the top 10 for which the total numbers have gone down between 2000 and 2019, by 16% (or 327 000 deaths) and by 21% (or 205 000 deaths) respectively. High-income is the only category of income group in which there have been decreasing numbers of deaths from these two diseases. Nonetheless ischaemic heart disease and stroke have remained in the top three causes of death for this income category, with a combined total of over 2.5 million fatalities in 2019. In addition, deaths from hypertensive heart disease are rising. Reflecting a global trend, this disease has risen from the 18th leading cause of death to the 9th. (WHO, 2021)

Death is inevitable and over the past few years, the association and the profession at large has lost prominent figures within the oral health fraternity. The emergence of the Covid-19 has amongst many other effects, made many of people reflect more on death. This may have been caused by daily statistics of how many people had succumbed to the virus, which were and still are being published. The daily statistics of people getting infected may have resulted in many people starting to reflect on their own lives. During this period, we lost many colleagues, friends and family.

Such a communique may be something that is out of the ordinary for the association, but because we understand that there is no timeline that can be put to grief. We would like to say that our thoughts are with the oral health community during this time of sorrow following

the loss of their loved ones. We would like to wish all comfort during the difficult time, and our deepest sympathies go to each and every member of the SADA community.

This particular communique was inspired by the growing number of requests from members to pay tribute to their friends and colleagues who have passed on. Due to the decisions that have been taken and the standards that the journal subscribes to, the SADJ has not been able to accommodate these noble requests. Since we felt very strongly about this gesture, we felt that the purpose would be served through the SADA communique. We wish peace for all who have suffered a loss.



Determination of the influence of body mass percentile on mandibular canine calcification stages among 5-17 years old Northern Nigerian children

SADJ July 2022, Vol. 77 No. 6 p323- p329

Osaronse Anthony Aghimien¹, Osasumwen Aghimien-Osaronse²

ABSTRACT

BACKGROUND

Dental calcification is a biological phenomenon used to estimate the maturation status of growing children. The effect of body mass index percentile (BMI-percentile) on this process appears contentious among researchers.

AIMS AND OBJECTIVES

To determine the predictive effect of body mass percentile on mandibular canine calcification.

DESIGN

A prospective descriptive cross-sectional study.

METHODS

This was a prospective cross sectional descriptive study comprising of eighty four participants (5-17 years) who visited the Child Health Dental Clinic of Federal Medical Centre, Keffi, Nigeria between January and September, 2021. Mandibular canine calcifications of the study participants were staged using the Demirjian method while the World Health Organisation growth chart specific for age and gender was used to classify the BMI-percentile. The effect of BMI-percentile on the mandibular canine calcifications was determined using multinomial logistic regression.

RESULTS

Chronological age had a significant predictive effect on the mandibular canine calcification ($P=0.002$) as against gender and BMI-percentile. A one-percentile

increase in the BMI-percentile increases the likelihood of healthy children of having to present in stage D by 3.454 compared to obese children, but this effect was not statistically significant ($P= 1.000$).

CONCLUSIONS

Obese children have a tendency of having advanced mandibular canine calcification than healthy children. Female participants were likely to be in advanced mandibular canine calcification stage. Early intervention is therefore suggested for obese children.

Key words: Body mass percentile, mandibular canine, calcification.

INTRODUCTION

In 2006, the World Health Organisation (WHO) released standard growth charts for describing growth of healthy children in ideal conditions.¹ These charts were used to assess the nutritional status of children globally. Children and adolescents were categorized as either underweight, healthy, overweight or obese using body mass index percentile (BMI-percentile) scores of <5%, 5%-85%, 85%-95% and >95% respectively.

The prevalence of obesity is on the rise globally with increasing trend in developing countries like Nigeria.²⁻⁴ Continuous increase in the BMI-percentile of an individual can affect their general wellbeing by; predisposing them to increased blood pressure, coronary heart disease and increased risk of diabetic mellitus. It can also affect their dental development.⁵

Dental development is a biological phenomenon that is used to estimate the maturation of growing children. Orthodontists and paedodontists consider dental development as a crucial parameter that is usually evaluated before commencing treatment on their patients. Apart from dental eruption age, the dental formation stages (calcification/mineralization) of the teeth are more confidently used to estimate an individual's dental age because it has been reported to follow a more independent process and can be evaluated at any stage of its developmental process.^{6,7} The effects of changes in BMI-percentile on dental development have been studied by several researchers.⁸⁻¹⁷ Changes in the BMI-percentiles have been reported to either cause acceleration or a delay in tooth eruption.⁸⁻¹¹ Advancement in dental age among

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1. Osaronse Anthony Aghimien: 60%;
2. Osasumwen Aghimien-Osaronse: 40%.

overweight and obese children as against normal healthy individuals have also been reported in different population.¹²⁻¹⁷ Recently, it was reported that black South Africans overweight children aged 5-20 years were observed to be significantly advanced in their dental development when compared to underweight children.¹⁸ If nutritional status as classified by the BMI-percentile have influences on dental development, it cannot be said to absolutely follow an independent process of growth.¹⁸ The effect of BMI-percentile on dental maturation have been observed to be dichotomous among researchers.⁸⁻²² While some researchers observed BMI-percentile to have a statistically significant explanatory effect on dental maturation,¹⁸⁻²⁰ some others have reported non-statistically significant explanatory effects.^{21,22}

The effect of increased BMI-percentile on orthodontic tooth movement is still considered controversial among researchers.²³

There is no doubt that fluctuation in BMI-percentile can influence dental development. However, there appears to be scarcity of researches on the influence of BMI-percentile on dental development among Nigerians, despite the increasing prevalence of overweight and obesity among the Nigerian population.²⁴ This study was conducted to determine the influence of BMI-percentile on the developmental stages of the right mandibular canine in Northern Nigerian children using the Demirjian method.²⁵ It was hypothesized that there was no statistically significant correlation between BMI-percentile and the developmental stages of the right mandibular canine. Secondly, that BMI-percentile has no statistically significant explanatory effect on the developmental stages of the right mandibular canine. The outcome of this study will guide clinicians especially those in the fields of Orthodontists and paedodontists on proper timing of implementation of treatment procedures.

MATERIALS AND METHODS

Study population

This was a prospective cross-sectional study. It included 84 children and adolescents that visited the Child Health Dental Clinic, Federal Medical Centre, Keffi, Nigeria (between January 2021 and September, 2021). Data were extracted from records of patients that visited for routine treatment.

Ethical consideration

Ethical approval was obtained from the institution's Health Research Ethical Committee (FMC/KF/HREC/2571/21) prior to collection of the data, informed consent was obtained from parents/guardians of the participants while verbal consent was obtained from the children.

Inclusion and exclusion criteria.

Participants recruited for the study included patients between aged 5 to 17 years with no previous orthodontic treatment and the absence of congenital or developmental defects. Participants with serious childhood illness, multiple extractions, congenital anomalies affecting the teeth in the form of supernumeraries and; dilacerations

as well as those who refused consent and assent were not recruited for the study. Participants with distorted peri-apical radiographs were also excluded from the study

Data collection

Digital peri-apical radiographs of the mandibular canine were obtained using the bisecting angle technique. The Demirjian method²⁵ was used to grade the developmental stages of the right mandibular canine calcification.

Mandibular canine calcification stages using the Demirjian method

- **Stage D:** Crown formation is complete down to CEJ. Superior border of pulp chamber is curved and concave towards the cervical region. The beginning of root formation is in the form of a spicule.
- **Stage E:** The walls of the pulp chamber form straight lines. The root length is less than the crown height.
- **Stage F:** The walls of the pulp chamber form a more or less isosceles triangle, with the apex ending in a funnel shape. The root length is equal to or greater than the crown height.
- **Stage G:** The walls of the root canal are parallel and its apical end is still partially open.
- **Stage H:** The apical end of the root canal is completely close. The periodontal membrane has a uniform width around the root and the apex.

Measurement of body mass index (BMI) and body mass index-percentile

Weight (in kilogram) and height (in meters) were measured using a stadiometer with a weighing scale at the base. Body mass index was calculated by dividing the weight in kilogram (kg) by the square of the height in meters (m²).

BMI percentile for each participants was obtained from BMI scores with reference to the growth charts specific for age and gender. The WHO growth chart specific for age (2-20 years) and gender was used for this participants. A BMI-percentile less than 5%, between 5%-85%, between 85%-95% and greater than 95% were scored as either underweight, healthy, overweight or obese respectively.

Description of equipment and machines

The Carestream peri-apical x-ray machine model CS2100 with a standard wall-mounted unit was used to take radiographs in for this study. It has exposure dose of 60KV-7mA at a distance of 20cm from the x ray tube focal spot to the skin. Carestream digital sensor, RVG 142 size 1 (24mm x 40mm) was used to obtain the peri-apical radiographs of the study participants.

Intra-investigator reliability

Before the commencement of the study, a reliability survey was conducted to assess the level of intra-investigator error of the mandibular calcification stages. Eight (8) digital peri-apical radiographs of the participants were randomly selected and assessed at two different sections of 2 weeks interval to determine intra-class reliability. Intra-class coefficient (ICC) showed

excellent intra-investigator reliability to be 0.948 for the mandibular canine calcification stages, $p < 0.001$.

Data analysis

Data collected were coded and entered into the computer system and analyzed using Statistical Package for Social Sciences (SPSS) version 22.

Unpaired t-test was used to compare the mean of the chronological age, height, weight and Body Mass Index (BMI) according to gender. The mean chronological age and mean BMI of the various groups of BMI-percentile and the various stages of mandibular canine calcifications were compared according to gender using the unpaired t-test. Spearman's correlation was used to determine the association of BMI-percentile and the mandibular canine calcifications stages. Multinomial

logistic regression was thereafter used to determine the effect of some explanatory independent variables (chronological age, gender and BMI percentile) on the dependent variable (mandibular canine calcifications stages) with stage F of the mandibular canine calcifications stages as the reference category.

RESULTS

Table I shows the comparison of the mean values of chronological age, height, weight and Body Mass Index (BMI) according to gender using unpaired t-test. Female participants had higher heights (1.40 ± 0.14 m), larger weights (35.00 ± 11.23 kg) and BMI (17.56 ± 2.99 kg/m²). However, but they were not statistically significant, with p values of 0.979, 0.584 and 0.442 respectively. The mean BMI of the healthy females was significantly higher than the males ($p = 0.015$). Overweight and obese

Table I: Mean chronological age, height, weight and body mass index (BMI) using unpaired t-test

Variables	Gender	N(%)	Mean \pm SD	MD	95% CI		P value
					Lower	Upper	
Chronological age (years)	Male	47 (56.0)	10.51 \pm 2.80	0.186	-1.139	1.512	0.777
	Female	37 (44.0)	10.32 \pm 3.19				
	Total	84 (100.0)	10.43 \pm 2.96				
Height (m)	Male	47 (56.0)	1.39 \pm 0.14	-0.001	-0.062	0.061	0.979
	Female	37 (44.0)	1.40 \pm 0.14				
	Total	84 (100.0)	1.39 \pm 0.14				
Weight (kg)	Male	47 (56.0)	33.53 \pm 12.83	-1.468	-6.782	3.846	0.584
	Female	37 (44.0)	35.00 \pm 11.23				
	Total	84 (100.0)	34.18 \pm 12.10				
BMI (kg/m ²)	Male	47 (56.0)	16.93 \pm 4.21	-0.633	-2.262	0.997	0.442
	Female	37 (44.0)	17.56 \pm 2.99				
	Total	84 (100.0)	17.21 \pm 3.72				

MD, Mean difference; CI- Confidence interval

Table II: Comparison of the mean chronological age of the BMI-percentile and also the comparison of the mean BMI of the BMI-percentile according to gender using unpaired t-test.

BMI-				95% Confidence interval		P-Value	
Percentile n (%)		Male N (%)	Female N (%)	MD	Lower		Upper
Underweight 14 (16.3%)	CA Mean SD	9(10.7) 11.76 4.09	5(6.0) 10.20 2.39	1.467	-2.926	5.860	0.481
	BMI Mean SD	13.70 1.80	13.47 1.11	0.236	-1.712	2.185	0.796
Healthy 58 (69.0%)	CA Mean SD	31(36.9) 10.32 2.47	27(32.1) 10.56 3.40	-0.233	-1.782	1.316	0.764
	BMI Mean SD	16.36 1.69	17.78 2.58	-1.414	-2.548	-0.281	*0.015
Overweight 9 (10.7%)	CA Mean SD	5(6.0) 9.80 1.64	4(4.8) 10.25 2.06	0.450	-3.360	2.460	0.725
	BMI Mean SD	20.72 1.55	20.58 2.38	0.147	-2.944	3.237	0.914
Obese 3 (3.6%)	CA Mean SD	2(2.4) 10.00 4.24	1(1.2) 5.00 0.00	10.580	-172.524	193.684	0.597
	BMI Mean SD	30.72 11.76	20.14 0.00	5.000	-61.023	71.023	0.512

*- $P < 0.05$; CA-Chronological age; BMI-Body mass index; SD-Standard deviation; MD-Mean difference

males participants ($20.72 \pm 1.55 \text{ kg/m}^2$ and $30.72 \pm 11.76 \text{ kg/m}^2$ respectively) had higher mean BMI when compared to females ($20.58 \pm 2.38 \text{ kg/m}^2$ and 20.14 kg/m^2 respectively) but no statistical significance was observed. The mean ages of obese participants was observed to be 10 years for males and 5 years for female participants, $p=0.597$ (see table II).

Table III shows that Stage F of mandibular canine calcification was mostly represented among the various stages of the tooth development with 26.2% while stage D was least represented with 6.0%. The mandibular canine calcification stages among the male participants were majorly categorized as stage F (17.9%) while stage G had the highest representation among females (13.1%). The mean chronological age of the various developmental stages of the mandibular canine were consistently earlier among females than in males. Statistical significant difference was only observed at stage F where the mean chronological age was 8.57 years for females and 10.13 years for males, ($p=0.046$). Mean BMI for each stage were lower among the males compared to females in stages D, E, G and H but higher in stage F. Statistical difference was only

observed in stage D, ($p = 0.026$). As the mandibular canine calcification stages advanced from stage to stage, the mean BMI also steadily increased among the males.

Table IV shows that the average correlation of the mandibular canine calcification stages with the BMI-percentile was positive but weak and not statistically significant, ($p = 0.769$). Table IV also shows that age has significant ($p < 0.001$) positive and moderate correlation while gender had weak correlation with the mandibular canine calcification stages ($p = 0.077$).

Multinomial logistic regression was used to determine the influence of age, gender and BMI percentile on the dependent variable (mandibular canine calcification stages) with stage F of the mandibular canine calcification stages as the reference category as shown in Table V. There was an increase in the likelihood of males to present with stage D of mandibular canine calcification by 2.233 than females. This shows that females are more likely to be in advanced stage F. However the effect of gender on the canine calcification was observed not to be statistically significant ($p = 0.199$).

Table III: Comparison of the mean chronological age of the mandibular canine calcification stages (MCCS) and the mean BMI of the mandibular canine calcification stages (MCCS) according to gender using unpaired t-test.

MCCS N(%)		Male N(%)	Female N(%)	MD	95% CI		P-Value
					Lower	Upper	
Stage D 5 (6.0%)	CA	3 (3.6)	2 (2.4)				
	Mean SD	8.00 2.00	5.00 0.00	3.000	-1.744	7.744	0.138
	BMI						
	Mean SD	13.81 0.58	16.25 0.78	0.236	-4.343	-0.544	0.026
Stage E 21 (25.0%)	CA	14 (16.7)	7 (8.3)				
	Mean SD	8.21 0.89	7.71 1.60	0.500	-0.629	1.629	0.365
	BMI						
	Mean SD	15.61 2.87	16.15 2.12	-0.541	-3.116	2.034	0.665
Stage F 22 (26.2%)	CA	15 (17.9)	7 (8.3)				
	Mean SD	10.13 1.77	8.57 1.13	1.562	0.305	3.093	0.046
	BMI						
	Mean SD	16.92 2.44	16.20 1.89	1.721	-1.463	2.901	0.499
Stage G 18 (21.4%)	CA	7 (8.3)	11 (13.1)				
	Mean SD	12.00 1.29	10.64 1.57	1.363	-0.142	2.870	0.073
	BMI						
	Mean SD	18.08 2.99	17.26 3.19	0.819	-2.372	4.010	0.594
Stage H 18 (21.4%)	CA	8 (9.5)	10 (11.9)				
	Mean SD	14.88 1.96	14.10 2.33	0.775	-1.413	2.963	0.464
	BMI						
	Mean SD	19.41 8.10	20.10 2.91	-0.681	-6.499	5.137	0.807

*- $P < 0.05$; MCCS- Mandibular canine calcification stages; CA-Chronological age; BMI-Body mass index; SD-Standard deviation; MD-Mean difference.

Table IV: Measure of relationship with mandibular canine calcification stages (MCCS)

	Pubertal growth spurt	
	Correlation coefficient	P value
BMI-percentile		
Male	*0.080	0.591
Females	*0.008	0.961
Total	*0.033	0.769
Age	**0.712	<0.001
Gender	***0.194	0.077

*-Spearman's correlation, **- kendaul tau-b correlation, ***- Rank biserial correlation

Table V: Multinomial logistic model of the mandibular canine calcification stages (MCCS), stage F as reference category.

Predictive variables	B	Df	OR	95% CI		P value
				Lower	Upper	
Gender (male)	2.233	1	9.327	0.309	218.436	0.199
Chronological Age	-2.805	1	0.061	0.011	0.348	0.002
BMI percentile (Healthy 5%-85%)	3.454	1	31.624	0.009	0.694	1.000

OR-Odd ratio; CI- Confidence interval.

Furthermore, a one-percentile increase in the BMI-percentile increased the likelihood of healthy children to present in stage D by 3.454 than in stage F as against obese children. This revealed that obese children tend to have advance mandibular canine development than healthy children. This effect was also not statically significant ($p= 1.000$).

An increase in chronological age by one year was observed to have significantly ($P = 0.002$) decreased the likelihood of presenting with stage d of mandibular canine calcification by 2.805. Thus showing that an increase in chronological age is accompanied by increase in developmental stages of the mandibular canine calcification stages.

This result shows that gender and BMI-percentile were not statistical significant predictors of mandibular canine calcification stages.

DISCUSSION

In this current study, it was observed that the correlation of the mandibular canine calcification with the BMI-percentile was positive but weak irrespective of gender. This findings is consistent with results of a previous study conducted in an Iranian population.¹⁴ While the present study recorded a non-statistically significant correlation among males and females, Anbiaee et al¹⁴ only reported a non-statistically significant correlation among the males.

The present study also confirms that age has a significant predicting effect on the calcification stages of mandibular canine. These findings corroborate previous observations. Hedayati & Khalafinejad in a study conducted among an Iranian population observed that gender was not a statistical significant predictor of mandibular canine calcification.¹⁵ The findings in the present study corroborate the observation made by the authors.¹⁵

Findings in the current study differ from previous reports made by Mack et al¹⁹ and Erhamza et al²² where it was observed that gender played a significant predicting role in determining the outcome of the dental development.

Although this present study shows that an increase in the BMI-percentile increases the tendency towards advanced dental calcification, the effect was however not statistically significant. There is general consensus among several authors that there is a tendency towards advanced dental development when there is an increase in the BMI-percentile on the contrary, they differ with regard to the level of statistical significance of the predictive effects.^{14,15,19,22,26} While finding in the present study is consistent with the observations made by some authors,^{21,22,26} it is at variance with other researchers that reported BMI-percentile as a significant predictor of dental maturation.^{13,18-20} This present study apart from having lower study participants focused majorly on the calcification stages of the right mandibular canine while the study conducted by Mack et al¹⁹ and DuPlessis et al²⁰ calculated the actual dental maturity score and the corresponding dental age of the participants using the Demirjian method which involve the use of seven teeth. These differences could have accounted for the difference on the predictive effect of BMI-percentile.

The study conducted in a black South African population focused majorly on stage H of the left seven teeth.¹⁸ The exclusion of other developmental stages of the teeth could have probably magnify the predictive effect of the BMI-percentile on stage H that was evaluated. Although Zangouei-Booshehri et al¹³ reported a tendency towards accelerated dental development which is corroborated by observations made in this present study. The significant predictive effect of BMI-percentile reported by the author is at variance with the findings in the current study. The BMI-percentile was either classified as normal or above normal by the authors¹³, therefore obviating the separate effects of the 4 groups

of BMI-percentile used in the current study. Also, only the coefficient ratio of BMI-percentile was reported while the parameter estimate of the logistic model was reported in this current study. Coefficient ratio only reports the overall effect without considering individual contribution of the various groups of the BMI-percentile.

The differences in methodology, ethnic difference and possibly racial variation could have accounted for the difference observed between the present study and the studies that reported significant effect of BMI-percentile on dental development. Obese patients have also been reported to have significantly more erupted teeth than normal non-obese individuals in a study conducted among a North American population,⁹ but the mixed model analysis failed to show that obesity had a statistically significant effect on the eruption pattern which is further corroborated by the results of this current study which shows a non-significant effect of BMI-percentile on mandibular canine calcification. The quadratic mixed-effects model used in the longitudinal study conducted by Nicholas et al⁹ also showed that BMI-percentile had no statistical significant effect on changes in the dental of the study participants. This is in agreement with results from the current study.

Since findings from this current study have shown that there is a tendency towards advanced dental development among individuals with increased BMI-percentile, special considerations should be given to overweight and obese individuals visiting the paediatric and orthodontic dental clinics. These individuals may require earlier treatment intervention than individuals within the normal range of healthy BMI-percentile among Nigerian children.

CONCLUSION

1. A one-percentile increase in the BMI-percentile increased the likelihood of healthy children to present be in stage D by 3.454 than in stage F as against obese children. However, the effect of an increase in BMI-percentile on the mandibular canine calcification was not statically significant ($P=1.000$). This revealed that obese children tend to have advance mandibular canine development than healthy children.
2. Chronological age was observed to be a statistical significant predictive factor ($P=0.002$) of mandibular canine calcification stages. A statistically significant and strong positive correlation ($p<0.001$) was also observed between chronological age and mandibular canine calcification stages.
3. The effect of gender on mandibular canine calcification stages was not statistically significant ($P=0.199$). The correlation between gender and mandibular canine calcification stages was also not statistically significant ($P = 0.077$).

Conflict of interest

The authors declare that there is no conflict of interest.

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A review of the 2030 Human Resources for Health Strategy and Vision: Goals and their implications for dentistry

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ABSTRACT

Introduction

The South African National Department of Health (NDoH) released a report in March 2020: "2030 Human Resources for Health (HRH) Strategy: Investing in the Health Workforce for Universal Health Coverage".

Aim

The aim was to analyse the five National Health Goals for 2030 with reference to the impact they could have on dentistry in South Africa.

Methods

This was an independent review of the HRH strategic document with inputs from three specialists in Community Dentistry. The views are that of the authors and not necessarily from the report itself. The strategic document comprised of five goals and each goal's objectives implication to dentistry was analysed based on the SMART criteria.

Results and Discussion

Some of the goals are being attained but to meet the remaining goals, government has to increase its commitment to improving oral health. More posts in the public sector needs to be created, managerial posts need to be filled by community dentistry specialists, current managers need to be upskilled, the number of mid-level workers (MWs) posts (oral hygienists and

dental therapists) need to be increased and the MWs financial package needs to be improved. The tertiary institutions need to train oral health workers who are aligned with the oral disease burden, introduce career pathways for MWs and assist in supporting oral health research and training of oral health managers.

Conclusion

In terms of oral health, there is an urgent need to determine and align the disease burden and these goals. There should be an increase in the number of MWs, existing managers need to be upskilled, and adverts for managerial posts need to have clear criteria for the required skills.

INTRODUCTION

The South African National Department of Health (NDoH) released a report in March 2020: "2030 Human Resources for Health (HRH) Strategy: Investing in the Health Workforce for Universal Health Coverage". This report was developed by the Ministerial Task Team (MTT) established by the former Minister of Health (Aaron Motsoaledi) and consisted of various stakeholders and academics from different sectors of health and was one of the most comprehensive HRH reports produced. The MTT was established to draft the report and pave the way forward for the training and planning of health care workers, including dental personnel in South Africa (SA). Hence, this report has direct implications for the training of dental personnel and the planning of dental services in SA.

The report consisted of two sections, the human resources for health needs and the five goals that the South African Department of Health have developed which they intend to attain by the year 2030. The oral health human resources has been critiqued and analysed in terms of the implications for dentistry.¹ This paper critiques the five goals and their implications to dentistry in the South African context.

AIM

The aim was to analyse, summarise and critique the five National Health Goals for 2030 with reference to the impact it could have on dentistry in South Africa.

METHODS

This was an independent review of the HRH strategic document with inputs from three specialists in Community Dentistry. The recommendations and

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interpretations are the views of the authors and not necessarily from the report itself. The strategic document comprised of five goals and each goal had numerous objectives to help plan and attain for that goal. Each of the objectives were analysed within the dental context based on the SMART criteria.² These criteria determine whether the goals are Specific, Measurable, Relevant and Timely. It is a thorough analysis of the policy document pertaining to context, implementation and monitoring.³

RESULTS AND DISCUSSION

Goal 1: Effective Health Workforce Planning to Ensure HRH Aligned with Current and Future Needs

Objective 1: Strengthen strategic health workforce planning capability, methodologies and processes at national, provincial, district and facility levels.

Dental workforce forecasting is crucial to the planning of training needs, service delivery and health budgets. Various factors influence workforce forecasting including demographic changes such as an ageing population and the burden of dental diseases. Planning also needs to consider the dental training capacity, the package of services to be provided with the possibility of the NHI, the most effective and efficient mix of skills required and the appropriate workloads to ensure quality care. The oral disease burden and treatment options change over time. These changes have major implications for the size and mix of the oral health workforce, yet the methods used to plan the training of the oral health workforce have remained rigid and isolated from the oral healthcare services and healthcare expenditures.⁴

In order to strengthen the workforce planning, the oral health disease burden and treatment needs must be determined. To ensure that the country's oral health needs are aligned to the health workforce, regular national surveys need to be conducted. Unfortunately, there has been no National Oral Health Survey (NOHS) conducted in South Africa for almost twenty years.⁵⁻⁶ Since then, there have been localised studies in different provinces and regions to determine the prevalence of oral conditions. However, there has been no calibration of these studies and as such, it is difficult to compare the results with confidence.

In terms of treatment provided, studies from Gauteng and Western Cape have shown that dental extractions were the most common procedure.⁷⁻⁸ This could indicate that dental caries and periodontal diseases are likely the most common oral health diseases that patients are seeking help with. Dental therapists are capable of carrying out extractions and as such more DTs could be trained to meet this goal. OHs are trained to prevent these diseases and more OHs are required to improve the dental IQ of the South African patients.

Inequalities for oral health in SA can be avoided by collaboration of oral health workers with other primary health care service providers in the provision of health services.⁹ In addition, it is suggested that primary oral health care providers are constantly up-skilled with regards to diagnosis, service rendering and

management of patients. Integrated oral health planning and service delivery have the potential to improve access to oral health services and redress the historical inequities in oral health care.¹⁰

Studies have shown that the current number of oral health professionals in SA are not adequate to meet the population's oral health needs in the public sector.⁹ For SA to achieve the required numbers of oral health workers, we suggest that there be an increase in the number of training of DT and Oral Hygienists to form part of Midlevel workers (MWs).

The current rate of training Dental Therapists (DTs) is very low compared to dentists and SA should consider increasing the number of DTs trained as an alternative dental workforce model to increase access to dental care and potentially reduce costs of care as done in other countries.⁷ The utilization of community workers to improve oral health education and practices has shown to be effective in other countries and this cadre must be actively involved in the prevention and education of oral diseases.¹¹ This community-based model could be implemented in SA to help deal with HRH planning.

Objective 2: Apply strategic health workforce modelling and planning to optimise investments in HRH.

Research has shown that currently and in the future, there is likely to be an even greater shortage of dental human resources.¹ This could be due to a reduction in posts in the public sector, increased emigration of health professionals and low throughput of dental students due to the limited number of dental schools in the country. This objective can best be accomplished with coordination and discussion with all stake holders being the department of health, the department of higher education and training, the South African dental association (SADA) as well as oral hygiene and dental therapist's organizations. This is because the previous models have been shown to have gaps.

To optimise investments in HRH, the country should train MWs who can address the huge burden of dental caries and who are more cost effective to train and to employ than dentists. This is based on the fact that the OH and DT degrees take three years to complete compared to dentistry which is 5 year degree with one year of community service.

There is a need for dentists and specialists to deal with the specialised and rehabilitative services, but given the current types of services being rendered in public facilities, the demand is for prevention and curative care of basic dental conditions such as caries and periodontal diseases. As per the previous objective, more posts need to be created in the public sector. An increase in the DT and OH salaries need to be considered and career pathways need to be strengthened for these cadres to ensure they do not leave the profession or come back and train as dentists. Something to be borne in mind is that DTs, OHs and dentists work with the assistance of dental assistants and therefore this cadre needs to be considered also in terms of career pathing and salaries for provision of oral health services.

Goal 2: Institutionalise data-driven and research-informed health workforce policy, planning, management and investment.

Objective 1: Institutionalise health workforce data analytics, the standardisation and monitoring of core health workforce indicators and reporting and use at every level of the health system.

Currently within the public sector, the workforce data of all full and part time employees including community service dentists are captured in the persal system and this can be analysed when necessary.

In the public sector, the key performance areas within the Performance Management and Development System needs to be aligned to the disease burden and treatment needs of the community in which the practitioner is employed. Managers need to monitor the employees and ensure that their targets are being met, that they are standardized for all staff and that they are being analysed on a regular basis. The results need to be fed back to the employee in order to ensure that he/she has an idea of their strengths and weaknesses. It is recommended that each province employ a community dentistry specialist to assist with the data collections and analysis as this cadre is trained in data management and policy. The cadre will then be able to advice about the implications of the analysed data to service delivery

In order to build capacity, dental universities should host workshops to train clinical and provincial managers on the data collection and analysis. Going forward it is suggested that new clinical manager posts should be filled by community dentistry specialists or oral health care practitioners with a background in biostatistics or public health The Department of Health also need to review the dental indicators to ensure the appropriate and relevant data is being collected.

Objective 2: Build capacity for the collection, analysis and utilisation of HRH data.

Specialists in community dentistry should be employed to assist with dental HRH data, its analysis and needs for future planning. Currently there is a gap with the Health Professions Council of South Africa register in terms of the whereabouts of health care providers. Many oral health care providers registered on the HPCSA currently, are no longer practicing in SA and hence this provides an over estimation of the HRH. The public sector register needs to be updated regularly regarding the human resources employed in the public sector.

Objective 3: Develop and coordinate an essential national HRH research agenda.

Dentistry staff should be encouraged to carry out research aligned with the services rendered. These research projects should utilise universal data collection tools and indices and ensure that examiners are calibrated. This will ensure that the collected data can be compared and analysed across different settings and different countries. The results should then be used to inform services so that services are evidence based. Dental training institutions should support the public

sector staff members in carrying out research and in providing platforms for them to present their results and publish in accredited and peer reviewed journals. Collaboration between private, public and training institutions need to be encouraged in order to support each other and develop a practical and appropriate research agenda for human resources.

Goal 3. Produce a competent and caring multi-disciplinary health workforce through an equity-oriented, socially accountable education and training system

Objective 1: Institutionalise the governance and financing mechanisms that will sustain a transformative and socially accountable health workforce education and training system, covering quality pre-service, in-service and continuous professional education and training.

These impacts on all dental schools and currently these principles are being followed in dentistry. Currently all dental schools have a quota system to try and ensure equity and produce socially accountable oral health care workers.

The Department of Higher Education is working with universities to provide funding for those who cannot afford fees. It is recommended that multiple and innovative funding mechanisms be looked into to ensure that those students who are accepted into oral health degrees have the resources to graduate. It is also recommended that there be in house training courses to upskill the qualified workforce. These two recommendations will go a long way in addressing this objective.

Objective 2: Revolutionise selection and recruitment of health professional students to overcome health workforce inequities, between urban and rural areas, and between the public and private health sectors.

This is being done at all dental schools by allocating specific number of seats to previously disadvantaged races, especially Black students. This allocation procedure is determined by the respective dental schools and faculties. Currently, the only indicators used are the grade 11 and 12 results to qualify for entry to university. Other parameters like the candidate's home area and type of school attended during grade 12 should be included. Another option is to possibly stratify recruitment of students according to the province in which they reside then make it compulsory for them to go and to do community service in those provinces. Another option would be to only allow compulsory community service to be carried out in rural provinces. This, would require more facilities to be established with adequate and appropriate equipment. All the dental training institutions have an outreach platform which allows students to be exposed to rural and underserved communities. One of the objectives is to create social responsibility and accountability and hopefully instil in them a desire to render services in rural areas.

Provide incentives for people to stay in rural areas like sponsoring their postgraduate training and then letting them come back to those areas and provide specialised

services. If the status quo remains, more dental facilities and posts need to be created in underserved communities in order to address the public private inequalities. However, if National Health Insurance (NHI) is introduced in the near future this could address this public private inequality.

Objective 3: Ensure transformed and modernised curricula and training platforms to imbue the health workforce with the requisite values, knowledge and population-centred competencies so that they are able address the quadruple burden of disease and meet current and future health system needs.

The dental curriculum is constantly being revised through the HPCSA 4 year accreditation programs. This accreditation process allows for dental schools to benchmark themselves with other dental schools in order to standardise. External examiners moderate exam papers and curriculum content, this also allows for annual standardization of assessments.

Social responsibility and accountability are crucial domain that should reflect from all health professionals. Studies have shown an increase in students social responsibility and personal growth following participation in community projects.¹¹ To further increase the growth in social responsibility and accountability in oral health care workers, the government and training institutions should ensure adequate provision of dental resources such as mobile dental units for outreach settings.

Studies amongst dental students in SA have also shown that the introduction of service learning lead to an increase in social responsibility and personal growth following participation in community projects.¹¹⁻¹² Therefore universities need to strengthen service learning activities to ensure that health care workers have a sense of social responsibility

Objective 4: Facilitate the development and innovative expansion of educators (faculty) to ensure the production of a socially-accountable health workforce.

All staff members at teaching institutions are empowered to continue their studies by completing Masters and PhD degrees. Dental schools also offer training workshops for staff members to improve their skills and presentation styles.

Certificates, Diplomas and Masters Degrees are offered at a reduced fee to the dental personnel employed at Tertiary training Institutions whilst those employed at public institutions are subsidised in a form of bursaries for career development. Dental personnel attend Continuous Professional Development (CPD) workshops to keep up to date with the latest techniques and materials as stipulated by the HPCSA. Government should try and increase posts at training institutions which will assist in having a wide pool of academics and clinicians which could improve the student's' exposure and training.

Objective 5: Leverage existing and new funding streams and partnerships for adequate and the equitable supply and distribution of human, infrastructural and operational resources.

Within dentistry, leverage of funds is a challenge as the funding of human, infrastructural and operational resources

is predetermined by the budget constraints. Clinical managers need to identify shortages of human resources and infrastructure and possible maintenance that might arise and plan in advance to ensure that funding is directed where it is needed most.

Currently some dental programmes are sponsored by private companies but more are required in order to achieve the goal of reducing the oral disease burden.

With regards to new funding streams, additional stakeholders like non-government organisations (NGO) and international organisations should be identified who could assist in addressing the inequitable supply of infrastructure. Unfortunately, drawing financial investment in the public sector is ridden with policies and regulations that often make donors reluctant to invest.

Goal 4: Ensure optimal governance; build capable and accountable strategic leadership and management in the health system

Objective 1: Revitalise HRH regulatory structures to enhance the education, performance and accountability of the health workforce.

The HPCSA is currently monitoring the education, performance and accountability of the health force. The public is in turn doing their part by reporting unethical behaviour of health professionals to the HPCSA. A study from 2007 till 2016 on dental malpractices reported to the HPCSA revealed a total of 118 cases. Of these, the majority of cases were fraud related and 75% were against dentists.¹³ The HPCSA ensures that oral and other health workers are adequately trained by insisting on attaining CPD points on a regular basis. The recommendation by the HRH document is to instate a Health Workforce Consultative and Advisory structure comprised of a diverse group of stakeholders. This will ensure that gaps are identified, and innovative ideas are suggested in order to build capacity and increase accountability.

Objective 2: Implement good governance principles and practices in national and provincial Departments of Health and HRH intergovernmental, private sector and civil society structures.

There is movement in this direction as observed in the dental sector with the appointment of more dental staff and the filling of management dental posts. The NHI mentions contracting of private practitioners in the third phase of the NHI which is scheduled for 2022 to 2026. In this phase there will be Contracting for Accredited Private Hospital and Specialist Services.¹⁴

Audits of staff must be done to ensure good governance principles and identify strengths and weaknesses.

Objective 3: Institutionalise a critical mass of empowered, competent, accountable and capacitated HRH leaders and managers at national, provincial and district levels.

The objective to create a critical and empowered HRH leaders would do well in achieving the goals in the three spheres of government and ensure a productive and capable workforce. There is a move by the Department of

Health to achieve this but there are notable deficiencies in the managers appointed in the senior management system (SMS) positions in the public sector. Many of them are appointed because of their professional qualifications but they lack postgraduate qualifications in management. Potential managers should attend managerial workshops, courses or complete postgraduate qualifications in managerial skills.

To mitigate for this gap, the Gauteng provincial department of health has an agreement with Gijima Company to do competency tests for senior managers. Currently a tool to monitor all public personnel is in place. All employees contract in a form of Performance Management Development System (PMDS) to monitor their performance.

For personnel occupying management posts, line managers should ensure that the key performance on management constitute a larger percentage on leadership which should be assessed during annual reviews. An audit of personnel skills and competencies in the public sector should be introduced. This will assist in identifying personnel occupying management positions who require training on leadership and management. This can be achieved by universities providing part time and tailor-made modules on leadership and managerial courses in a form of diplomas for public sector employees to build and upskill public personnel managers so that personnel who will be appointed in such management post are well trained.

For an example the current existing Master of Public Health (MPH) offered by a number of universities in South Africa can be tailor made to suit the dental personnel. The green paper on NHI has pointed out that one of the things that will make the NHI to be successful is that competent and qualified Chief Executive officers must be appointed to head hospitals and that part of the required competencies is a qualification in management.¹⁴

Objective 4: Encourage distributed leadership and management through teamwork, with collective and holistic, value based competencies (knowledge, skills, attitudes and behaviours), and supported by an enabling working environment and culture of continuous learning and accountability.

This objective can be achieved by ensuring that dental managers are appropriately trained and capable of carrying out their tasks professionally and efficiently. Workshops must be held regularly amongst dental managers to discuss common problem areas and solutions that will assist and improve their management skills. A mentorship program can be introduced where junior managers are paired with more senior managers for skills transfer when and where necessary.

Objective 5: Ensure role clarity and improved competence and capacity of HR Managers and line managers in HR functions.

Line managers need to discuss with their supervisors what their roles are and ensure they are capable of fulfilling their roles. New managers, before being appointed,

should have experience in performing managerial duties and the necessary qualifications in their different roles they would need to perform. The HR managers and line managers need to deal with all personnel in the public sector.

Goal 5. Build an enabled, productive, motivated and empowered health workforce

Objective 1: Embed a positive practice environment and culture, which is based on the values of equity, gender transformation, decent work and respect for rights.

Health systems can only function with health workers; improving health service coverage and realizing the right to the enjoyment of the highest attainable standard of health is dependent on their availability, accessibility, acceptability and quality.²⁴ The mere availability of health workers is not sufficient, only when they are equitably distributed and accessible by the population, when they possess the required competencies and are motivated and empowered to deliver quality care that is appropriate and acceptable to the sociocultural expectations of the population, and when they are adequately supported by the health system.²⁵ It is necessary to ensure a healthcare environment where the health workforce is valued and supported and has the opportunity to develop while providing high-quality care.²⁶

Objective 2: Establish, promote and maintain infrastructure and conditions of service that ensure effective and respectful care.

Workers can only thrive in what they do if the conditions of service are conducive. Managers of dental staff need to carry out regular meetings and identify challenges in the work place which must then be addressed. By so doing, the work environment will become conducive to both staff and patients. The environment should be supportive and take the wellbeing of staff as a priority to prevent burnout. An example is wellness and occupational safety programmes which are recommended for workplaces.

Objective 3: Optimise health worker recognition, supervision, performance management and development.

In the oral health field, as with all public sector health workers, the implementation of the PMDS and its subsequent modification is expected to address these issues. As the strategy clearly points out sometimes the PMDS is not applied uniformly in the same districts and within one institution. Care should be taken that this tool is applied to achieve the objective of employees feeling recognised and intensified for the work well done. Managers in institutions should therefore make sure that the PMDS is workshopped and applied to achieve the intended objectives.

SA has a shortage of oral health workers and this has had a severe impact on the health system.¹⁵ SA needs to identify the underlying reasons for the shortages, determine what motivates oral health workers to remain in the health sector, and evaluate the incentives required for maintaining a competent and motivated health

workforce. Low levels of worker satisfaction persist for MWs as there is little room for financial improvements over time.

This has resulted in dissatisfaction among MDWs. Research findings from the Asia-Pacific region indicated that salaries and benefits, together with working conditions, supervision and management, and education and training opportunities are important to achieve a well-motivated workforce.¹⁶

Objective 4: Ensure safety and security for both patients and health workers.

It is correctly stated that there should be safety and security for both patients and health workers as this factor is important. Once health workers can feel safe then they can concentrate in delivery of services. Engage professional associations and trade unions to achieve a safe and people-centred work environment. There are specific workplace issues related to burnout and mental health, and the widespread reports on violence in the workplace is one of them. Addressing these problems will require investments in staff incentives, occupational health and safety and employee wellness programmes, and mainstreaming of work-related safety and security programmes, developed in collaboration with other government departments such as safety and security and police. In general, most of these measures are available for oral health workers in the public sector.

CONCLUSION

The goals are realistic and relevant to the current health disease status and outcomes in SA. In terms of oral health, there is an urgent need to determine and align the disease burden and these goals.

Although the majority of these goals are currently being achieved or will probably be achieved by 2030, COVID and the unpredictability of disease burdens, training of health workers and lack of public sector posts, it is unclear how oral health will progress within the next few years.

There is a huge shortage of trained managers in the dental field and this has resulted in many managerial posts being filled by individuals who may not be aware of their roles or be competent to carry them out. The existing managers need to be upskilled, new appointees need to be thoroughly interviewed to ensure they have skills, managerial diplomas and degrees for future managers should be strengthened. Adverts for managerial posts need to be specific and have clear criteria for the required skills. Although these goals are attainable and have the potential to improve the oral health sector in South Africa, much more commitment is required from the government. Government will have to address the shortage of oral health public sector posts, address the low financial remuneration for MWs and assist tertiary institutions in increasing the training of oral health workers and in carrying out national oral health surveys.

Recommendations

1. We suggest that the partnership with other stakeholder need to be strengthened, like the Phelophepa train and provision of mobile units from those sponsors.

2. A blueprint for others in their efforts to implement a systematic approach for enhancing collaborative academic practice in their organizations.

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Students' knowledge, attitudes and practices related to infection control in undergraduate dental clinical training during COVID-19

A report from one South African university

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Abstract

The COVID-19 pandemic has highlighted the need for renewed conversations in infection control in the context of dental undergraduate learning.

Objectives

This study set out to examine dental therapy and oral hygiene students' knowledge, attitudes and practices related to infection control.

Methods

This quantitative survey was conducted at one dental training site in South Africa. The study population comprised 156 full time enrolled students that was stratified into Year 1 (n=55), Year 2 (n=54) and Year 3 (n=47). An online, self-administered questionnaire with closed and open-ended questions was used to collect information. Data were analyzed using SPSS version 25.0 (IBM Corp., USA) and thematic analysis.

Results

The response rate for the study was 70.5% (n=111). Almost all participants (n=104) strongly agreed/agreed that COVID-19 is transmitted mainly through infected droplets. Most participants (Year 1: n=24, 22.5%; Year 2: n=28, 26.2%; Year 3: 22, 31.2%) strongly disagreed / disagreed that younger people were less susceptible to contracting COVID-19 disease. While 23 first (21.5%) and 16 second-year students (14.9%) strongly agreed/agreed

that personal protective gear was sufficient protection against COVID-19, about 16 third-year students (14%) were unsure or disagreed. Almost all participants (n=105, 98.1%) strongly agreed/agreed to washing or sanitizing their hands regularly. The emergent themes from qualitative data analysis included: better access to resources and more coordinated planning for clinical and classroom-based learning.

Conclusion

There were inconsistencies in participants' knowledge and attitudes towards infection control. There is a need for ongoing awareness of infection control in both clinical and class-room based learning.

Keywords: incontrol, COVID-19, dental students, learning

INTRODUCTION

Cross-contamination in the dental clinical environment remains a significant public health concern given the high risk of exposure to blood and airborne infections.¹⁻² In addition, the use of high-speed hand pieces and ultrasonic scalers during dental clinical procedures can create aerosols that could potentially transfer air-borne infections beyond the dental working environment. Apart from these possible sources of cross contamination, the environmental work surfaces and water lines of dental units could also pose a potential risk.³ Standard (universal) precautions in infection control include hand washing/disinfection; use of personnel protective equipment (e.g. gowns, protective eye wear, and gloves); use of disinfectants for clinic surface cleaning; and appropriate handling and disposal of contaminated sharp instruments and other clinical waste.⁴⁻⁶ While infection control is described as the prevention of disease transmission in health care and clinical settings,⁷ this definition and scope requires a re-examination in light of the COVID-19 pandemic.

The need for public health measures to include infection control practices such as regular handwashing, sanitization with at least 70% alcohol-based solutions and wearing of facial masks in public spaces, in addition to social distancing, isolation and quarantine,⁸ somewhat provides an expanded understanding of infection control practice. The need to break the chain of infection now extends beyond the clinical settings and is seen as the 'new normal'.⁹

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| 3. Ilana Moodley: | 15% |

Although the COVID-19 pandemic has been in existence for more than a year, not much is known about undergraduate dental students' preparedness to deal with this pandemic.¹⁰⁻¹² The risks associated with dental clinical service delivery such as cross infection, and close contact with patients, clinical supervisors and fellow students are well documented yet the extent to which COVID-19 complicates this already high-risk environment,¹³⁻¹⁴ especially from a clinical training perspective, remains largely unknown. Nevertheless, patients, students, dental operators, staff and the public at large have a right to access or provide oral health care within a safe and healthy clinical environment.¹⁵

This study arose out of a need to understand the contextual influences on theory based and clinical teaching during COVID-19, and undergraduate students' understanding and preparedness for learning during this pandemic. Using a student-centred approach,¹⁶ students' perspectives and input should be taken into consideration when reviewing and adapting the undergraduate curriculum to meet the demands of a changing teaching and learning environment during COVID-19. The study thus aimed to contribute to curriculum review by determining undergraduate dental students' knowledge, attitudes and practices related to infection control in response to clinical and classroom-based learning during the COVID-19 pandemic.

This study formed part of a larger study that examined undergraduate students' perspectives on learning during the COVID-19 pandemic.

Study population and methodology

This quantitative survey was conducted at one dental training site to determine undergraduate Dental Therapy and Oral Hygiene students' knowledge, attitudes and practices related to infection control during COVID-19. There are currently two undergraduate training programmes offered by the Discipline of Dentistry, namely, B. Dental Therapy and B. Oral Hygiene at the identified training institution. A whole population approach was used thus the study population comprised 156 full time enrolled students. The study population was stratified into Year 1 (n=55), Year 2 (n=54) and Year 3 (n=47). The B. Oral Hygiene only commenced in 2020 thus only first year students were included in the study. This study was conducted at the end of the second semester in 2020 and students had already been exposed to almost nine months of teaching and learning during the COVID-19 pandemic. Ethics approval (Ref. No. HSSREC/00001601/2020) and gatekeeper permission were obtained prior to commencement of this study.

An online, self-administered questionnaire was developed to determine students' knowledge, attitudes, and infection control practices related to clinical learning during the COVID-19 pandemic. The data collection tool comprised of four sections; Section A focused on student demographics, Sections B, C, and D focused on knowledge of COVID-19 disease transmission, attitudes towards susceptibility to infection, use of personal protective equipment, and infection control practices (such as handwashing, care of personal belongings). The questionnaire

comprised closed questions using a Likert scale format with responses ranging from 1 (strongly agree), 2 (agree), 3 (not sure), 4 (disagree) to 5 (strongly disagree). one open-ended question was used to elicit participants' recommendations to improve infection control in undergraduate dental learning. All returned questionnaires were coded (e.g P1) to ensure anonymity of study participants.

Participants were recruited through the social media platform WhatsApp, using a snowball sampling technique. An invitational message was sent to the first student to consider participating in the study. This message included a link to the informed consent documents and survey questionnaire. Once the student clicked on the link, he/she had to give consent by clicking on the necessary icon. The participant was then given a choice to complete the survey. The participant was also given a choice to forward the survey link to the next student with each participant remaining anonymous. The link remained active for approximately six weeks to allow study participation.¹⁷ Participants had the right to withdraw and any stage of the study without any negative consequences.

For data analysis, the collected information from the closed ended questions was analyzed using SPSS version 25.0 (IBM Corp., USA) after the data were cleaned and coded. Data analysis included univariate descriptive statistics such as frequency and mean distribution. An inferential statistical technique, the Pearson chi-squared test was used to determine a relationship between the independent variable (year of study) and the dependent variables (knowledge, attitudes and practices). A p-value of <0.05 was established as being statistically significant. The open-ended question was analyzed using thematic analysis. The response from each student was first transcribed verbatim. The data was coded and then organized into code groups. Each code group was further examined for patterns and emergent themes. Confirmability was established by quoting actual responses of students

RESULTS

The response rate for the study was 70.5% (n=111). The majority of study participants were female (n=72, 68%) and were registered for the Dental Therapy programme (97%). There were almost equal numbers of respondents over the three years of study: Year 1 (n=33, 30.8%), Year 2 (n=33, 30.8%), Year 3 (n=41, 38.3%).

Knowledge of infection control

More students in first (n=18, 16.9%) and third years (n=23, 21.4%) strongly disagreed/disagreed that COVID-19 is the same as influenza. Interestingly, 10 participants (9.4 %) in the second year and 8 (7.5 %) in the third year were unsure (Table 1). Most participants (Year 1: n=31, 28.9%; Year 2: n=33, 40.9%; Year 3: n=40, 37.4%) strongly agreed/agreed that COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. Almost 36.3% of third years (n=39) strongly agreed/agreed that an aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces. About 17 first year students (15.9%) were unsure. This finding

was seen as statistically significant (0.000). While the majority of participants (n=79, 73.9%) strongly agreed/agreed that the use of face masks and shields offer maximum protection against coronaviruses, about 16 participants (14.9%) were unsure.

Attitudes towards infection control

The majority of participants (Year 1: n=24, 22.5%; Year 2: n=28, 26.2%; Year 3: 22, 31.2%) strongly disagreed/disagreed that younger people were less susceptible to contracting COVID-19 disease. About 18 second (17.2%) and 16 third year students (15%) expressed fear of working with dental patients in the clinic. Interestingly, 19 first year students (17.7%) strongly disagreed/disagreed with this statement. While 23 first (21.5%) and 16 second year students (14.9) strongly agreed/agreed that personal protective gear (gloves, masks, scrubs, eye wear) is sufficient to protect them from COVID-19, about 15 third year students (14%) were unsure or disagreed with the statement (n=16, 14,9%).

The majority of participants (n=82, 76.6%) were confident that optimal measures were in place to protect students from contracting COVID-19 in the clinical environment.

Only 7 first (6.6%) and 19 third year students (18.7%) strongly agreed/agreed that social distancing in the dental clinic is impractical. At the same time 11 third year students (10.2%) were unsure (=0.01).

Infection control practices

Almost all participants (n=105, 98.1%) strongly agreed/agreed that they washed or sanitized their hands regularly. The majority of participants (Year 1: 19,17.8%; Year 2: n=26, 24.3%; Year 3: n=31, 29%) strongly disagreed/disagreed that the scrubs were worn throughout the entire day. About 17 first (15.9%) strongly agreed/agreed that the laboratory coats were washed once a week while 18 second (16.8%) and 26 third year students (24.3%) strongly disagreed/disagreed with this statement. Almost all participants (n=101, 94.3%) strongly agreed/agreed that one should ensure that personal belongings (pens, erasers, book covers) are wiped with disinfectants before leaving the dental clinic.

Several emergent themes were obtained in response to the question: How can we improve infection control during clinical and class room based- learning? These included the availability of resources for better infection control practices; the need for coordinated planning in clinical training and re-organization of class-based learning. These themes inadvertently highlighted the current gaps in creating a safe and healthy environment for student learning at the identified research site.

Availability of resources for better infection control practices

Respondents indicated the need for increased availability in personal protective equipment (PPE). While gowns, face shields, and N95 masks were made available for student learning in the clinical environment, some respondents expressed concern over the quality

of N95 masks, while others were dissatisfied on having to use the same PPE for a week or more. Likewise, respondents pointed out there were limited availability of hand sanitizers.

The following quotes illustrate these expressed views: It's not logical to use one N95 mask for an entire week. The quality of our N95 masks are poor as well. The elastics tear easily (4).

Provide students with new N95 masks and gowns everyday or every session. At clinics we are expected to use two masks and 2 gowns for 2 weeks straight. We are expected to use the same hairnet throughout the day. Shoe covers are not provided. Students have to wait in a classroom in order to fill in their COVID [screening] form and [have] their temperature [checked], No social distancing can be carried out (14).

Provide more sanitizer bottles in the clinic as were always fighting over the 3 bottles that are currently available. The spray bottle makes it easier to clean (3).

The need for coordinated planning for clinical training

Respondents outlined the need for better coordination in clinical training so as to optimize students' health and safety in clinical training. A major sub-theme arising was the need for students to practice proper social distancing in the clinical environment. Respondents highlighted the need for regular temperature checks, and for reminders to be put up for handwashing or hand sanitization. Other reported recommendations for improving clinical training included better ventilation in the clinic, and repair of non-functioning dental clinical units. Respondents also iterated the need for small groups of students during clinical rotation.

We need proper ventilation in our working area (55)
Fix malfunctioning cubicles to have more space for everyone to work, Please!!!! (32)

Re-organization of class-based learning

Concurrently, the need for optimal infection control practices was also seen to be pertinent for class-room based learning as well.

All desks and chairs must be cleaned before students use it and again for the next set of students Social distancing must be followed and desks must be spaced apart. There is no reason to sit so close to each other (64).

Respondents highlighted the need for greater student awareness in infection control. There was also a need for the development of protocols for the use of PPE and for hand sanitization processes. These protocols should be supported by regular monitoring to ensure student compliance.

Correct use of PPE and the correct handwashing procedures and also disinfecting the working surfaces (69).

Surprisingly, respondents also highlighted the need for students to reflect on the traditional peer learning

Table 1: Students' knowledge, attitudes and infection control practices						
Questions	Response	First-Year Students (%)	Second Year Students (%)	Third Year Students (%)	Total Students	P-Value
Knowledge of infection control						
COVID-19 is the same as influenza	Strongly agree	6 (5.6 %)	7 (6.5 %)	8 (7.5%)	107 (100 %)	0.8
	agree	2 (1.9 %)	1 (0.9 %)	2 (1.9 %)		
	unsure	7 (6.5 %)	10 (9.4 %)	8 (7.5 %)		
	disagree	10 (9.4%)	8 (7.5 %)	12 (11.2 %)		
	Strongly disagree	8 (7.5 %)	7 (6.5%)	11 (10.2 %)		
COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales	Strongly agree	11 (10.2%)	10 (9.4%)	19 (17.8%)	107 (100 %)	0.2
	agree	20 (18.7%)	23 (21.5%)	21 (19.6%)		
	unsure	1 (0.9%)	0	0		
	disagree	1 (0.9%)	0	0		
	Strongly disagree	0	0	1 (0.9%)		
An aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces	Strongly agree	6 (5.6%)	9 (8.4%)	13 (12.1 %)	107 (100%)	0.0
	agree	7 (6.5%)	20 (18.7%)	26 (24.2%)		
	unsure	17 (15.9%)	4 (3.7%)	2 (1.9%)		
	disagree	2 (1.9%)	0	0		
	Strongly disagree	1 (0.9%)	0	0		
Use of face masks and shields offer maximum protection against coronaviruses	Strongly agree	16 (15%)	9 (8.4%)	21 (19.6%)	107 (100%)	0.7
	agree	9 (8.4%)	14(13.1%)	10 (9.4%)		
	unsure	5 (4.7 %)	4 (3.7%)	7 (6.5%)		
	disagree	3 (2.8%)	6 (5.6%)	3(2.8%)		
	Strongly disagree	0	0	0		
Regular disinfection (any type) of clinical working surfaces will remove coronaviruses	Strongly agree	16 (15%)	10 (9.4%)	15 (14%)	107 (100 %)	0.2
	agree	6 (5.6%)	13 (12.1%)	8 (7.5%)		
	unsure	8 (7.5%)	6 (5.6%)	11 (10.2%)		
	disagree	2 (1.9%)	1 (0.9%)	5 (4.7%)		
	Strongly disagree	1 (0.9%)	3 (2.8%)	2 (1.9%)		
Attitudes towards infection control						
I am young and strong COVID-19 only affect older and sick people	Strongly agree	4 (3.7%)	0	3 (2.8%)	107 (100 %)	0.5
	agree	1 (0.9%)	1 (0.9%)	0		
	unsure	4 (3.7%)	4 (3.7 %)	6 (5.6%)		
	disagree	10 (9.4%)	14 (13.1%)	12 (11.2%)		
	Strongly disagree	14 (13.1%)	14 (13.1%)	20 (18.7%)		
I am afraid to work with dental patients in the clinic	Strongly agree	5 (4.7%)	12 (11.2%)	10 (9.4%)	107 (100 %)	0.3
	agree	2 (1.9%)	6 (5.6%)	6 (5.6%)		
	unsure	7 (6.5%)	7 (6.5%)	7 (6.5%)		
	disagree	15 (14%)	3 (2.8%)	13 (12.1%)		
	Strongly disagree	4 (3.7%)	5 (4.7%)	5 (4.7%)		
My personal protective gear (gloves, masks, scrubs, eye wear) is sufficient to protect me from COVID-19	Strongly agree	17 (15.9%)	11 (10.2%)	8 (7.5%)	107 (100 %)	0.0
	agree	6 (5.6%)	5 (4.7%)	2 (1.9%)		
	unsure	6 (5.6%)	10 (9.4%)	15 (14%)		
	disagree	3 (2.8%)	6 (5.6%)	9 (8.4%)		
	Strongly disagree	1 (0.9%)	1 (0.9%)	7 (6.5%)		

I am confident that my supervisors and lecturers have put optimal measures in place to protect me from contracting COVID-19 in the clinical environment	Strongly agree	15 (14%)	9 (8.4%)	16 (15%)	107 (100 %)	0.1
	agree	15 (14%)	15 (14%)	12 (11.2%)		
	unsure	3 (2.8 %)	8 (7.5%)	8 (7.5%)		
	disagree	0	1 (0.9%)	1 (0.9%)		
	Strongly disagree	0	0	4 (3.7%)		
Social distancing in the dental clinic is impractical	Strongly agree	5 (4.7%)	9 (8.4%)	12 (11.2%)	107 (100 %)	0.01
	agree	2 (1.9%)	5 (4.7%)	7 (6.5%)		
	unsure	9 (8.4%)	9 (8.4%)	11 (10.2%)		
	disagree	9 (8.4%)	7 (6.5%)	9 (8.4%)		
	Strongly disagree	8 (7.5%)	3 (2.8%)	2 (1.9%)		
Infection control practices						
I wash or sanitize my hands regularly	Strongly agree	13 (12.1%)	13 (12.1%)	17 (15.9%)	107 (100 %)	0.9
	agree	20 (18.7%)	20 (18.7%)	22 (20.6%)		
	unsure	0	0	0		
	disagree	0	0	2 (1.9%)		
	Strongly disagree	0	0	0		
I wear my scrubs throughout the day, even when I go to the mall	Strongly agree	3 (2.8%)	4 (3.7%)	6 (5.6%)	107 (100 %)	0.3
	agree	4 (3.7%)	2 (1.9%)	2 (1.9%)		
	unsure	7 (6.5%)	1 (0.9%)	2 (1.9%)		
	disagree	10 (9.4%)	12 (11.2%)	15 (14 %)		
	Strongly disagree	9 (8.4%)	14 (13.1%)	16 (15%)		
My lab coats are washed once a week	Strongly agree	8 (7.5%)	11 (10.2%)	8 (7.5%)	107 (100 %)	0.07
	agree	9 (8.4%)	4 (3.7%)	2 (1.9%)		
	unsure	4 (3.7%)	0	5 (4.7%)		
	disagree	8 (7.5%)	9 (8.4%)	17 (15.9%)		
	Strongly disagree	4(3.7%)	9 (8.4%)	9 (8.4%)		
I must ensure that my personal belongings (pens, erasers, book covers) are wiped with disinfectants before I leave the dental clinic	Strongly agree	9 (8.4%)	9 (8.4%)	14 (13.1%)	107 (100 %)	0.2
	agree	19 (17.8%)	24 (22.4%)	26 (24.2%)		
	unsure	3 (2.8%)	0	1 (0.9%)		
	disagree	2 (1.9%)	0	0		
	Strongly disagree	0	0	0		

support practices. Ensure that everyone sanitize regularly and do not borrow [items] such as pens, books (15)

DISCUSSION

The study findings suggested inconsistencies in study participants' knowledge and attitudes towards infection control in the undergraduate training programmes. About 18 second and 16 third year students expressed fear of working with dental patients in the clinic while 19 first year students did not see this as a challenge. Study participants in the first (21.5%) and second year (14.9%) believed that personal protective gear (gloves, masks, scrubs, eye wear) was sufficient to protect them from COVID-19, yet 15 third year students (14%) were unsure or disagreed with the statement (n=16, 14,9%). These inconsistencies in responses are not

unusual. Students' perspectives on infection control and susceptibility to infection would be dependent on their year of study and exposure to clinical training.

The undergraduate training programme is structured as such that clinical training only occurs in the second and final years hence students in the first year would not have had much exposure to the clinical environment. However, this study findings were in contrast to those reported by Ebrahimpour et al. The authors contended that students' level of infection control knowledge and practice across the different years of study was the same.¹⁸ While the findings reported by Halboub et al. support this study findings in terms of inconsistency in students' perspectives on infection control in relation to their academic year of study, it was interesting to note that the authors reported that a 'higher percentage of 5th-year students (58.9%) showed positive attitudes toward the treatment of patients with infectious

diseases, as compared to only 31.0% of 4th year students'.^{19,15} It is however, equally important to note that these studies were conducted pre-COVID-19 and that the findings of this study should be contextualized within the current COVID-19 pandemic. COVID-19 has shown that individual susceptibility to infection increases with close physical contact.²⁰ Thus, final year students perceived a greater level of vulnerability to COVID-19 infections in this study, than students in the lower academic years, given their exposure in the clinical environment.

The majority of participants (Year 1: n=24, 22.5%; Year 2: n=28, 26.2%; Year 3: 22, 31.2%) disagreed that younger people were less susceptible to contracting COVID-19 disease. This implied that study participants believed that they were indeed susceptible to the disease. This finding is supported by other studies that outlined the demographic shifts in the COVID-19 pandemic and suggested that younger people are not only susceptible to contracting the disease but that their health-related behaviors could be driving the pandemic.²¹⁻²²

While almost all participants (n=105, 98.1%) reiterated the importance of handwashing and sanitization, about 17 first year students (15.9%) indicated that the laboratory coats were washed once a week. Again, this response could be attributed to first year students not being in a clinical setting, therefore washing of lab coats was not seen as a priority in infection control measures. However, these findings are supported by other studies where students reported changing their lab coats only where there were visible signs of contamination such as blood splatter.^{19,23}

The availability of appropriate resources for optimal infection control was also seen as a critical component for learning. Study participants highlighted the need for increased availability as well as better quality of personal protective equipment (PPE) and more hand sanitization stations. Study participants expressed dissatisfaction in having to use the same PPE for a week or more. The availability of appropriate PPE, including face masks remains a global challenge that is further exacerbated in resource constrained clinical teaching and learning environments. Blignaut, Nmutandani and Samaranayake advocate for innovative practice when confronted with shortages in PPE for dental clinical practice. These could include local fabrication of face shields and use of plastic disposal aprons worn over the gowns.²⁴ Additionally, this study findings imply that the impact of limited access to PPE, could contribute to students' fear and anxiety of working in the clinical environment. This finding is consistent with other reports that highlight a correlation between limitations in access to PPE and fear and anxiety among dental health workers,²⁴⁻²⁵ and dental students are no exception.

The study findings iterate the need for better coordination in clinical training so as to optimize students' health and safety in clinical training. These included the need for social distancing measures, regular temperature checks, and reminders for

handwashing or hand sanitization. Other reported recommendations included better ventilation in the clinic, and repair of non-functioning dental clinical units coupled with small groups of students for clinical rotation. These findings are supported by a number of studies that highlight the need to review current dental clinical practice in the context of the COVID-19 pandemic.²⁶⁻²⁸

Study participants also highlighted the need for optimal infection control practices for class-room based learning. While universal entry screening for university students and staff is critical, other mitigation measures such availability of COVID-19 vaccines, increased physical spacing/social distancing in classrooms, mandatory wearing of face masks, cough etiquette and avoidance of crowding, are equally important to curb the spread of COVID-19 infections.²⁹ This reiterates that universal precautions for infection control needs to extend beyond the clinical settings and that all other aspects of the learning environment must take these measures into consideration. Study participants also highlighted the need for ongoing training in infection control and the availability of standard protocols for wearing of personal protective equipment. This finding is supported by another study that highlights the need for comprehensive strategies for regular infection control monitoring to ensure student compliance.³⁰

Although this study was conducted on a single site, some interesting insights have emerged. The study findings overall highlight the need to engage actively with students, specifically in relation to their perceived needs and demands in undergraduate training. Hence the student becomes a stakeholder in curriculum review and development, and not merely a passive recipient of knowledge and skills acquisition. Such inclusive decision-making processes could address issues such as limited access to PPE in resource-constrained learning settings and students can be given the opportunity to engage in innovative measures to ensure sustained learning where possible during the pandemic.

Limitations of the study

Despite these valuable insights, several limitations were noted. Given that the study was conducted on a single training site, its generalizability was limited to the research site. There could have been over-reporting of data and the responses might not be a true reflection of students' attitudes and compliance in infection control.³¹ Despite these limitations, the study does provide pertinent data to understand students' perspectives in infection control and the measures needed to mitigate transmission of COVID-19 infections in dental undergraduate training.

CONCLUSION

There was general agreement among study participants that infection control practices such as handwashing and sanitization occurred regularly. However, there were inconsistencies in participants' knowledge and attitudes towards infection control that could have been influenced by the year of academic study. There is

a need for ongoing awareness in infection control and general health and safety practices in both clinical and class-room based learning that should extend beyond the COVID-19 pandemic.

Clinical Relevance

Standard precautions (regular hand hygiene, use of face masks and respiratory hygiene) in infection control and other public health measures (such as social distancing and regular temperature checks) should be important considerations for both clinical and classroom-based learning.

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The attitudes and perceptions towards the Covid-19 vaccine among dental staff at the University of the Western Cape, South Africa

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ABSTRACT

Introduction

Despite the well-known increased risk of exposure to the Covid-19 virus in a dental setting, vaccination rates among staff members are low. This information, as well as the possible associations to demographic profiles, may be useful for authorities to adequately address specific concerns and uncertainties.

Aims and Objectives

To determine the attitudes and perceptions towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers.

Design

A cross-sectional design was used.

Methods

An anonymous, online, validated questionnaire was used to collect the data.

Results

Majority (91.4%) of the participants had received the Covid-19 vaccine while just over 12% stated that they would not take the booster vaccination. Significant associations between the level of education and the attitudes and perceptions of staff were found.

Conclusions

While the majority had a positive attitude towards the Covid-19 vaccine, specific concerns and uncertainties were identified and will need to be addressed in order to improve vaccination rates among staff members.

Keywords: "Covid-19 vaccine"; "vaccine hesitancy"; "cross-sectional study"; "South Africa"; "Dental Staff"

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INTRODUCTION

COVID-19 is a communicable disease that is also known as severe acute respiratory syndrome coronavirus 2 (SARS-COV 2) and was announced a pandemic on the 11th of March 2020^{1,2}. The Covid-19 virus's most common route of spread is through tiny droplets propelled during coughing or speech from individuals infected with the virus, within a space of 6 feet¹.

According to the National Institute for Communicable Diseases, the first COVID-19 case in South Africa was identified and recorded on the 5th of March 2020 in KwaZulu-Natal³. The first confirmed case of COVID-19 reported in the Western Cape was on the 11th of March 2020 in the City of Cape Town⁴. There are 9 provinces in South Africa, and the Western Cape Province is the 3rd largest province with a population of nearly 7 million people, according to the Western Cape Government official website. The total number of positive COVID-19 cases for the Western Cape, up to the 05 of January 2022, was 3 494 696 infections, with a total of 91 561 deaths⁵.

Global efforts were made to develop an effective and safe vaccine against this COVID-19 virus. The following vaccines were developed with different approaches: Oxford Univ-AstraZeneca, Gamaleya Sputnik V

and Johnson & Johnson (vital vector, genetically modified virus); Pfizer-BioNTech, Moderna, Curevac and Curevac (RNA, nucleic acid, incorporating part of the virus genetic code); Sinopharm and Sinovac (Inactivated or attenuated virus); Inovio (DNA, synthetic DNA fragments) and EpiVAcCorona and Novavax (Protein subunit)⁶. According to a recent systematic review, the effectiveness of COVID-19 vaccines against a range of SARS-CoV-2 outcomes showed an 89.1% vaccine effectiveness for the prevention of infection, 97.2% prevention in hospitalizations, 97.4% vaccine effectiveness for the prevention of ICU admission or severe disease and 99.0% effectiveness for the prevention of COVID-19 related deaths⁷. The Johnson & Johnson, PfizerBioNTech vaccine is currently implemented, specifically for health care workers through the Sisonke Programme in South Africa⁸.

Although the Johnson & Johnson vaccine program may not eliminate COVID-19, it provides the best protection against severe COVID-19 cases that result in hospitalization and death⁹, but it is not as effective as Moderna and Pfizer-BioNTech, or compared to single dose Johnson & Johnson vaccines¹⁰. To date, more than 9.37 billion vaccine doses have been administered globally¹¹. As of the 7th January 2022, 28.3 million doses have been administered against the COVID-19 across South Africa¹². According to the Centre for Disease Control and Prevention, the side effects of the Johnson & Johnson vaccine and Pfizer vaccine are similar which include pain, redness, localized swelling at injection site, fatigue, headaches, flu-like fever, headache, nausea, vomiting, chills, joint pain, and exhaustion¹³. There appears to be a general lack of understanding regarding the mechanism of action and possible complications of the Covid-19 vaccine, specifically causing an allergic reaction especially seen with Pfizer-BioNTech¹³.

Dentists and dental staff face daily risks of cross infection due to exposure to high levels of microorganisms found not only in the patient's oral cavity, but also in the aerosols generated by dental instrumentation^{14,15}. Ultrasonic generated aerosols and the use of high-speed rotary instruments create a large amount of infectious aerosol droplets that can remain suspended in the air for extended periods of time after a dental procedure^{16,17}. The University of the Western Cape (UWC) in Cape Town, South-Africa, has two oral health centres that serve the Tygerberg and Mitchell's Plain communities. The University of the Western Cape was designated a World Health Organization (WHO) Collaborating Centre for Oral Health and is at the forefront of oral health developments while serving underprivileged communities. The oral health centres consist of a combination of academic, administrative and support staff for both teaching and clinical care. All staff members working in the oral health centres, regardless of their role, are in one way or another, exposed to the high-risk dental environment.

Despite the availability of the Covid-19 vaccine free of charge to all staff members, many opted not to accept the vaccine. The ideal would be for all staff members to be vaccinated against the Covid-19 virus, thereby limiting cross-infection and contributing to the safety of

staff, students and the patients at the two oral health centres. It is therefore important to identify and address specific concerns and uncertainties and thus improve vaccination rates.

The aim of the present study was to determine the attitudes and perceptions towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers. A secondary aim was to determine if there were any associations between the demographics (age, sex, staff type and level of education) and the staff's attitudes and perceptions.

MATERIALS AND METHODS

A cross-sectional study was conducted by means of an anonymized online survey. The study was approved by and ethical clearance obtained from the UWC Biomedical Research Ethics Committee (ref no. BM21/5/3). A human resources representative shared the link to the online survey with all the staff members. Participation was also voluntary and no incentive was set for participants, other than the new UWC specific data that would be gained. The included population consisted of the staff compliment included all professions actively working in the oral health centers (clinical, administrative, academic and support staff) for the Dental Faculty at the University of the Western Cape. Participation in the study was voluntary and participants could withdraw from the study at any stage. Using a 50% prevalence for attitudes, a sample size of 184 participants was necessary for a 5% precision and a 95% confidence interval for a limited sample of 368 staff members at the Dental Faculty.

The questionnaire was based on a validated questionnaire¹⁸ and included 16 questions. The first four questions recorded demographic details (age group, gender, staff type and level of education) followed by two questions regarding individual vaccine records (previous vaccinations and vaccination against Covid-19). Four questions on the attitudes and four on the perceptions of dental staff towards the Covid-19 vaccine were also recorded. The responses to "yes/ no" and Likert scale questions were coded as "1" for "yes/ agree" and "0" for "no/ don't know/ undecided/ disagree." Total scores were respectively calculated by summing the raw scores of each category of questions ranging from 0–4 for attitudes and perceptions. A score of zero was indicative of poor attitudes and perceptions, whereas a score of 4 was indicative of excellent attitudes and perceptions. REDCAP[®] was used for data capturing.

Microsoft Excel was used for data cleaning, editing, sorting, and coding. The excel file was then imported into STATA software (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC.). Confounders such as age, sex, level of education and staff type were also recorded. Descriptive statistics (i.e., frequencies, percentages, means, standard deviations) and first-order analysis (i.e., chi-square tests, Fisher's exact test) were performed. Likewise, t-tests or one-way ANOVA or Kruskal Wallis tests were performed to determine significant relations of the mean attitudes scores with sociodemographic information. A Pearson's correlation was used to determine

correlations between attitudes and perceptions. Finally, factors that significantly differed in terms of perception scores, were included into multivariate linear regression analysis with perceptions, as the dependent variables. All tests were deemed statistically significant at $p < 0.05$.

RESULTS

There was a 28.5% ($n = 105$) response rate out of 368 potential participants. This response rate is close to the expected response rate for internal surveys and above the expected response rate of external surveys.¹⁹ Only 6 participants indicated that they have never received a vaccine in their life time.

The majority ($n = 96$) of the participants had already received either the Johnson & Johnson (90.63%) or Pfizer (9.38%) Covid-19 vaccine. Table 1 indicates the demographics of the participants in this study, with a majority being female (61.9%), clinical staff (64.76%) with postgraduate qualifications (52.38%).

More than 80% felt that the vaccine was safe and 96% felt that they would take the vaccine without hesitation (Table II).

The distribution of attitude and perception scores by demographic profiles are reported in Table III.

Higher scores are indicative of positive attitudes and perceptions with regards to the COVID-19 vaccine. None of the adjusted models using forward or backward elimination had an impact on attitudes or perceptions. Therefore, only simple (unadjusted) regression models were presented for attitudes and perception scores. Although not statistically significant, males had a better attitude towards the COVID-19 vaccine compared to females, but this was not the case for the perception scores.

There was a statistically significant, moderately positive correlation between attitude and perception, $p = 0.0043$. In other words, participants with a better attitude also had a better perception towards the COVID-19 vaccine.

In Table IV, it is evident that older individuals were more likely to have higher (positive) perceptions scores compared to the younger participants. In fact, older participants had an increased perception score of 1.99 units greater than their younger counterparts. However, attitude scores did not differ by age group. Attitudes and perception scores did not differ between administrative or clinical staff. There was no statistically significant difference in attitude or perception scores for different levels of education.

Table I. Baseline demographics (n=105)

		n(%)
Sex	Female	65 (61.9)
	Male	40 (38.1)
Age category	< 41 years	52 (49.52)
	≥ 41 years	53 (50.48)
Staff Type	Admin	37 (35.24)
	Clinical	68 (64.76)
Level of Education	High school or below	17 (16.19)
	University	33 (31.43)
	Post-graduate	55 (52.38)

Table II. Responses to close questions related to attitudes and perceptions towards the Covid-19 vaccine (n=105)

Attitudes		n (%)
Do you think that the Covid-19 vaccine is safe?	Yes	87 (82.86)
	No/Don't know	18 (17.14)
Will you take the Covid-19 vaccine without hesitation?	Yes	96 (91.43)
	No	9 (8.57)
I will encourage my family/friends/relatives to get vaccinated	Agree	97 (92.38)
	Disagree/Undecided	8 (7.62)
Would you consider taking the booster vaccination?	No	13 (12.38)
	Yes	92 (87.62)
Perceptions		
Do you think the Covid-19 vaccine may have side effects?	Yes	97 (92.38)
	No	8 (7.62)
The Covid-19 vaccine is necessary to combat the global Coronavirus pandemic.	Agree	94 (89.52)
	Disagree/Undecided	11 (10.47)
In your opinion, who do you think should be vaccinated?	Everyone	100 (95.24)
	HCW/OHCW/Individuals with comorbidities	5 (4.76)
Do you think that if everyone in the society maintains the preventive measures, Covid-19 will be eradicated?	Yes	25 (23.81)
	No	80 (76.19)

Table III. Distribution of Attitude and Perception scores by demographics (n=105)

		Attitudes		Perceptions	
		Total mean (SD)	p-value	Total mean (SD)	p-value
Gender	Females	2.969 (0.56)	0.3374	3.554 (0.90)	0.8769
	Males	3.075 (0.53)		3.525 (0.96)	
Age category	< 41 years	3.481 (0.99)	0.4961	2.903 (0.57)	0.0489 *
	≥ 41 years	3.604 (0.84)		3.113 (0.51)	
Staff Type	Admin	3.622 (0.72)	0.5202	3.108 (0.52)	0.1734
	Clinical	3.500 (0.92)		2.956 (0.56)	
Level of Education	High school/ below	3.25 (0.97)	0.2109	3.235 (0.56)	0.1770
	University	3.485 (1.03)		2.969 (0.59)	
	Post-graduate	3.673 (0.82)		2.964 (0.51)	

*statistically significant.

Table IV. Unadjusted and Attitudes and Perceptions regression with demographic variables.

		Attitudes		Perceptions	
		Unadjusted Coefficients		Unadjusted Coefficients	
		Estimate (95% Confidence Interval)	p-value	Estimate (95% Confidence Interval)	p-value
Clinical Staff	Clinical	-0.65 (-0.495 to 0.252)	0.52	-1.37 (-0.372 to 0.068)	0.173
Age category	> 41 years	0.68 (-0.234 to 0.48)	0.496	1.99 (0.001 to 0.418)	0.049 *
Sex	Male	-0.16 (-0.397 to 0.34)	0.877	0.96 (-0.112 to 0.323)	0.337
Education level	University	0.00 (-0.292 to 0.791)	0.363	-1.64 (-0.587 to 0.055)	0.104
	Post-graduate	-0.16 (-0.066 to 0.941)	0.088	-1.81 (-0.57 to 0.027)	0.074

*statistically significant.

DISCUSSION

The aim of the present study was to determine the attitudes and perception towards the COVID-19 vaccine among dental staff at the UWC Oral Health Centers.

The results of the present study show that overall, age did not impact the attitudes ($p = 0.4961$) of participants, but that perception scores were statistically significantly higher (more positive) in older participants ($p = 0.0489$) towards the Covid-19 vaccine. Al-Zalfawi *et al.*²⁰ and Islam *et al.*¹⁸ found that neither attitudes or perception scores differed between different age groups. Participants that attended university and post-graduate studies did not appear to have more favourable attitudes ($p = 0.2109$), or perceptions ($p = 0.1770$).

Al-Zalfawi *et al.*²⁰ found that attitudes scores differed between sexes, but perception scores did not differ. Similarly, Islam *et al.*¹⁸ found that sex had a statistically significant impact on attitude scores. In the current study it was found that sex did not have statistically significant ($p > 0.05$) impact on attitudes or perceptions scores (Table I), however, the present study did not have an equal number of male and female participants which may have skewed this comparison.

Nearly all the participants (95.24 %) reported that everyone should be vaccinated against COVID-19 and this finding was higher than the findings in a study by Haque *et al.*²¹ According to Alam *et al.*,²² less than 50% of healthcare workers in Bangladesh, and 46% of Bangladeshi citizens were interested in receiving the COVID-19 vaccination if it became available is much

lower than the present study population (91.43%). Older individuals also had a statistically significantly higher perceptions score compared to younger individuals (Table IV). This finding agrees with Rzymiski *et al.*,²³ who found that 71% of Polish adults, and 55.3% of Saudi adults were willing to receive the COVID-19 Vaccination compared to the 12.38% of dental staff in the present study¹³.

CONCLUSIONS

The present study revealed that majority of the staff at the UWC oral health centres, have positive attitudes and perceptions towards the COVID-19 vaccine. Attitudes and perception scores were statistically significantly lower for participants without post-graduate training. The findings suggest that policy makers should provide specific information regarding the mechanism of action of the vaccine, possible side effects and the necessity of booster shots, to improve the and strengthen the attitudes and perceptions among dental staff towards the Covid-19 vaccine, especially among staff with lower levels of education. Focused informative interventions will help alleviate uncertainties, reduce vaccine hesitancy and improve the success rate of the vaccine roll out.

Limitations

There was a very low response rate, as only 28.5% of the staff population responded to the survey, however, a response rate of 33% is generally accepted²². The low response rate of staff could possibly be attributed to survey fatigue, as staff were overwhelmed by many online research projects conducted in the Covid-19 pandemic.

Author Contributions

The following statements should be used “Conceptualization, F.K.D. and N.P.; methodology, F.K.D.; software, F.K.D.; validation, F.K.D and L.R.; formal analysis, F.K.D.; investigation, F.K.D. and N.P.; resources, F.K.D.; data curation, L.R., D.P., I.P., C.P., S.L.R., S.R. C.R.; writing—original draft preparation, L.R., D.P., I.P., C.P., S.L.R., S.R. C.R.; writing—review and editing, F.K.D., N.P., S.N.; visualization, F.K.D.; supervision, S.N.; project administration, F.K.D. and N.P.; funding acquisition, S.N. All authors have read and agreed to the published version of the manuscript.”

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The Practice of Oral Medicine in South Africa

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ABSTRACT

Introduction

Oral medicine is a clinical discipline, practiced by periodontists, which concerns itself mostly with the non-surgical management of oral mucosal diseases. Many of these diseases are rare and the discipline less well known – making it essential to identify the obstacles this discipline faces.

Aims and objectives

The purpose of this study was to describe the private and academic practice of Oral Medicine.

Design and Methods

A self-administered, internet-based, questionnaire was distributed to South African periodontists which questioned the clinician's competency, diseases managed, special investigations performed, referral sources, proportional time and monetary distribution of the discipline, and perceived barriers to the practice.

Results

Twenty-six periodontists completed the questionnaire. In comparison to periodontology and implantology, periodontists generally feel less competent, spend less time on, and receive less money from Oral Medicine. Lack of awareness of the speciality (55.6% - 59.3%) was identified as the biggest constraint, with only 11.2% of referrals received from medical doctors. Immune-mediated diseases (29.3%) and benign neoplasms (26.5%) are managed the most, and surgical biopsies (80.2%) are used most regularly to diagnose oral mucosal disease.

Conclusion

Oral Medicine is still a lesser-known clinical speciality. Despite the heavy burden of HIV-related oral disease

and oral mucosal malignancies, this speciality remains underutilised.

Keywords: oral medicine, oral mucosal disease, special investigations, scope of practice

INTRODUCTION

There is currently no available data that describes the clinical practice of Oral Medicine (OM) in South Africa. Because OM is a less well-known dental speciality, among both dental and medical practitioners as well as the public, the service remains incompletely utilised,^{1,2} even though many healthcare practitioners feel that the diagnosis and management of oral diseases fall outside their scope of practice.³ The speciality shares its clinical domain with other medical and dental disciplines, but appropriate referrals are necessary to reduce treatment cost and time while improving patient care.³ In addition, while the clinical competencies of the OM clinician have been delineated by the HPCSA, it is necessary to mirror these competencies with the clinical practice of OM in real life.

It is important to establish the current state of affairs of OM in private practice and academia so that recommendations can be made regarding the future of OM, in terms of training, treatment, collaboration, continuous skill development, research, and service provision. This should ultimately culminate in an improved service that is rendered to patients with oral mucosal disease.

Oral medicine is a relatively young, and somewhat unknown,¹ speciality with varying definitions and recognition across the globe. In the United Kingdom, it is defined as 'the speciality of dentistry concerned with the oral health of patients with chronic, recurrent and medically-related disorders of the oral and maxillofacial region, and with their diagnosis and non-surgical management'⁴ while in the USA it is considered as 'the speciality of dentistry concerned with the oral healthcare of medically complex patients and with the diagnosis and non-surgical management of medically-related disorders or conditions affecting the oral mucosa'.⁵ The common denominator seems to be the 'diagnosis and non-surgical management of medically related disorders' but differs in terms of the treatment of medically complex patients. The HPCSA stipulates that: "The scope of expertise of the specialist in Oral Medicine and Periodontics includes the diagnosis and management of diseases, disorders and anomalies that affect the oral and periodontal tissues, as well as the oral and peri-oral manifestations of systemic diseases according to evidence-based practices".

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The VIth World Workshop in Oral Medicine has recently validated core clinical competencies in OM through the contributions of 31 different countries.⁷ South Africa has largely adapted these competencies but has excluded those involving temporomandibular disorders and behavioural and mental health.

The major competencies subsequently include the examination and diagnosis of oral mucosal disease through careful history taking, clinical examination, and special investigations; as well as the effective pharmacological and surgical management of localised benign disease in which surgical biopsies are employed to establish a diagnosis of disease. Diseases of an immune-mediated, developmental, genetic, or infective basis, as well as salivary gland disorders, orofacial pain, and the oral presentation of systemic diseases, are included in the scope of practice of the OM specialist.

Despite the American Association of Oral Medicine being established 75 years ago, it was only in 2020 that it received recognition as a speciality.⁵ While in Europe, although OM can be considered as a distinct field of study in several countries, it is only registered as a speciality in the UK, Croatia and Israel, while elsewhere it is combined with other disciplines.⁶ A similar sentiment is shared in South Africa where the speciality is combined with periodontics to culminate in the "Periodontics and Oral Medicine" degree.

Currently, it is unknown what the demand for OM services is, and whether the professional services of OM clinicians are fully utilised by health care workers⁸ and the general public. If the service is not well known, general clinicians may resort to either inappropriate diagnostic and therapeutic strategies of conditions that they are unfamiliar with,³ or inappropriate referrals.^{1,2} It is therefore important to assess referral and treatment patterns of OM-related complaints to most effectively structure the delivery of these services, workforce planning, and hospital, academic, and government funding policy.

This study will therefore attempt to shed some light on OM practice in South Africa. It will seek to identify what proportion of their time periodontists spend on OM, who their referral base is, which diseases are most commonly managed and whether it is financially rewarding given the fact that OM is mostly considered as a part-time practice by specialists in academic institutions.⁸ Hopefully, the results can be used to inform future decision-making regarding the dental training curriculum, expected clinical competencies of trainee periodontists, and support future collaboration with other clinical disciplines.

MATERIALS AND METHODS

This was a cross-sectional, descriptive study that describes the practice of OM in SA through a self-administered, internet-based, questionnaire.

The study was conducted among a population of HPCSA registered periodontists in South Africa. An email, with the invitation to participate in the study and an informed consent form, was distributed by the South African Society for Periodontology, Implantology and

Oral Medicine. A personal follow-up email was sent to each member with another invitation to participate.

The survey was distributed as an electronic link powered by the Qualtrics XM survey platform. It consisted of 16 questions. Questions ranged from multiple response questions, yes/no answers, using a sliding scale to give proportionate agreement/disagreement answers, as well as a single open-ended question. Respondents were asked how long they had been in practice, where they qualified, type of clinical practice (academia, private, public), whether they render OM services and which factors they perceive as barriers to OM practice. In addition, they had to use a rating scale to proportionally portray their OM practice in terms of time spent, money earned, referral sources, variety and frequency of diseases treated, special investigations ordered; and self-perceived clinical competency.

Participation was completely voluntary and the survey response was anonymous. Respondents gave consent by agreeing to participate in the study and the results could by no means be traced back to a respondent. Ethics approval was obtained from the University of Pretoria, Faculty of Health Sciences, Research Ethics Committee (366/2021).

Data were analysed with IBM SPSS Statistics version 27 (1989,2020). Descriptive statistics using frequencies (counts and percentages) was performed for categorical variables and means, medians, standard deviations, and 95% confidence intervals were performed for continuous variables. A total sampling method was applied whereby all registered periodontists were invited to participate in the study.

RESULTS

Demographics of study participants

Twenty-seven periodontists agreed to participate in the study, but only 26 completed the questionnaire, resulting in a 47.2% response rate, given that the invitation was emailed to 55 periodontists. Yet, not all questions were answered by all respondents, and neither were all the questions relevant to all clinicians. Two periodontists were in their first year of clinical practice, while one had been in practice for 46 years. The greatest number of respondents ($n = 7$) had been in practice for 3 years (26.9%), and 18 (69.2%) had been in practice for 13 years or less. The greatest proportion of respondents had qualified from the University of Pretoria ($n = 10$, 38.5%), eight (30.8%) from the University of the Western Cape, and five (19.2%) from Sefako Makgatho Health Sciences University (SMU), also previously known as Medunsa or the University of Limpopo.

Description of clinical practice

There was an equal distribution between periodontists that are in full-time private practice and those that have some academic involvement ($n = 11$, 40.7%). All of the periodontists practice oral medicine, either as part of their private or academic practice. In private practice, four (16.7%) periodontists spend 1% of their workweek on OM, 6 (25%) spend 5% of their workweek on OM and only 1 (4.2%) spend 60% of the workweek on OM. In total, 95.8% spend 34% or less time per week on

Table I: Proportion of workweek and monthly income that private periodontist spend and obtain from OM

Proportion of workweek that private periodontists spend on OM			Proportion of monthly income that private periodontists obtain from OM		
Rating	N	%	Rating	N	%
1,0%	4	16,7%	1,0%	6	26,1%
5,0%	6	25,0%	2,0%	6	26,1%
9,0%	1	4,2%	4,0%	1	4,3%
10,0%	3	12,5%	5,0%	3	13,0%
13,0%	1	4,2%	7,0%	1	4,3%
15,0%	1	4,2%	10,0%	2	8,7%
20,0%	3	12,5%	20,0%	2	8,7%
21,0%	1	4,2%	30,0%	1	4,3%
30,0%	2	8,3%	50,0%	1	4,3%
34,0%	1	4,2%			
60,0%	1	4,2%			
	24	100,0%		23	100,0%

Table II: Self-perceived competency of periodontists in the different clinical disciplines

Competency rating	Periodontology		Oral Medicine		Implantology	
	N	%	N	%	N	%
50%	0	0,0%	5	19,2%	0	0,0%
60%	0	0,0%	1	3,8%	2	7,7%
61%	0	0,0%	1	3,8%	0	0,0%
65%	0	0,0%	1	3,8%	0	0,0%
67%	0	0,0%	1	3,8%	0	0,0%
70%	1	3,8%	2	7,7%	1	3,8%
72%	0	0,0%	1	3,8%	1	3,8%
75%	0	0,0%	1	3,8%	1	3,8%
77%	1	3,8%	2	7,7%	1	3,8%
78%	0	0,0%	1	3,8%	1	3,8%
80%	10	38,5%	2	7,7%	6	23,1%
81%	3	11,5%	0	0,0%	1	3,8%
82%	3	11,5%	1	3,8%	1	3,8%
84%	0	0,0%	0	0,0%	1	3,8%
85%	0	0,0%	1	3,8%	0	0,0%
90%	1	3,8%	2	7,7%	3	11,5%
95%	1	3,8%	0	0,0%	2	7,7%
96%	1	3,8%	0	0,0%	0	0,0%
100%	5	19,2%	4	15,4%	5	19,2%
	26	100,0%	26	100,0%	26	100,0%

OM. Six periodontists said that OM contributes only 1% to their practice turnover, while 82.6% said it contributes less than 10% to their practice turnover. Only one (4.3%) periodontist generates 50% of his/her income from OM (Table I). On average, periodontists spend 14% of their time on OM and 8% of their monthly income comes from OM. Twenty-nine percent of periodontists collaborate in multidisciplinary clinics to manage complex oral mucosal diseases.

Self-perceived competency and constraints that periodontists experience in their OM practice:

Periodontist could present their self-perceived competency in the different clinical disciplines of the speciality on a sliding percentage scale:

- **Periodontology:** 10 (38.5%) of periodontists scored their self-perceived competency in periodontology

as 80% (also the greatest number of periodontists on a single score), and 5 (19.2%) scored themselves at a 100%. The lowest score was 70% which only one periodontist scored him/herself. Only 2 (7.7%) scored themselves less than 80% competent in periodontology.

- **Oral Medicine:** 5 (19.2%) of periodontists scored their self-perceived competency in OM as 50%, which was also the lowest mark given and the greatest total number of periodontists on a single score. Four periodontists (15.4%) scored themselves as 100% competent, while 11 (61.5%) periodontists scored themselves less than 80% competent in OM.
- **Implantology:** 2 (7.7%) scored themselves at 60% (lowest mark), 5 (19.2%) scored themselves at 100% and 7 (26.9%) felt they were less than 80% competent. The greatest number of periodontists on

Table III: Frequency of constraints to the practice of OM in South Africa identified by periodontists

Constraint	N (%)
I am not really interested in Oral Medicine	3 (11.1%)
Lack of awareness of the specialty among the general public	15 (55.6%)
Lack of awareness of the specialty among general dental practitioners	14 (51.9%)
Lack of awareness of the specialty among general medical practitioners	16 (59.3%)
Competition with other clinical disciplines	8 (29.6%)
Lack of patient finances	2 (7.4%)
Low fee structure of treatment codes in comparison with other procedures (Medical Aid Rates)	11 (40.7%)
My postgraduate training	2 (7.4%)
The infrequency with which I manage oral mucosal disease makes it difficult to expand my competency	6 (22.2%)
Lack of continuous development opportunities in Oral Medicine	13 (48.1%)
Other – restrictive scope of OM practice	5 (18.5%)

Table IV: Referral sources to private OM practices

Referral sources	Valid N	Mean	Median	Std Dev	Min	Max
General practitioners:						
Dental	24	73,8	80	21,9	3	100
Medical	24	11,2	5,5	12,6	0	47
Specialist practitioners:						
Dental	24	9,8	2	20,3	0	97
Medical	24	5,3	1	7,7	0	30

Table V: Referral sources to academic OM clinics

Referral sources	Valid N	Mean	Median	Std Deviation	Min	Max
Academic Hospital:						
Clinical dental departments	15	55,7	50	34,5	0	100
Clinical medical departments	15	8,6	9	8,9	0	26
Private:						
General dental practitioners	15	16,4	5	26,1	0	100
General medical practitioners	15	0,8	0	2,1	0	8
Dental specialists	15	3,3	0	5,7	0	20
Medical specialists	15	0,7	0	1,6	0	5
Public:						
General dentists	15	10,6	1	15,6	0	56
General medical practitioners	15	3,9	0	9,7	0	30

a single score was 6 (23.1%) who scored themselves 80% (Table II).

- On average, periodontists scored themselves as 85.3%, 83.8%, and 74.2% competent in periodontology, implantology, and oral medicine respectively.

The greatest constraint to a successful OM practice, as perceived by the respondents, is the lack of awareness of the specialty by both the general public (55.6%), general dental practitioners (51.9%), and medical practitioners (59.3%). Although lack of patient finances (7.4%) was not considered a significant constraint, the fee structure of OM-related procedures (40.7%) was. The lack of continuous professional development opportunities in OM (48.1%) was identified as another significant constraint to a successful OM practice (Table III).

Sources of OM referrals in private and academic practice:

For private OM clinics, 85% of referrals come from general clinicians and only 15% from other specialities. Dental clinicians are the most frequent sources of referrals; 73.8% and 9.8% among general and specialist clinicians respectively (Table IV). In the academic environment, most referrals (64.3%) come from other academic departments in both the dental and associated medical school.

Twenty-one percent of referrals come from private clinicians, and other public clinics contribute 14.5% of the referrals. Yet, referrals from medical healthcare workers only contribute a small fraction: 8.6% from academic medical departments, 1.5% from private, and 3.9% from public clinics (Table V).

Table VI: Frequency of oral mucosal lesions and conditions seen in OM practice

Oral mucosal disease	Valid N	Mean	Median	Std Dev	Min	Max
Benign (reactive) neoplasms	24	26,5	21	16,9	0	61
Chemosensory disorders	24	1,5	0	2,4	0	8
HIV associated disease	24	7,0	0,5	11,3	0	40
Immune-mediated diseases: oral lichen planus, mucous membrane pemphigoid, pemphigus vulgaris, recurrent aphthae, erythema multiforme	24	29,3	27,5	14,0	5	60
Oral adverse drug effects including chemotherapy-induced oral mucositis	24	5,1	4,5	5,3	0	15
Orofacial pain (including burning mouth syndrome)	24	6,3	5	6,3	0	20
Oral mucosal infections: fungal, viral, and bacterial	24	10,2	9,5	7,9	0	33
Potentially malignant and malignant lesions of the oral mucosa	24	7,6	5,5	5,6	0	20
Salivary gland disorders (including xerostomia)	24	3,5	3	2,8	0	10
Systemic conditions that present with oral mucosal disease	24	2,6	1,5	3,1	0	10
Other	24	0,4	0	2,0	0	10

Table VII: Frequency of special investigations performed in OM practice

Special investigations	Valid N	Mean	Median	Std Dev	Min	Max
Surgical biopsies	24	80,2	81,5	17,5	31	100
Exfoliative cytology	24	9,2	10	12,7	0	41
VELscope/ toluidine blue	24	5,7	5	15,5	0	60
Serology	24	20,2	10	35,5	3	100
Aspiration biopsy	24	6,2	1	33,1	0	100
Radiographic assessments (ultrasound, MRI, CT)	24	13,8	6	41,9	0	100
Allergy testing	24	5,2	4,5	9,4	0	36
Direct immunofluorescence	24	23,0	17,5	35,9	2	100
Microbiological culture	24	12,1	18	20,0	1	71
Brush biopsy	24	6,3	10	11,8	0	36

Table VIII: Proportion of time spent on different aspects of OM in academia

Academic responsibilities	Valid N	Mean	Median	Std dev	Min	Max
Patient treatment	15	21,7	10	27,9	0	100
Research	15	2,3	0	4,6	0	15
Administration	15	28,8	5	37,7	0	100
Teaching and training:						
Undergraduate students	15	6,1	0	10,6	0	40
Postgraduate students	15	41,1	34	40,3	0	100

Frequency of oral mucosal lesions and conditions seen in OM practice:

Respondents estimated that immune-mediated diseases such as oral lichen planus, mucous membrane pemphigoid, pemphigus vulgaris, recurrent aphthae, and erythema multiforme are seen the most frequently (29.3%), followed by benign reactive neoplasms (26.5%). These would include lesions such as traumatic fibroma, fibrous epulis, pyogenic granuloma, etc. Chemosensory disorders, such as altered taste perception, account for only 1.5%, and oral mucosal disease as the presentation of systemic disease, only 2.5% of lesions and conditions (VI).

Frequency of special investigations performed in OM practice:

Surgical biopsies were the most commonly performed special investigation (80.2%), and as part of this investigation, direct-immunofluorescence was regularly performed (23%). The next most commonly performed special investigation was serology (20.2%), followed by

radiographic assessments. Allergy testing was performed the least (5.2%) followed by the use of adjunctive diagnostic aids, such as the VELscope and Toluidine Blue (5.7%) (VII).

The proportion of time spent on different aspects of Oral Medicine in academia:

When the respondents only considered the amount of time they spent on different aspects of OM in academic practice. They spent the most time training postgraduate students in OM (41.4%), and the least amount of time on research (2.3%) and undergraduate training (6.1%) (Table VIII).

DISCUSSION

A 47.2% response rate was achieved in this study, which falls slightly short of the target of 60%. The 52.8% of periodontists who did not complete the questionnaire, introduce a degree of nonresponse bias which reduces the validity and reliability of this study.⁹ Multimode approaches, such as another SMS or Whatsapp

communication, may have improved this response rate.⁹ It is possible that clinicians who are not interested in OM, naturally, opt-out of research on this topic. From the response rate to questions that only focused on the academic aspect of OM, and by deducing the number of periodontists that are known to be in academia, it seems that the larger proportion of non-respondents is in full-time private practice. The respondents of this study were equally weighed between full-time private practice and those that have some academic involvement. But a survey among OM specialists in 40 different countries, found that most clinicians practice in hospitals and dental schools and that private practice was less commonly utilised.⁸ However, in South Africa, because of the combined clinical practice of periodontology and implantology, private practice is a feasible option for many periodontists.

It seems that OM is the neglected stepchild of many periodontists, which only occupies 14% of the average workweek, and only contributes 8% to the monthly income. It can be argued that the lower self-perceived competency that periodontists have in OM, as opposed to their other clinical disciplines, is either the result or the cause of the above figures. However, periodontists largely attribute it to a lack of awareness of this sub-speciality among the general public and other healthcare workers. In addition, the low fee structure of OM-related treatment codes reflects the mismatch between time spent and money earned in this discipline. Lastly, there are extensive, local, and international, continuous development opportunities in periodontology and implantology, but hardly any in OM. Conferences and training opportunities in these disciplines are sponsored by manufacturers, but because OM is not a revenue-generating source to large companies, this type of sponsorship, and hence, continuous professional development in OM, is sorely lacking in South Africa.

Private periodontists receive most of their referrals from general dentists. This may sound like a paradox because the lack of awareness of this speciality among general dentists was also considered one of the largest constraints. Yet this phenomenon is mirrored in the literature: while dentists may be the largest referral source to an OM practice,^{3,10-13} very few dentists make use of an OM service.¹⁰ Implying that it is a small group of general dentists that notice and refer the bulk of oral mucosal disease.

Other studies which have assessed OM referral practices were predominantly hospital-based.^{3,10-14} From these studies, it was only Villa et al., 2015, who conducted their study in a medical hospital, that found most referrals come from medical practitioners.¹⁴ Given the high prevalence of common oral mucosal diseases and lesions,¹⁵⁻¹⁸ it is possible that dentists either manage these patients themselves, refer to other disciplines, or not notice these lesions. Yet, when general clinicians do refer patients, it is seldom accompanied with a diagnosis,^{12,14} and when a diagnosis is offered, it is mostly incorrect.¹³ In addition, most healthcare workers feel that the management of oral diseases falls outside their scope of practice and that OM is a clinical competency that is hard to maintain in clinical practice because many of the diseases present too infrequently.³ Given the fact that only 6.1% of OM

dedicated academic time is spent on the training of undergraduate students, we need to reconsider our dental curricula so that the clinician responsible for the management of oral diseases, and to whom a referral should be directed, stands front and center in the training of dentists.

Patients with oral mucosal disease are just as likely to consult with a medical doctor, than with a dentist.¹⁷ Yet, only 16.5% and 14% of referrals in this study came from medical doctors in private and academic clinics respectively. The lack of referrals from medical practitioners implies that they are more likely to refer to a medical colleague, such as an otolaryngologist,¹⁸ or a more well-known dental specialty, such as maxillofacial and oral surgery, or a dental colleague. Only a few medical practitioners are aware of OM specialist services.¹⁹ This can be improved by greater involvement in multidisciplinary clinics, in which only 29.2% of South African periodontists are involved, as opposed to our international counterparts (50%).⁸

The fact that OM is so poorly known, and perhaps hidden to a degree within other specialties, can result in patients seeing multiple clinicians,^{1,2} where inappropriate tests are ordered and ineffective therapy is provided, before the eventual referral to an OM specialist.²⁰ This results in an unnecessary escalation of health care costs and patient morbidity. Because OM is such a poorly known speciality among the general public,¹ patients are unlikely to self-refer and may be obstructed by the archaic principle which requires a general clinician referral to a specialist clinician. Given the fact that OM often involves chronic, painful, and even life-threatening oral mucosal conditions²¹ with a significant impact on the quality of life of the affected individual, the need to provide effective and expedited care cannot be overemphasised. The demand for OM services in other countries has been well established^{1,17} and should reasonably be transferrable to South Africa. Yet, the ability to match service provision to demand should be elucidated.

An international survey of oral medicine practice conducted by the Vth World Workshop in Oral Medicine in 2011 described the status of OM practice amongst 40 different countries (not including South Africa). The definition of OM varied between different countries, mostly concerning general dental care provided to medically complex patients, chemosensory disorders, and orofacial problems in patients with physical and mental disabilities.⁸ Although the South African periodontist may need to manage periodontal and oral mucosal complaints of medically complex patients or patients with mental and physical disabilities, the provision of general dental care to this population is not part of the HPCSA defined scope of practice. Chemosensory disorders, though not explicitly specified in the scope of practice, are hardly ever managed by our study population (1.5%).

The spectrum of oral diseases treated by South African OM specialists matches the common scope of practice in other countries, and those stipulated by the HPCSA, which includes the management of oral mucosal diseases, salivary dysfunction, oral manifestations of skin

disorders, HIV, gastrointestinal, rheumatic disease and facial pain. In the study by Stoopler et al., respondents indicated that their patient populations mostly consisted of patients with oral mucosal lesions but facial pain and the oral presentation of skin disorders were also well represented.⁸

In South Africa, OM specialists treat immune-mediated diseases, which can also be described as the oral presentation of skin disorders, most frequently, followed by benign, reactive, neoplasms. Although infections are managed the third most commonly, the low frequency at which it is managed (10.2%) contradicts the common misperception that infections of the oral mucosa are exceedingly common. Although the frequency with which periodontists manage diseases certainly cannot be extrapolated to the overall prevalence of a disease, it merely demonstrates the focus of a clinician's practice. Yet, it is surprising to see that HIV-associated oral disease is managed the 5th most frequently, and only 7% of the time. This is even though STATS SA estimates that 13.7% of the South African population is infected with HIV in 2021²² and that more than a third of these patients are expected to present with oral manifestations.²³ Managed only slightly more frequently were potentially malignant disorders and malignancies of the oral mucosa. A recent meta-analysis calculated the worldwide prevalence of oral potentially malignant disorders as 4.47%,²⁴ which of course differs among populations according to the varied exposure to risk factors. While the WHO reported 1933 new lip- and oral cancer cases, and a resultant 814 deaths in 2020 in Southern Africa, it does seem that periodontists are an underutilised resource in the management of these conditions.²⁵

In this study, periodontists used surgical biopsies and subsequent direct immunofluorescence (DIF) staining, most frequently in the assessment and management of oral mucosal disease. The frequent use of DIF corresponds to the regular management of immune-mediated diseases as well as the close relationship these participants have with academic pathology laboratories where these facilities are more readily available. Surgical biopsy of oral mucosal lesions, and the subsequent histopathological examination, remains the gold standard in the assessment of oral mucosal disease.²⁶ And while conventional exfoliative cytology is often employed in the diagnosis of oral candidiasis, the clinical appearance, combined with an accurate history, is often sufficient to reach a diagnosis.²⁷ When it does become necessary to distinguish between different *Candida* strains, as in the immunocompromised host who shows resistance to therapy, conventional histopathological assessment of a smear will be insufficient.²⁸ More reliable techniques, such as microbiological culture with sensitivity testing may then become necessary.²⁹ The low frequency at which oral mucosal infections are managed by periodontists (10.2%), matches the equally low frequency at which exfoliative cytology (9.2%) and microbiological culture (12.1%) are used.

Brush biopsies and adjunctive diagnostic aids, such as the VELscope and Toluidine Blue, are frequently used in

the assessment of potentially malignant disorders. While the sensitivity and specificity of a brush biopsy have been improved by the use of a cytobrush and liquid-based cytology, further advances such as computer-assisted-, DNA-, molecular- and immunocytochemical analysis that can further improve the reliability of this investigation,³⁰ are still not used routinely in South Africa. It is therefore unlikely that a brush biopsy will replace a surgical biopsy to reach a definitive diagnosis of OPMD or OSCC, it is helpful in the assessment of doubtful lesions and the monitoring of OPMD.³⁰ It is encouraging to see that the adjunctive diagnostic aids are being used by the specialists who are best suited to interpret their results.³¹

OM specialists working in academia are primarily tasked with the training of post-graduate students (41.1%), followed by administration (28.8%) and patient treatment (21.7%), only 2.3% of their time is spent on research. While internationally, the most time is spent on patient care, followed by administration, teaching, and also, lastly, on research.⁸

This study attempted to address some of the shortcomings that Stoopler et al. 2011, identified in their study. Namely, to establish referral sources and the financial viability of an OM practice. They also recommended that future research should assess the potential of OM as "a full-time clinical practice, rather than chiefly a part-time practice by specialists in academic institutions".⁸ But, through the words of one study respondent, unfortunately, "Oral Medicine is not a viable component to sustain private practice".

CONCLUSION

Therefore, we should develop strategies to expand the awareness of OM among patients, dentists, and our medical colleagues. We can only hope to achieve this through focused collaboration in the training of healthcare workers, and the management of our shared patients. OM-related research and local publications should further improve the visibility of this speciality among clinicians.

Ethics approval

Ethics approval was obtained from the University of Pretoria, Faculty of Health Sciences, Research Ethics Committee (366/2021).

Conflict of interest

None.

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An evidence-based guide to occlusion and articulation.

Part 6: Artificial jaws: articulators real and imagined

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CP Owen¹

SUMMARY AND PREAMBLE TO THE SERIES

Although this is essentially a review, it has not been written in the passive, third-person style normally associated with scientific writing, as it is intended to be thought-provoking and, hopefully, educational. It has therefore been written in more of a conversational style, and is aimed at students, dentists and dental technicians who are receptive to a slightly different view of occlusion and articulation, based on evidence.

Occlusion is a topic that has become a kind of archaic minefield of conflicting ideas, propositions, and above all, solutions, most of which are based on a complete lack of understanding of the evolution and development of teeth, and by extension, of clinically objective evidence.

That in itself is a statement of conflict (and perhaps even heretical), but it is by way of warning that this guide is not going to be much like anything you will find in standard text-books of dentistry or dental technology. It is, rather, an attempt to help you navigate through what you will read elsewhere, in the hope that eventually you will find an understanding that you can live with. It will appear as a sequential series in 7 Parts.

Artificial jaws: articulators real and imagined

The history of attempts to reproduce jaw movement by mechanical means is a fascinating one, and started about 190 (!) years ago. The value of a mechanical device and its ability to reproduce jaw movements and therefore its applicability to the clinical environment is, after nearly 200 years, still being debated. And now in this digital age we find ourselves in the realm of virtual devices.

But we should begin at the beginning. This will not be a history lesson, as the history of articulation has been well written, and you are referred to a series of articles published since 2001 in the *Journal of Prosthodontics*,

written mostly by Scaife and Engelmeier (there are many, so the references are not given here, but a PubMed search for “history of dental articulators” will reveal them all).

In the beginning there was the so-called “plaster articulator” which wasn’t an articulator at all, but merely a means of seating the models in a consistent position relative to each other. There was no movement. Then there was the “barn door hinge”, which provided a simple hinge movement (Fig. 1).

So that was the start, and if you read the development of articulators since then, you will see all sorts of weird and wonderful designs. Instead of going through those, because very few people are interested in that sort of thing, this paper will look at the three types of articulator most commonly used today. These are the hinge articulator, the average-value articulator, and the so-called semi-adjustable articulator with its variation of a non-arcon and arcon (see later) type of movement.

In the early 20th century, the theories behind articulator development were basically either based on condylar guidance and rotation, which became to be called the



Fig. 1. A “barn-door hinge” articulator from the 1840s. In the collection of the Museum of Health Care, Kingston, Ontario, Canada. <https://mhc.andornot.com/en/permalink/artifact13495>
Accessed May 2021

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“condylar” or “anatomic” school; or were based on the way the teeth articulated, and a belief that this guided the mandible, and that planes created by the tooth arches were the only consideration, not the condyles. This came to be known as the “geometric,” or “nonanatomic,” school. From this latter, we still have the curves of Spee, Monson, Wilson, Hall, and the triangular planes of Bonwill and Balkwill. We will mention these in due course but if you have read the previous papers in this series you should by now I hope, have a healthy scepticism about this school of thought. Astonishingly, some of this nonsense is still taught today, not in its historic context (as it should be) but as a means, for example, of setting teeth in complete dentures as a purely mechanical exercise. It’s almost as astonishing as the fact that hinge articulators are still used today, so let’s get on with looking at these three main types.

The hinge articulator

A ‘modern’ version of a simple hinge articulator looks a bit like Fig. 2, but in reality has been around for decades.

Recognising that this was a straight hinge movement, variations appeared which allowed for the upper member to slide along an inclined plane (Fig. 3), but was still referred as a hinge articulator. You can, sadly, also buy these today and they are, sadly, in common use.

It is astonishing that these articulators are still used, because they bear no relationship whatsoever to any movement of the mandible other than that of a straight hinge movement. Of course a clinically perceived hinge-like movement is a useful one when there are no teeth, as it is mostly a repeatable movement, but usually guided by the clinician. We are not carnivores as we have seen and so the likelihood of making restorations that will not have any interference to mandibular movement on these articulators is practically impossible. This is because, even in a so-called hinge movement, these articulators bear no relationship to even a perceived hinge movement of the mandible (Fig. 4).



Fig. 2. A simple hinge “Plane Line” articulator.



Fig. 3. A brass hinge articulator that allows some movement of the upper member.

So apart from the fact that we do actually chew, if the vertical dimension is wrong, taking a new jaw registration may not help and re-articulating the models with a wax bite between the teeth will mean that both arches have to be repositioned, not just one.

So the message is clear: there can be only very few clinical circumstances where the use of any form of a hinge articulator is justified. Perhaps a small inlay on a molar where there is a posterior disclusion in protrusive and lateral movements may not be a problem for example. Fortunately, there are other articulators that will provide more versatility. The next of these is the average-value articulator.

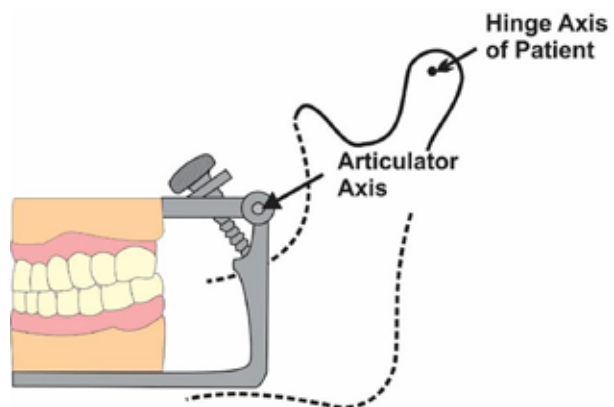


Fig. 4. The opening axis of a hinge articulator bears no relation to the opening axis of the mandible (if there is such a thing).

The average-value articulator

This is an articulator whose dimensions are closer to those of the skull, in that the distance between the condyles is (or should be) the average value of 110 mm. This, though, does not guarantee that the distance from the teeth to the axis of the articulator is the same as in the mandible so these too may have a similar limitation to the hinge articulator. Fig. 5 shows two types of these articulators. The one at the bottom has a posterior ‘incisal pin’ (arrow) which is very useful to maintain the vertical dimension when the incisal pin is removed for easier viewing of the anterior teeth.



Fig. 5. Two types of average-value articulator

Apart from the inter-condylar width, the other average settings are for the sagittal condylar guidance angle, which is set to 30° and the incisal angle which is set to 10°. These articulators have become very versatile since the evidence of anything much more complicated is now equivocal, but more of that later. Clearly there are still limitations, but the opening axis is likely to be similar to the clinically observed opening hinge-like movement of the mandible, and protrusive and lateral movements will provide some indication of how the teeth may relate to each other in these movements in the mouth. But certainly not completely, hence the search for the next layer of complexity, to try to relate the mandible's relationship to the skull in the same way as on the articulator. This led to the use of the facebow and the semi- or fully-adjustable articulators.

The facebow, semi- and fully-adjustable articulators.

Once again, the history of the development of the facebow and these ever more complex mechanical devices is (to some) a fascinating one, and the intention here is not to go into that or even into how they are used, but rather to concentrate on whether they should be used and under what circumstances.

First, though, a look at two generic articulator types, the 'arcon' and 'non-arcon' because these terms have been

known to be confusing to some. The term, 'arcon' dates back to 1950 and is merely a contraction of the words articulator and condyle and was used to distinguish articulators which had the 'condyle' on the lower part and the 'fossa' on the upper part of the device. This was because many of the earlier articulators (which by the way, you can still buy today) had these parts the other way round and are now known as 'non-arcon'. An example is the Dentatus articulator (Fig. 6), and an arcon articulator, the Denar Mark II is shown in Fig. 7.



Fig. 6. A non-arcon articulator: the 'condyle is on the upper member and the 'fossa' on the lower member.



Fig. 7. An arcon articulator: the 'condyle is on the lower member and the 'fossa' on the upper member.

One of the advantages of the arcon type as shown, is that the entire upper member could be removed, which was very useful when, for example, waxing up full crowns. The dimensions of these articulators were also considered to be more natural when considered in relation to the head, or skull. The intention was to make the upper member coincide with Frankfort plane, and the condylar element to coincide with the mandibular condyles, or rather what was perceived to be the opening axis, or condylar 'transverse' axis or 'hinge' axis (Figs 8 and 9).

Fig. 9. Shows the articulator opening as if it were the mandible. In reality, the lower member remains flat on the bench and the upper member is opened, something that often confuses those using an articulator for the first time.

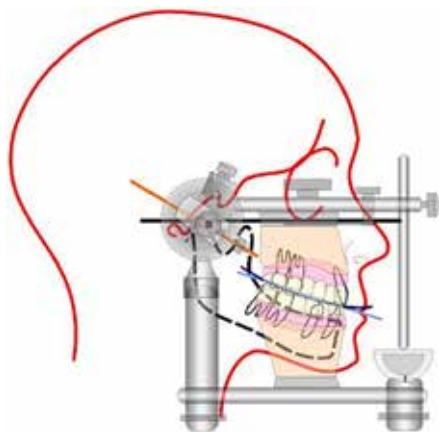


Fig. 8. An articulator (non-arcon) superimposed on the skull. The upper member was to coincide with Frankfort plane and the condylar element to coincide with the opening axis, so that the occlusal plane was at the correct height and angle.

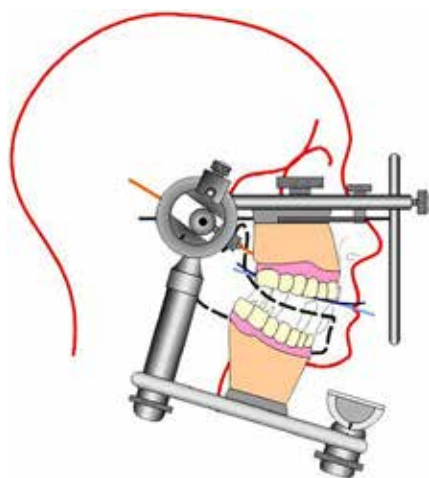


Fig. 9. The articulator opening as if it were the mandible.

In order to relate the real anatomical structures to the articulator, it was recognised early on that some other device was required, and the earliest recorded use (in 1889!) was of an “articulating caliper” which then evolved into the facebow, first described as such in about 1900.¹ Since then, all sorts of weird and wonderful devices have been used, but it is not the intention here to go onto these or how they are used. What is necessary to know and understand is what principles were being followed and if those principles bear any relationship to reality.

For that we need to go back to the anatomy of the system, because as we have said before, the temporomandibular joint is very complex and the mandible is only ever at rest when the teeth are firmly occluding. So the question must be asked: is

it possible to reproduce the anatomy of the patient and the path of movement of the mandible from one position to the next? And sadly, the answer is in the negative, at least for now, as it may be possible to get closer in the digital world. In the analogue world, though, it is necessary to understand the limitations of mechanical devices, despite all the claims made by the manufacturers and such groups as the gnathologists.

And we have to go back to this ‘hinge’ axis, because of the assumption that it is a condylar axis, and on this assumption the kinematic facebow was created. This did indeed give the impression that the mandible was rotating, as a clutch attached to the mandibular teeth traced with a stylus against a vertical plate against the condyle would show a circular motion if the mandible was rotating on opening and closing as a ‘hinge’ (Fig. 10). The only problem is, as we have seen (in Part 1), that instantaneous centres of rotation exist and none of them are anywhere near a condylar axis.

Finding this kinematic axis was a time-consuming procedure, and so seldom done, and gave rise to the publication of many papers describing an “arbitrary” hinge axis and several methods of obtaining this. These have now evolved into probably the most common type of facebows in general use which uses one such arbitrary axis by relating it to the external auditory meatus and hence a facebow can be placed into the ear, which is much easier to use.

However, there are few studies comparing the effects of using these different facebows and so-called axes on the ease with which restorations are placed with or without occlusal adjustments once the restorations are placed in the only articulator that really matters – the patient. For some reason there have been attempts to relate the intercondylar axis as a guide to setting complete denture teeth² and there have been radiographic measurements on intercondylar width for no apparent reason other than to conclude that some people have larger mandibles than others!³ But a seminal (and another which has largely been ignored: it has had only 14 citations in 19 years) study⁴ did relate the effect of articulator setting to the estimated existence of any occlusal errors, and that is precisely

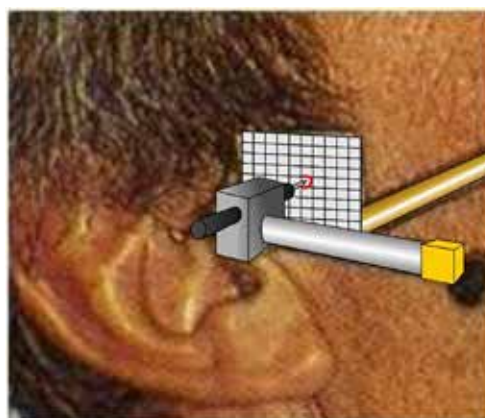


Fig. 10. A stylus attached to the lower component of a kinematic facebow will show a circular movement if the mandible purely rotates.

what we need to know to assess the limitations of such mechanical devices.

Although the paper used a kinematic axis and therefore rested on the assumption that this was true, by transferring data to a virtual articulator, the authors were able to derive average values for a number of parameters. These were interesting in the ranges and means that were produced from 57 subjects (the usual suspects: dental students) with complete dentitions and normal function. For example, the sagittal condylar guidance angle had a range of 36° to 71° with a mean of 53°; the medial condylar guidance angle had a range of -6° to 29° with a mean of 7°. But what was important, was that the authors then calculated the effect at the occlusal surfaces of these ranges and means, comparing individual settings with mean settings. The results will dismay many who insist on the use of facebows and individual settings, for the individual settings held no advantages over the mean settings with the greatest error being no more than 0.3 mm! Their conclusion was that “The use of a facebow to register individual condylar angle and spatial relations yields no profitable reduction of occlusal errors compared to mean value setting”. A more recent review came to the same conclusion: “the face bow transfer treatment procedure is not absolutely necessary to mount dental models on an articulator” and “there was no condylar axis of rotation during functional activity”.⁵

It appears that in Scandinavia, this has been recognised for several decades, where the predominant use of semi-adjustable articulators has been by setting the casts in the geometric centre of the articulator, and by setting the condylar guidance angles to average values.^{6,7} So it seems that the use of the facebow may not confer any great advantages and therefore by implication the use of any more complicated devices such as the pantograph and so-called ‘fully adjustable’ articulators will still require one to finally adjust occlusions once placed in the mouth. This has certainly been my experience, having used all these instruments clinically. The best articulator is still the patient, but this does not mean we abandon everything else, and so Part 7, the last in this series, will offer guidelines based on the evidence that has been summarised here.

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

SADJ July 2022, Vol. 77 No.6 p365 - p368

Prof V Yengopal, Dean, Faculty of Dentistry, University of the Western Cape, University of the Western Cape

1. Does Vitamin D deficiency aggravate COVID-19 infection?- A systematic review and meta-analysis

The lack of a cure for COVID-19 infection has spawned a host of treatment and preventative approaches directed at either the virus, strengthening of the immune system or management of the signs and symptoms associated with the disease. Vitamin D is thought to play an effective role in immune system functioning, which can help in a satisfactory cellular response and in protecting against the severity of infections caused by microorganisms¹. Vitamin D deficiency (25(OH)D below 50nmol/l) has also been associated with severe COVID-19 raising discussions about the benefits of supplementation of this vitamin when treating the illness caused by SARS-CoV-2. In Europe, an association has been identified between vitamin D deficiency in the population and higher COVID-19 mortality rates implying that that countries closer to the equator present lower COVID-19 mortality rates than those further from the equator¹.

Pereira and colleagues (2021)¹ reported on a systematic review with meta-analysis that sought to evaluate the association between vitamin D deficiency and COVID-19 severity, via an analysis of the prevalence of vitamin D deficiency and insufficiency in people with the disease.

METHODOLOGY

A search strategy was conducted by 3 independent reviewers in 5 electronic databases up until October 2020. The terms "Vitamin D" and "COVID-19" were used and the lists of bibliographical references of the relevant studies were examined in order to identify potentially eligible studies. No language limits were applied.

Using the PECO strategy (patient, exposure, comparison, outcome), only studies that met the following criteria were considered for inclusion:- (i) only involved individuals in the adult and elderly age group; (ii) involved individuals with COVID-19; (iii) compared the prevalence of vitamin D deficiency according to COVID-19 severity; (iv) classified the serum VitD concentration outcome in the study's participants: mean VitD (nmol/l; ng/ml), insufficiency, and

deficiency; and, (v) case series, cross-sectional, cohort, and case-control studies.

Studies were selected independently and any disagreements was resolved by consensus. Methodological quality was assessed according to the Research Triangle Institute Item Bank (RTI-Item Bank) scale, which assesses the risk of bias. The RTI-Item Bank contains 29 items for evaluating studies, of which seven were applied to observational studies included in this review. This tool considers the following issues: (1) clear inclusion and exclusion criteria; (2) uniformly distributed inclusion and exclusion criteria; (3) appropriate sample size; (4) whether the inclusion and exclusion criteria were applied using valid and reliable measures; (5) whether the results were analysed using valid and reliable measures, including all participants; and (6) whether important confounding and effect variables were considered in the study and/or analysis.

One point (yes) or zero (no) was scored for each item. The total score in all items can generate an overall quality index that ranges from 0 to 6. According to the scores, the risk of bias is classified as low risk (=6 points) or high risk (<6 points).

The main outcome was vitamin D deficiency and COVID-19 severity. The investigators compared the proportion of patients with vitamin D deficiency in those with mild versus severe COVID-19. Second, the occurrence of vitamin D deficiency and insufficiency and the association for vitamin D deficiency and the occurrence of infection, hospitalization, and mortality from COVID-19 was analysed.

RESULTS

From the initial search, 1542 studies in the databases were identified and after the selection of studies protocol, 27 studies were selected for qualitative synthesis and 26 was included in the meta-analysis. All of the included studies were published in 2020 and presented 372332 participants with most studies set in Europe. There was a predominance of articles with a methodological quality classified as high risk of bias (n=23 out of 27, 74%). The meta-analysis included 8176 COVID-19 patients participating in 26 studies and the mean age was 58years old (95% CI = 54–62).

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The prevalence of vitamin D deficiency was 39% among individuals with COVID-19. Regarding the severity of the disease, it was recorded that individuals with severe COVID-19 present 65% (OR = 1.65; 95% CI = 1.30–2.09; I² = 35.7%) more vitamin D deficiency compared with mild cases of the disease. A vitamin D concentration of less than 75 nmol/L increased hospitalization for COVID-19 (OR = 1.81, 95% CI = 1.41–2.21; I² = 0.0%), and this deficiency was associated with COVID-19 mortality (OR = 1.82, 95% CI = 1.06–2.58; I² = 59.0%).

CONCLUSIONS

The results of the meta-analysis confirm the high prevalence of vitamin D deficiency in people with COVID-19, especially the elderly. There was a positive association between vitamin D deficiency and the severity of the disease

Implications for clinical practice:

The results of the meta-analysis suggest that vitamin D supplementation could be considered in patients with vitamin D deficiency and insufficiency, if they have COVID-19. However, there is no support for supplementation among groups with normal blood vitamin D values with the aim of prevention, prophylaxis or reducing the severity of the disease.

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2. Plant-based diets and risk of disease mortality: a systematic review and meta-analysis of cohort studies

Plant-based diets (PBDs), focusing on a high intake of plant-based food products and low intake of animal-based products, have increasingly become popular in many settings that have promoted a healthier lifestyle. Depending on the definition, these diets may have diverse compositions- for example, a vegetarian diet, a type of PBD, includes vegan (no animal products), lacto-ovo-vegetarian (including dairy and eggs), lacto-vegetarian (including dairy products), pesco-vegetarian (eating fish and seafood), and semi-vegetarian (consuming meat infrequently) diets.

Dietary information is usually collected in the form of a food frequency questionnaire (FFQ), which is a list of foods and beverages with response categories to indicate usual frequency of consumption over the time period queried (usually the past 1 year). To assess the total diet, the number of foods and beverages assessed typically ranges from 80 to 120. To study the effects of the consumption of whole plant foods on health, researchers have developed the pro-vegetarian score or plant-based diet index (PDI) – a way of scoring the data collected from FFQs. This plant-based scoring system gives the consumption of plant foods positive marks and the consumption of any animal-derived foods negative markers. Unhealthy plant foods, such as refined grains and sugar and processed foods can also be given negative marks in what is termed an unhealthy plant-based diet index (uPDI).

Considering the variances in the composition of different PBDs, Jafari and colleagues (2021)¹ undertook a systematic review and meta-analysis of prospective cohort studies to investigate the association of a plant-based eating style with the risk of all-cause and cause-specific mortality in the general population.

METHODOLOGY

This systematic review was completed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Four electronic databases were searched for publications related to the aim of the review using a structured search strategy up until October 2020. The search was performed without any restrictions. Moreover, the bibliography of relevant articles was meticulously examined to find potential missing studies. The researchers included prospective cohort studies that 1) were conducted in the general adult population (≥ 18 years); 2) considered different types of plant-based eating style including PDI, and vegetarian, vegan, semi-, lacto-, lacto-ovo-, and pesco-vegetarian diets as exposure of interest; 3) reported all-cause, CVD, site-specific and total cancer mortalities as well as other causes of death; and 4) reported adjusted estimates including relative risk (RR), risk ratio, or hazard ratio (HR) and 95% confidence interval (CI) as the effect size.

Two reviewers independently applied the inclusion criteria and discrepancies were managed by a consensus

approach using a 3rd reviewer. The 9-point Newcastle–Ottawa assessment tool to assess the quality of the included studies.

The certainty of evidence was assessed by the use of the Grading of Recommendations Assessment, Development and Evaluation (GRADE) tool which is also used in Cochrane Reviews. This tool grades the evidence as high, moderate, low, or very low quality.

RESULTS

After the initial screening process, 22 relevant full-texts remained for review and consideration after which 10 were excluded (4 had incomplete data, 2 were not performed in the general population, 1 did not have a control and 1 did not report this review's outcome of interest). As a result, 12 prospective cohort studies with 42,697 cases and 508,861 participants were included.

The pooled results from the 12 trials showed that greater adherence to the PBDs (highest vs. lowest category) was significantly associated with a lower risk of all-cause mortality (HR: 0.90, 95% CI: 0.82, 0.99; $I^2 = 90.7\%$, $P_{heterogeneity} < .001$). The sensitivity analyses did not show changes in the significance of the results (HR range: 0.88–0.98) meaning that all subtypes of PBDs were significantly associated with a lower risk of all-cause mortality.

Further analyses based on types of PBDs showed significant inverse associations between Pesco-vegetarian diet (HR: 0.81, 95% CI: 0.70, 0.92), hPDI (HR: 0.92, 95% CI: 0.88, 0.96), and Pro-vegetarian diet (HR: 0.74, 95% CI: 0.55, 0.88) with the risk of all-cause mortality implying that the closer one adhered to these diets, the lower the risk of all-cause mortality.

Seven studies reported 5349 cases of mortality due to CVDs among 168,294 participants. The results of highest vs. lowest category did not show significant association between the PBDs and CVDs mortality (HR: 0.90, 95% CI: 0.79, 1.02; $I^2 = 78\%$, $P_{heterogeneity} < .001$). However, among different types of PBDs, only the vegetarian diet was significantly associated with lower risk of CVDs (HR: 0.92, 95% CI: 0.85, 0.99; $I^2 = 0\%$, $P_{heterogeneity} = .82$). Inverse significant results (HR: 0.77, 95% CI: 0.70, 0.86; $I^2 = 36\%$, $P_{heterogeneity} = .01$) were found with the meta-analysis on eight prospective cohort studies including 3168 deaths due to cardiac heart disease (CHD) among 234,202 participants. Analyses based on the type of diets showed inverse association between the vegetarian diet and lower risk of CHD (HR: 0.76, 95% CI: 0.68, 0.85; $I^2 = 35\%$, $P_{heterogeneity} = .16$) implying that the closer the adherence to a vegetarian diet resulted in a significantly lowered risk of CHD.

The pooled analysis of five cohort studies with 1088 cases of mortality due to cerebrovascular disease among 122,165 participants did not show any association

between adherence to vegetarian diet and risk of cerebrovascular mortality (HR: 0.93, 95% CI: 0.78, 1.10; I² = 45%, Pheterogeneity = .12)

Five prospective cohort studies including 2838 cases of mortality due to total cancer among 133,818 participants indicated that the highest vs. lowest category of vegetarian diet was not associated with total cancer mortality (HR: 0.96, 95% CI: 0.85, 1.08; I² = 28%, Pheterogeneity = .24). The meta-analyses on different cancer subtypes also did not show any associations between vegetarian diet and risk of mortality due to colorectal (HR: 1.01, 95% CI: 0.79, 1.29; I² = 0%, Pheterogeneity = .48), lung (HR: 0.96, 95% CI: 0.72, 1.29; I² = 0%, pheterogeneity = .44), female breast (HR: 0.92, 95% CI: 0.52, 1.64; I² = 72%, pheterogeneity = .01), prostate (HR: 0.89, 95% CI: 0.59, 1.34; I² = 18%, Pheterogeneity = .30), and gastric (HR: 1.06, 95% CI: 0.63, 1.77; I² = 27%, Pheterogeneity = .25) cancers. The reviewers also did not find any significant associations between the highest vs. lowest adherence to the vegetarian diet and risk of mortality due to mental and neurological (HR: 1.73, 95% CI: 0.98, 3.05; I² = 44%, pheterogeneity = .18), respiratory (HR: 1.18, 95% CI: 0.91, 1.54; I² = 30%, Pheterogeneity = .23), and gastrointestinal (HR: 0.93, 95% CI: 0.60, 1.44; I² = 0%, Pheterogeneity = .42) diseases.

The certainty of evidence was rated using the GRADE approach. The certainty of evidence was rated low for CHD mortality and very low for other outcomes, with various downgrades for serious imprecision and inconsistency

CONCLUSIONS

This review found that there was an inverse association between the total PBDs and risk of all-cause and CHD mortality. Simply put, it implied that the “higher” the adherence to PBDs were, the “lower” the risk of all-cause and CHD mortality were.

Implications for practice

Oral Health professionals are often required to offer dietary advice to their patients. These findings should assist clinicians in offering advice that benefits both oral and general health.

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CPD questionnaire on page 374



The Continuous 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.

On being self-ish, self-less or well-balanced (other-ish), and how this may relate to practicing dentistry

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Sykes LM¹, Postma TC²

ABSTRACT

It has been said that people are driven by either self-interest or caring for others. In extreme cases, the former selfishly seek self-fulfilment, often at the expense of others, while the latter selflessly and altruistically strive to please others, many times with personal costs. This paper will explore the issues of selfish versus selfless behaviour with regard to the practice of dentistry, and offers dialogue on how practitioners could pursue a more balanced option that will serve the best interest of both parties.

INTRODUCTION

A rather cynical author once wrote:

“About winning: It matters not if you win or lose, it’s how you play the game.

On losing: It matters not if you win or lose its how you play the game.

On playing the game: Play to WIN.”

It is generally accepted that anyone who enters into a game does so with the hope of winning. Unfortunately, some players become so set on personal gains that they will do anything in their power to win, even if it is at the expense of their opponents. Bill Gates, had a different view and suggested that not everyone plays to win, he said “There are two great forces in human nature: self-interest, and caring for others.” Thus, in the game of life there will also be those players who are so committed to serve the interests of the other, that they set aside their own needs in the process. In the extreme cases, the former selfishly seek self-fulfilment and benefits, often at the expense of others, while the latter selflessly and altruistically strive to please and serve others, and in the process may end up physically, mentally or emotionally burnt out themselves. This paper will explore the issues of selfish versus selfless behaviour with regard to the

practice of dentistry, and how clinicians could “play the game” in a manner that will benefit both parties.

Selfish versus selfless

The Oxford English dictionary defines selfishness as: “being concerned excessively or exclusively, with oneself or one’s own advantage, pleasure, or welfare, regardless of others”.¹ This is diametrically opposed to selflessness, which is defined as “having more concern for the needs and wishes of others than with one’s own”. Neither trait is desirable if it is displayed on a permanent basis. Thus, it would seem that there is a need to find a midway solution that will be beneficial to both. The discussion will be based on a model designed by Adam Grant, who wrote an insightful book wherein he compared people who were predominantly selfless (self-sacrificing) givers with the selfish takers. He proposed a possible more balanced category, which he called the “other-ish” group. He considered them to be “successful givers who know how to maintain concern for themselves as well as others”.² They genuinely care about helping people, but still want to achieve their own ambitions and interests, and don’t see these two perspectives as being in conflict with each other. His original model has been slightly modified for this paper and is depicted below (Figure 1).

Giving and Taking in a clinical professional environment

Based on the above model, the givers and takers fall into two opposite boxes running along the X and Y axes, where the X axis considers other-interest, while the Y axis refers to self-interest. Both boxes have outer extremes at their opposing corners. Those in position O show total concern for Others, while those at point S are fully committed to Self. However not everyone can be categorised as being one or the other of these two personas. There are two other groups that should be considered as well. At the bottom of both axes is a group which Grant termed the Apathetic, who show general indifference towards themselves and others. They are opposed by a fourth group, which he termed the Other-ish people. In this adapted model they will be referred to as the Balanced successful givers. Once again, these two boxes also have extreme outer limits at point A and point B respectively. Travelling from point A to point B you will meet at an intersection of the diagonal line between points S and O, at a mid-point M, this may be seen as a Moderate, Midway stance taken by Most people Most of the time. The aim would be to move up the arrow from which ever starting point a person may find themselves to reach point B, where one has found

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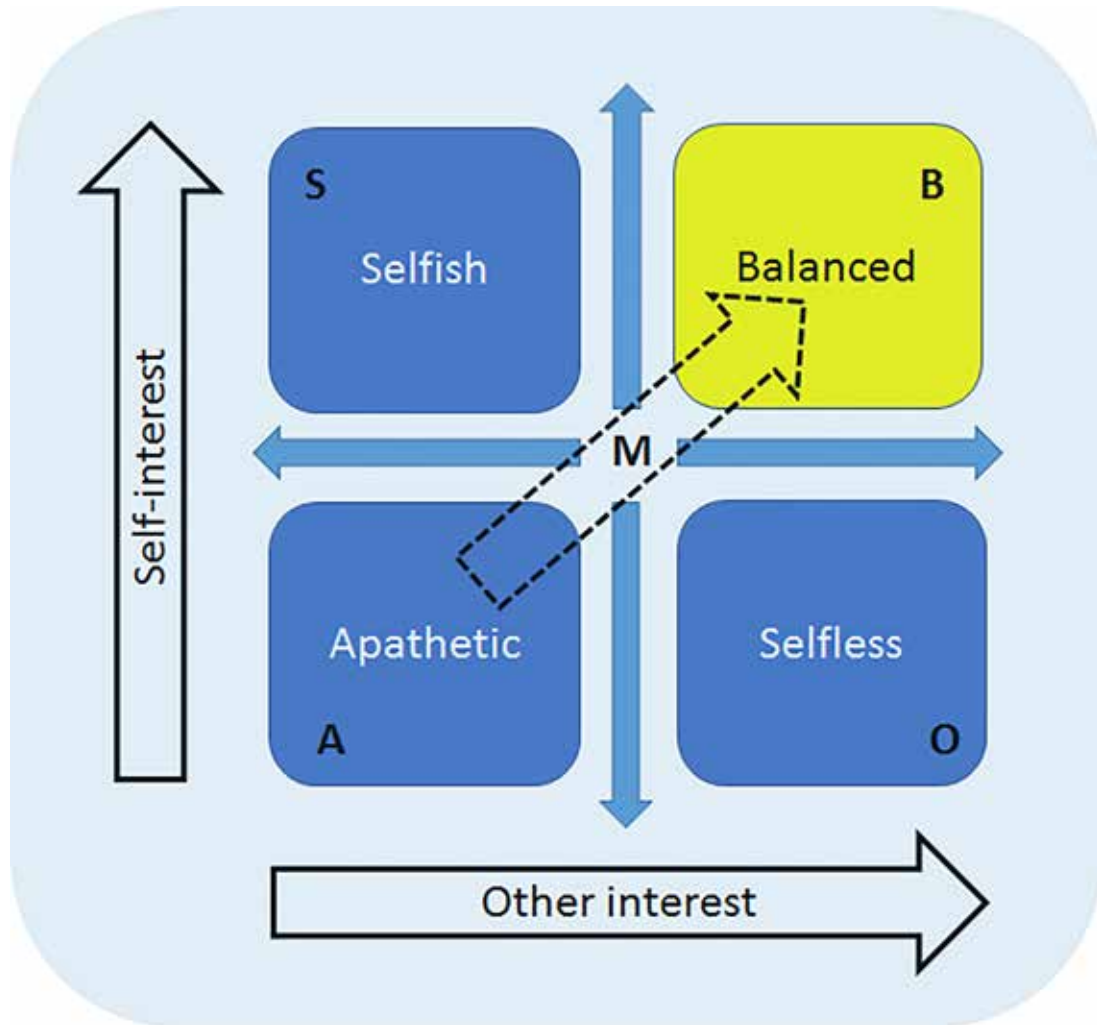


Figure 1. The difference between selfish, selfless and balanced givers.³

the perfect Balance of striving for and achieving the BEST for everyone. This paper considers if and how this model could be applied to the practice of dentistry.

Apathetic practitioners are those who have very little concern for advancing themselves or their practices. They don't set high personal or professional goals, and don't strive to achieve great wealth, repute, clinical or academic prowess. They show little interest in attending refresher courses, reading current literature, or making an effort to update their practices and skills. As a result, their scope and sphere of expertise may stagnate, and they will continue to practice in the same manner that they were taught, no matter how long ago they graduated. While not intentionally acting malevolently, they could end up doing their patients a dis-service if they fail to keep up to date with current trends, materials and techniques, and continue to practice in a dated manner.

Travelling along the X-axis towards wards point O are those clinicians who go out of their way to please their patients, no matter what the personal costs. This can be manifest in a myriad of ways. They may always try to please every patient's needs, demands and desires, no matter how unrealistic the expectations. This is

humanly impossible, yet when they fail, they tend to take it personally and may become stressed or depressed. Some try to give every patient the best possible treatment regardless of the patient's ability to pay for this, and might even undercharge for their services, sponsor materials, or cover laboratory costs, resulting in them being out of pocket. Some concede to patient's desires for treatment times, and may start work very early or finish late, and perhaps work over weekends or on public holidays to accommodate their patients' schedules. In so doing they sacrifice personal relaxation and family time. They could find themselves being pressurised to carry out more complex procedures that they are not skilled enough to handle where patients cannot afford to see a specialist, but still want to have a procedure done.

This places immense stress on an ethically conscious practitioner, who may also have to endure the fear of failure or the repercussions of actual failure. While being selfless is admirable, the dentist who is a relentlessly selfless giver and who does not keep an eye on their own interests can end up doing a greater dis-service to themselves. They run the risk of burning out and / or developing resentment towards their careers. This in turn deprives them of energy, and leaves them is a

state where they are of no use to the very people they set out to please. "There is no honour in NOT taking care of yourself". (Prof Flavia Senkubuge, personal correspondence).

Moving up the vertical axis to point S of the selfish takers. These practitioners are driven by Self-interest and have a "Succeed all costs mentality". They crave rewards (usually financial) and as such may see patients as a means to them fulfilling their own needs and desires. This becomes evident in how they structure their practice and patient care and can result in them behaving in any number of unethical ways such as: They may favour intervention above prevention, promote and recommend more complex and costly treatment over equally suitable yet cheaper conservative options, make use of excessive diagnostic aids that were not essential for diagnostic or treatment purposes, promote procedures according to materials or equipment they have purchased to offset the costs of these, charge inflated fees, underpay their own staff, expect assistants to work for extended hours with no extra remuneration, promote purely cosmetic or aesthetic dentistry, advertise themselves on social media sites to attract patients, over-inflate their abilities using terms such as "specialist implantologist", give patients false expectations to entice them into having certain procedures done, cut costs on materials, use expired, cheap or even non-certified materials, accept kickbacks from company representatives in exchange for using their products preferentially, not present patients with all possible treatment options, and only elaborate on those they wish to carry out, and at worst may become guilty of over servicing. They are often able to justify and defend the aforementioned if questioned. However, it becomes easy for the S practitioner to slide down the slippery slope from being an ethical caregiver towards becoming maleficent or even guilty of malpractice.⁴

Finally, going upwards and outwards to the best position B, which is where the Balanced successful givers can be found. These clinicians have ambitious goals for themselves, but at the same time want to act in a Beneficent manner and also Benefit their patients. In contrast to the selfless givers who sacrifice the self and focus on people, they focus on interests and are proactive about understanding how to make a positive impact. They do not exist merely to please, but have a well-defined purpose and plan, which enables them to decide how, where, and how much to give and how much to take. They develop well-defined boundaries with rules to help them preserve their own well-being. Instead of becoming victims and risking burn out, they become energized by their choices. They learn how to trust most of the people most of the time, and as such avoid being used or becoming doormats to the needs and demands of others. They do not have the need to always be giving, and are adaptable enough to know how to pair empathy with reason. More importantly, they know when to ask for help and are willing to do so if needed.

In terms of their careers, they will spend time attending professional development courses, learning new skills, and investing in the latest materials and technology. This in turn allows them to offer the best possible treatment

to all their patients. They take pride in their work, and practice according to high legal and ethical standards. They acknowledge and value their own worth, and will not sell themselves short in terms of their abilities. They may at times charge higher fees with a clear conscience if they believe their skills and knowledge are deserving of this. They gain satisfaction and fulfilment from both justifiable financial compensation, as well as from knowing that their standards will hold them in high repute amongst colleagues and patients. They manage to structure their lives in order to strike a good balance between work, family, self-time, hobbies, sport and relaxation, and are able to pursue and fulfil their own desires guiltlessly. They have indeed mastered the art of both paying attention to others, as well as to themselves, which allows them to maintain their energy, enthusiasm and joy.⁵

CONCLUSION

Perhaps then the take home message should be that our goals in life and in the practice of medicine and dentistry are to focus on ALL interests, and to strive for the ideal balance between giving and taking. To grow and go from which ever point you identify as your own default position towards the ultimate outer point B of the truly "successful giver". In other words, to become clinicians who strive to gain the BEST for themselves and deliver the BEST to others. To quote Robert Holden "*Your relationship with yourself sets the tone for every other relationship you have*".⁶

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Maxillofacial Radiology 201

SADJ July 2022, Vol. 77 No.6, p372 - p373

C Smit¹, L Robinson²

CASES

Two female patients presented with multiple radiolucent lesions noted on panoramic radiography. Cone-beam computed tomography (CBCT) scans confirmed multiple “punched-out” lesions affecting the skull.

Patient 1:



Figure 1: Panoramic radiograph (A) of a 57-year-old female patient who presented with painless lesions that were detected incidentally by a general dental practitioner. Three-dimensional (3D) reconstructed CBCT imaging (B) showing bilateral involvement of the mandibular, frontal, parietal and occipital bones.

Patient 2:



Figure 2: Panoramic radiograph (A) of a 50-year-old female patient who presented with an expansile soft tissue lesion in the left mandible. 3D reconstructed CBCT imaging (B) showing bilateral involvement of the mandible and extensive involvement of the entire calvarium.

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Authors contribution:

Chané Smit: 50%
Liam Robinson: 50%

INTERPRETATION

Both patients presented with multiple synchronous punched-out radiolucencies affecting multiple skull bones. In both cases, the lesions were biopsied with a confirmed diagnosis of a plasma cell neoplasm in keeping with multiple myeloma.

Multiple myeloma (MM) is a haematolymphoid malignancy of plasma cells that presents with multifocal destructive bony lesions. The focal/singular lesion is referred to as a plasmacytoma. MM represents 0.8% of all cancer diagnoses worldwide and often affects patients over the age of 40 years.¹ Accepted risk factors include advanced age, male gender, black ethnicity and positive family history.¹ The clinical signs and symptoms are related to

the uncontrolled growth of the malignant cells and their abnormal secretions.² The overgrowth of malignant cells in the bone marrow results in the underproduction of other cell types, resulting in anaemia, neutropenia, and thrombocytopenia. Therefore, fatigue, immunosuppression paired with frequent opportunistic infections, and petechial haemorrhages, are common presenting signs and symptoms. The extensive amount of bony destruction by the multiple bone lesions results in bone pain, pathological fractures, and increased serum calcium resulting in metastatic calcifications. Abnormally secreted proteins may cause renal damage and can be detected in the urine where they are referred to as Bence-Jones proteins. They may also be deposited in soft tissue as amyloid, which may be seen in the tongue as a cause of macroglossia. Patients with MM are usually treated by multiple cycles of combination

chemotherapy followed by stem cell transplant with long-term maintenance therapy to prevent relapse.³ The median duration of survival is 33 months², with early diagnosis and treatment initiation being paramount. This emphasises the need for early detection by dental practitioners during routine radiographic examinations.

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3. Rajkumar SV, Kumar S. Multiple Myeloma: Diagnosis and Treatment. *Mayo Clin Proc*. 2016;91(1):101-119. doi:10.1016/j.mayocp.2015.11.007

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



CPD questionnaire



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

GENERAL

Determination of the influence of body mass percentile on mandibular canine calcification stages among 5-17 years old northern Nigerian children.

- Which of the following statements is CORRECT: Concerning stage F of Demirjian dental developmental stage
 - Walls of the pulp chamber form a more or less equilateral triangle.
 - The root length is usually greater than the crown height.
 - Apex of the pulp chamber ends in a funnel shape.
 - The root length is usually equal to the crown height.
- Select the CORRECT option. Concerning WHO standard for body mass index (BMI) percentile for children 2-20years
 - BMI-percentile less than 5% is normal.
 - BMI-percentile less than 85% is healthy.
 - BMI-percentile less than 85% is usually overweight.
 - BMI-percentile greater than 95% is obesity.
- Which of the following options is INCORRECT. Histological method of dental age estimation include the following except
 - Average age of attrition
 - Dentinal translucency
 - Incremental lines of cementum.
 - Coronal pulp cavity apex method.

A review of the 2030 Human Resources for Health Strategy and Vision: Goals and their implications for dentistry

- Select the CORRECT answer. Various factors influence workforce forecasting, which one of the factors is very crucial to meet the dental training capacity?
 - Demographic changes such as an ageing population
 - Planning
 - Burden of dental diseases.
 - Oral health surveys
 - None of the above

- Choose the CORRECT answer. What criteria is recommended that should be added for entrance to dental school
 - Only GR11 results
 - Only GR 12 results
 - Candidate's marital status
 - Type of school attended during grade 12
 - All of the above
- Select the CORRECT definition. Which of the statements clearly defines a productive health workforce
 - When health workers are equitably distributed and accessible by the population,
 - When health workers possess the required competencies
 - When health workers and are motivated and empowered to deliver quality care that is appropriate and acceptable to the sociocultural expectations of the population
 - When health workers are adequately supported by the health system
 - All of the above

Students' knowledge, attitudes and practices related to infection control in undergraduate dental clinical training during COVID-19 – A report from one South African university

- Select the CORRECT statement regarding student perceptions on aerosol production from ultrasonic scalers and dental hand pieces
 - Almost 36.3% of third year students strongly agreed/agreed that an aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces
 - Almost 15.9% of third year students strongly agreed/agreed that an aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces
 - Almost 36.3% of second year students strongly agreed/agreed that an aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces
 - Almost 15.9% of second year students strongly agreed/agreed that an aerosol is produced from dental instruments such as ultrasonic scalers and dental hand pieces

8. Select the CORRECT statement concerning beliefs that personal protective gear is sufficient protection for students.
- Study participants in the first (14.9%) and second year (21.5%) believed that personal protective gear (gloves, masks, scrubs, eye wear) was sufficient to protect them from COVID-19.
 - Study participants in the third (21.5%) and second year (14.9) believed that personal protective gear (gloves, masks, scrubs, eye wear) was sufficient to protect them from COVID-19.
 - Study participants in the first (21.5%) and second year (14.9) believed that personal protective gear (gloves, masks, scrubs, eye wear) was sufficient to protect them from COVID-19.
 - Study participants in the first (21.5%) and third year (14.9) believed that personal protective gear (gloves, masks, scrubs, eye wear) was sufficient to protect them from COVID-19.
9. Select the CORRECT statement regarding students' perceptions of vulnerability
- All students perceived a great level of vulnerability to COVID-19 infections
 - Final year students perceived a great level of vulnerability to COVID-19 infections
 - Students did not perceive any level of vulnerability to COVID-19 infections.
 - Second and third year students perceived a greater level of vulnerability to COVID-19 infections.
10. Select the CORRECT option. The following can be considered for class room-based learning:
- protocols for infection control
 - increased physical spacing/social distancing in classrooms,
 - mandatory wearing of face masks,
 - All of the above
 - None of the above

The attitudes and perceptions towards the Covid-19 vaccine among dental staff at the University of the Western Cape, South Africa

11. Select the CORRECT answer. What percentage of participants had vaccine hesitancy?
- 8.57%
 - 7.62%
 - 9.62%
 - 17.14%
12. Which of the following is CORRECT. What percentage of participants think that Covid-19 will be eradicated?
- 76.19%
 - 95.24%
 - 89.52%
 - 7.62%
13. Choose the CORRECT option. The mean attitude scores for males was higher than females and was
- 2.969
 - 3.075
 - 3.604
 - 3.500

An evidence-based guide to occlusion and articulation. Part 6: Artificial jaws: articulators real and imagined

14. Select the CORRECT statement. A pure hinge movement articulator
- Is suitable for complete dentures
 - May be suitable for single posterior restorations that contact only in centric
 - Reproduces the hinge axis of the mandible
 - None of the above
15. Which statement is CORRECT. An arcon semi-adjustable articulator
- Has the condyle on the upper member
 - Has the fossa on the upper member
 - Has the fossa on the lower member
 - None of the above
16. Select the CORRECT option. An ear-piece facebow allows for the mounting of the maxillary cast using
- The inter-condylar axis
 - An axis through the external auditory meatus
 - A kinematic axis
 - An axis determined at a distance and angle relative to the external auditory meatus
17. Which of the following statements is CORRECT. A study which measured occlusal errors comparing a facebow and individual settings with average settings found occlusal errors of
- More than 2 mm
 - About 500 μm
 - No more than 300 μm
 - None of the above
18. Choose the CORRECT answer. A sensible articulator to use when making complete dentures is:
- An average-value articulator
 - A simple hinge articulator
 - A semi-adjustable articulator with a facebow
 - A hinge articulator that allows some movement of the upper part

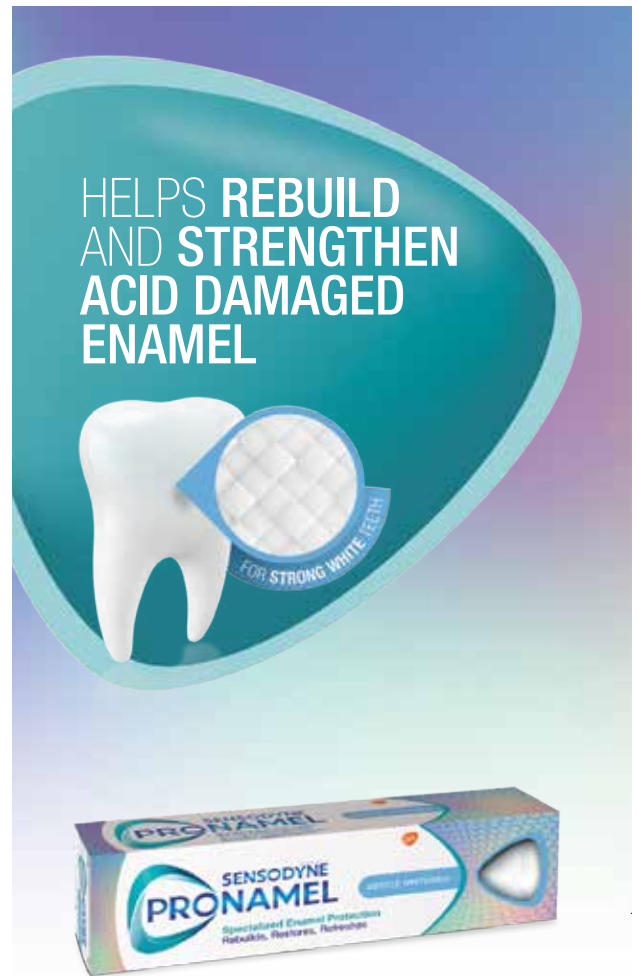
Evidence Based Dentistry

19. Choose the CORRECT answer. When a study is classified as having "a high risk of bias", it implies that:
- The results of the study is high quality
 - The results of the study is based on large numbers
 - The results of the study should be viewed with caution
 - The results of the study is supported by good quality studies.
20. Select the CORRECT option. In the Jafari et al study, the pooled results from the 12 trials showed that greater adherence to the PBDs (highest vs. lowest category) was significantly associated with:
- A lower risk of stroke
 - A lower risk of all-cause mortality
 - A lower risk of CHD
 - A lower risk of Cancer

CPD questionnaire

Ethics: On being self-ish

21. Which of the following are CORRECT. According to Grant, a successful giver:
- Is more concerned for others than themselves
 - Hopes that in giving they will receive equal or more in return
 - Is ambitious and will strive to reach their highest potential
 - All of the above are correct
 - None of the above are correct
22. Select the CORRECT answer. Apathetic practitioners may be seen as those who:
- May practice outdated dentistry
 - Don't have much interest in updating their skills
 - May be unintentionally negligent towards their patients
 - Only a) and b) are correct
 - All the above are correct
23. Which is the CORRECT answer. Practitioners who are selfish takers may:
- Favour prevention over intervention to save patients from clinical fees
 - Be susceptible to malpractice if they over service their patients
 - Be guilty of malpractice if they use expired materials to save on costs
 - Only b) and c) apply to them
 - All of the above apply to them
24. Choose the CORRECT option. Which of the following may be considered unethical practice:
- Clinicians who sponsor materials for patients who cannot afford them
 - Clinicians who do specialist treatment for patients who cannot afford to consult a specialist
 - Clinicians who work overtime and deprive themselves of relaxation
 - Clinicians who use the cheapest materials possible
 - Clinicians who refuse to treat non-emergency patients on public holidays
25. Select the CORRECT answer. The balanced and ethical clinician will:
- Practice according to high legal and clinical standards
 - Know when and how to set personal boundaries
 - Strive to preserve their own well-being
 - All of the above are correct
 - Only a) and b) are correct



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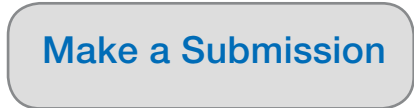
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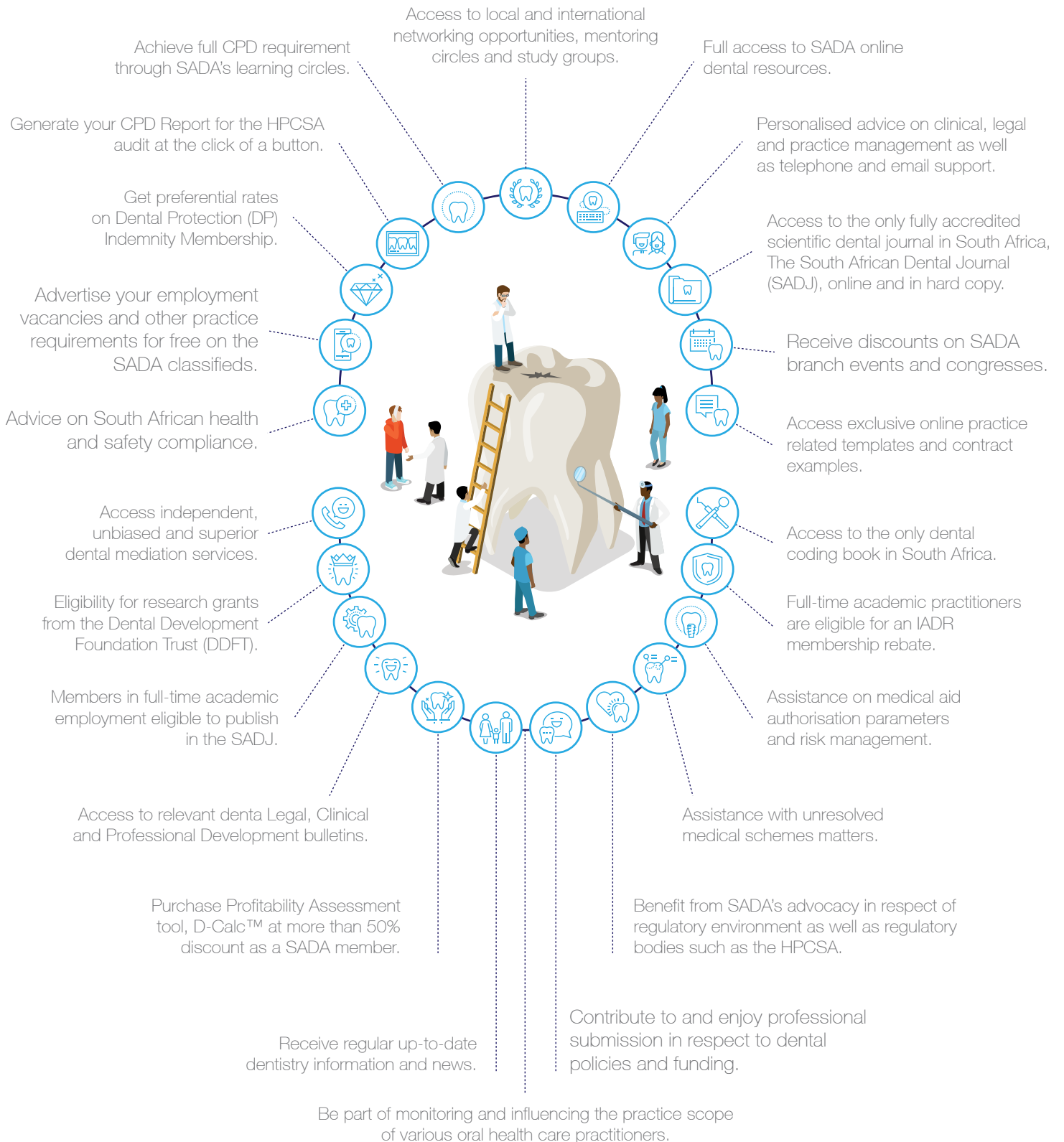
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