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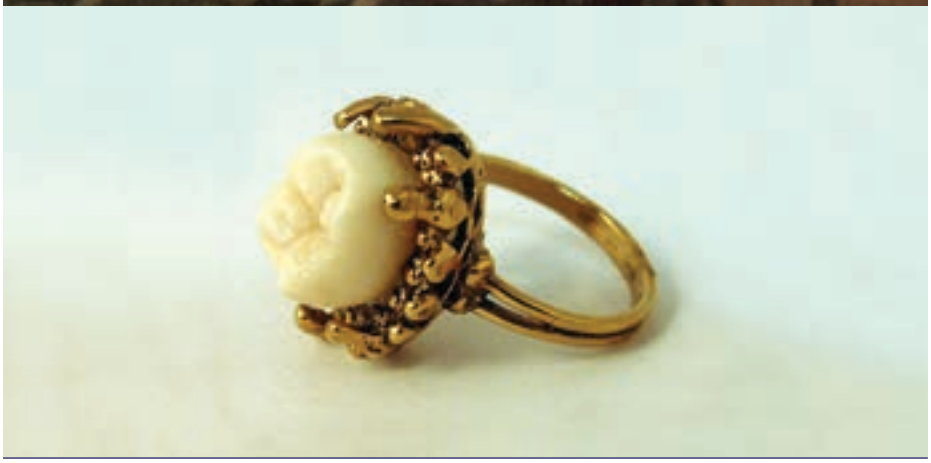
SADA
THE SOUTH AFRICAN DENTAL ASSOCIATION

Sir Isaac Newton



Sir Isaac Newton:
Sir Isaac Newton (1642 to 1727) …mathematician, physicist, astronomer, theologian, author …he of the falling apple story… who lost a molar which was later sold in 1816 for 730 pounds... about 30,000 dollars today. The tooth was apparently set in a ring... which has never since been seen.

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CONTENTS

Our Front Cover for this Issue…

Teeth have on occasion been central to historical, social and humorous events. The **Front Cover** in 2019 will reflect some of these **Famous Teeth.**

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PRODUCTION OFFICE
E-Doc c.c.,
a Division of Life-Long Learning Solutions c.c.
Tel: +27 (0)10 020 1013

Publisher and Project manager
Mr René Smulders

GENERAL AND ADVERTISING ENQUIRIES
Mr René Smulders
Email: rene@edoc.co.za

Design and Layout
Ms Reine Combrinck
Email: production@edoc.com

Website smalls advertising / CPD Enquiries and Member contact detail update
South African Dental Association
Tel: +27 (0)11 484 5288
Email: info@sada.co.za

CONTENTS

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Experience in cavities

SADJ August 2019, Vol. 74 No. 7 p355

WG Evans

The great paradox in Dentistry is that, reduced to the sublime, if not to the absurd, the profession may well be challenged by the enquiry.. why so many specialisations for so small a cavity? Look to an Orthodontist for part of the answer.. Robert Murray Ricketts (1920-2003) emphasised the importance of the mouth; in general health, in communication, in nutrition, in social standing, in sex, in speech, in expressing emotion.

The mouth is second only to the eyes in terms of the focus of attention of an onlooker. No wonder that the World Web of Science records increasing numbers of research papers on Dentistry and related topics.

A study published in 2012 recording the trends in this esoteric section of science found a contribution of 55,056 citable papers over the three decades ending in 2008. A rather daunting prospect for the aspirant researcher! The four main themes of the papers were Materials, Prosthetics, Orthodontics and General Dentistry.

The United States produced 12,742 papers in this period, a contribution overall of 23%. South Africa? well we managed 299, a contribution of 1%! But do not despair ...we were in the company of Denmark, Norway, Spain, South Korea, Taiwan, Greece, Belgium and India... all at the 1% contribution level! And lets be realistic... the USA boasted a population in 2008 of 304, 09 million, whilst South Africa held 48-69 million. Translate those data into dental research papers as a percentage of total population, and the USA proportion is 4%.. that in South Africa… 6%! A small victory!

The point is that out there the quantum of knowledge is burgeoning so rapidly that keeping up..an imperative of the HPCSA… is becoming rather a daydream, even for the most diligent and voracious reader. Again do not despair.. attendance at congresses offers a practical solution. Here registrants have the opportunity to rely on the leaders in the profession to deliver the goods on the developments and advances in their fields. Learning, then, is one good reason to attend congresses.

What of other considerations affecting decisions to register? The list may include Discussion with experts and colleagues; Benefitting from seeing new methods of presentation; Visiting new places and travelling; Networking nationally and internationally: Academic benefits including enhancing CV's: Reputation… proving to peers your consummate interest in the discipline.

WG Evans: Managing editor, Email: bill.evans@wits.ac.za

Other comments include Visiting the exhibitors to learn about new products and developments, and of course there is the satisfaction of gaining CPD points!

And there are many opportunities to attend... a computer site on World Dental Conferences in 2018 listed 32 International Dental Congresses, one of which (Oral Care and Dentistry) was held in Cape Town). There have already been 19 congress events in 2019, with an additional 19 yet to be held.

And of course the JOURNAL has published details of the 2019 Congress of the South African Dental Association Congress to be held in Durban, 30th August to 1st September… a marvellous panorama of contemporary Dentistry. For all those good reasons, attendance is highly recommended. But there is an additional reason which at first may appear a little irrational… and it is associated with experience.

Perhaps the wisdom of the famous may be helpful: Paulo Coelho commented, a little wryly: "People never learn by being told, they have to find out for themselves." More positively, Immanuel Kant observed "It is beyond doubt that all our knowledge begins with experience". Einstein also contributed "The only source of knowledge is experience".

I believe that a tremendous benefit of attending congresses is that the experience of registrants may be confirmed. To listen to a leading expert and to be reassured that in fact you are on the correct track.. what a comfort, what a boost!

To listen to an expert and to realise that the most recent developments can readily be incorporated into your practice, because of your experience… what an excitement! Sharing your experiences... what a pleasure!

And if this happens to be your first congress... rejoice at the thought that you will experience so many more as you take advantage of all that is on offer.

Experience with that small cavity makes the world your oyster!

Women in Dentistry

SADJ August 2019, Vol. 74 No. 7 p356

NP Metsing

Growing up I used to be really terrified of Dentists and as I do some introspection into why that may have been, one reason may be the fact that at that time there were not too many female dentists in practice, with whom I may have established some empathy. In fact, I have had more than five extractions and all were done in theatre, not because they were complicated cases but simply because my anxiety levels were just too high.

Why then did I choose a career in Dentistry, one may well ask? And this is a question I still get asked today. I have some challenge in answering… perhaps it is because when you are passionate about something the reasons do not matter anymore. The answer borders somewhere between passion ...or actually wanting to help people who may be as terrified of dentists as I was, to get over their genuine fear. I have actually received good feedback from my patients in this regard.

The earliest evidence of a female dentist is Emeline Roberts Jones who became the first woman to practice dentistry in the United States. She married the dentist Daniel Jones when she was a teenager, and became his assistant in 1855.

Women form an increasingly important part of the dentally trained workforce in South Africa. However, little is known about the professional issues and work-related problems affecting women dentists, according to an abstract which was published in the August 2005 issue of the SADJ.

A treatise submitted by Rajeh reported that women dentists are less likely to be married and to have fewer children.[1] Women are more likely to assume child rearing and household responsibilities.[1] They are less likely to be practice owners, work slightly fewer hours per week and weeks per year, and are more likely to take a leave of absence for illness or child rearing. However, women dentists demonstrate a far greater professional work commitment than was previously reported in the literature. Women earn significantly less income from the practice of dentistry, even after controlling for age, practice ownership, hours worked per week, and other personal characteristics.

As much as these results are from almost 30 years ago, the same phenomena still exist today according to my observations. This may be the reason why many female dentists find themselves being exploited (even by other women) and being subjected to poor conditions of employment.

Nthabiseng P Metsing: Head, Professional Development, SADA

Of course, I understand that the negative working conditions may not only befall women, however women are affected in larger numbers. A good example is that of a particular doctor who had completed her Dentistry degree in 2017. She called my office and was very emotional. This was because after her Community Service she decided to go into partnership with an established and experienced Dentist. They went 50/50 on the start-up capital, and the agreement was that the senior doctor would deal with the claims as well as the financial distribution. To make a long story short, the junior doctor realised, three to six months into the business, that she was being seriously short changed. The senior doctor was telling her that they were not making enough profits when she, the senior partner, was pocketing most of the money!

This and other stories make the industry unbearable for most women and frequently they end up leaving the profession, or joining universities. Lack of support from government resources may also be a reason for their abandoning the profession. I mean, one spends five years learning the art and craft of Dentistry so that you are able to practice and also teach people the benefits that a dentist can provide, only to find that because of cost cutting mechanisms, society is deprived of comprehensive medical care. This can be frustrating at times and may lead to professionals exploring other options.

I think that most dentists undertake studies in the field because they have a passion for the discipline, but also because it is a profession which, at least until recently, provides job security. Now if the latter is taken into consideration and conflated with the above factors affecting women, it may be seen that women in the profession are placed in a very compromising situation which may result in many leaving the profession. Women are innate nurturers. Dentistry requires a lot of that skill to be able to nurture those who are in pain. It would be a sad day indeed for me if I were to see women in large numbers being so despondent that they are leaving the profession. Sadly however, this is a growing phenomenon.

I am a strong believer that as women we should not wait for the males to help us in overcoming our challenges. We need to support each other and look out for each other. This I say because we have a new generation of professionals who need to be welcomed and retained in the profession.

Reference

1. Rajeh, M. Female dentists: their professional lives and concerns. Coll Dent. 1991 Fall; 58(3):12-8.

A farewell to Noko Reagan Mojela

SADJ August 2019, Vol. 74 No. 7 p357

The familiar voice on the phone, the characteristic and often laconic emails... that is Noko, the Journal mouth piece at Head Office. But he is to leave us and those dulcet electronic tones will not now echo over the Association telephones. Noko came to us in December 2016 and rapidly assimilated the intricacies of the publishing of the South African Dental Journal, assisted no doubt by his BA qualification in Media Studies.

It was clear that Noko truly enjoyed handling much of the incoming correspondence and soon gained sufficient confidence to be reminding the Managing Editor of tasks awaiting attention! He demonstrated a commitment and involvement, frequently making sound judgements and offering sage advice. Always a smile, always a willingness to pile more on his plate, for he also handled much other than the SADJ… but the Journal remained his first love. His interest is most recently shown by his initiative in preparing a Manual for the production of the Journal, a document which will be an invaluable guide for his successor.

Noko is to assume a position at Unisa as a lecturer and he departs from SADA carrying with him the sincere appreciation of the Journal and the good wishes of all who dealt with him at Head Office.

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The epidemiology and management of traumatic facial fractures in children seen in a tertiary hospital in Johannesburg, South Africa

SADJ August 2019, Vol. 74 No. 7 p358 - p363

G Fouche[1], M Mabongo[2]

ABSTRACT

Introduction

Serious head and facial injuries contribute as one of the leading causes of higher injury severity scores, prolonged hospital stay, mortality and morbidity in young children.

Aim

To determine the prevalence of traumatic facial fractures in children under the age of 15 years in Johannesburg, South Africa.

Objectives

To determine the aetiology, age and gender mostly affected, identify anatomical distribution with associated injuries and to record the management of facial fractures.

Methods

This was a retrospective study based on data retrieved from admission records.

Results

Of the 4044 admissions, 171 children had facial fractures, a prevalence of 4,2%. Most patients were males. The mean age was 6.45 ± 3.47 years.

The most frequent causes of the 247 facial fractures recorded were pedestrian vehicle accidents (PVAs), motor vehicle accidents (MVAs) and falls. The frontal bone followed by the orbital bone were the most common fracture sites.

Twelve patients showed ophthalmic/globe involvement, 49 had an associated tooth injury, 117 had associated bodily injuries and 435 facial soft tissue injuries (STIs) were detected. One hundred and nine (63.7%) patients were managed conservatively, while 58 (34.0%) required surgical intervention.

Conclusion

There is a statistically significant association between age and the cause of fracture.

Keywords

Maxillofacial, trauma, fractures, paediatrics, children.

ACRONYMS

MVAs:	Motor Vehicle Accidents
NOE:	Nasal-Orbital-Ethmoidal
PVAs:	Pedestrian Vehicle Accidents
PCC:	Road Traffic Accidents

INTRODUCTION

Serious head and facial injuries are recognized as some of the leading causes of higher injury severity scores, prolonged hospital stay, morbidity and mortality in young children.[1-6]

In some countries head injuries remain the most common cause of mortality in paediatric patients,[4,5] whilst traumatic dentoalveolar injuries are generally considered as a serious public dental health problem amongst young children.[1,4] Facial fractures do occur less frequently in children than in adults,[7] and paediatric patients are more likely to sustain greenstick or incomplete fractures and fractures that are less likely to have multiple communications.[7,8]

Previous retrospective studies of paediatric maxillofacial trauma show a facial fracture prevalence range of 1%-14.7% in children under 16 years of age.[1-3,9-13]

Author affiliations:

1. **Gerhard Fouche:** *BChD (Stellenbosch/UWC), MSc (Wits),* Annex 7 Wilgeheuwel Hospital, Amplifier road, Radiokop, Johannesburg, South Africa.
   ORCID Number: 0000-0002-2409-1504
2. **Mzubanzi Mabongo:** *STD, B Dent (MEDUNSA), BDS (Wits), MChD (MFOS) (UWC), Cert. Orofacial Pain, FCFS,* Head, Clinical Unit, Department of Oral and Maxillofacial Surgery; University of the Witwatersrand, York Road, Parktown, Level 4, Room 4I09, Johannesburg, South Africa.

Corresponding author: Gerhard Fouche
Annex 7 Wilgeheuwel Hospital, Amplifier road, Radiokop, Johannesburg, South Africa.
Tel: +27 (0)11 675 3026
Email: gfouche@gmail.com

Author contributions:

1. **Gerhard Fouche:** Conception and design of study, acquisition of data, analysis and interpretation of data, drafting of article/critical revision, final approval and guarantor of manuscript - 70%
2. **Mzubanzi Mabongo:** Conception and design of study, acquisition of data, analysis and interpretation of data, drafting of article/critical revision, final approval and guarantor of manuscript - 30%

This low prevalence of facial fractures in children, compared with adults, is most possibly due to particular anatomic features including the under-developed facial skeleton and para-nasal air sinuses; the craniofacial disproportion in size; the thicker layer of surrounding adipose tissue covering the more elastic, thin cortical bones of the paediatric facial skeleton.

The un-erupted dentition of the mandible and maxilla and the lack of sinus pneumatisation provides additional strength and stability of the jaws. The abundance of cartilage and cancellous bone, low mineralization and underdeveloped cortex, and the more flexible suture lines of the facial bones and indistinct corticomedullary junctions, confer greater intrinsic elasticity and flexibility on the paediatric facial skeleton.

The increased number of fat pads around the upper and lower jaws offer protection.[1,3,5,7,8,10-16] With advancing age and physiological development, facial growth increases in a forward and downward direction resulting in prominence of the midface and the mandible, which tends to lead to a decrease in the incidence of cranial and frontal bone injuries and a higher incidence of facial trauma (fracture injuries of the midface, mandible and orbit).[5,11,12,15,16]

Although the incidence rates for causes of injury vary from one country to another, studies from across the world suggest that the most frequent causes of facial injuries and fractures in children are falls, road traffic accidents (RTA), sports, social play and violence.[1-3,5,9,10,12,15,16,18-20]

Child abuse is not an uncommon cause of facial injury.[12] Many cases of child abuse involve trauma to the mouth, face and head.[5] Repeated injuries, multiple injury sites and questionable circumstances surrounding the injury should raise suspicion of possible abuse.[16]

Various studies show that as many as 50%-75% of cases of child abuse involve trauma to the mouth, face, head and neck.[5,13] Males are more likely sustain facial fractures than females.[1-4,9-14,16-18,20]

The most commonly affected sites of facial fracture in children are the mandible[2,3,7-9,11,12,15,16,18-20] dentolaveolar,[1,8] nasal,[2,3,10,16] and upper facial bones (which include the orbital, frontal and nasal-orbital-ethmoidal (NOE) bones),[13] with soft tissue swelling being the most commonly associated injury.[1,8,20]

The management of facial fractures in children is different from that in adults because of growth biology, age related facial anatomy, dental follicles and mixed dentition.[8] Conservative and functional treatment is recommended as the first choice for paediatric fracture, because of the high capacity for fracture remodelling.[7,10,11,15,16]

The aim of this study is to determine the prevalence of traumatic facial fractures in children in Johannesburg, South Africa. The objectives of this study are to determine the aetiology of the fractures, the age and gender most common amongst the affected children, to identify the anatomical distribution of the trauma and any associated injuries, and to record the management of facial fractures.

METHODOLOGY

Study design

This was a retrospective study based on data retrieved from admission records of a trauma unit of a tertiary hospital, from 2011 to 2015. The list of paediatric patients who were admitted for traumatic injuries from 2011 to 2015 was retrieved from the admission books at trauma casualty. In this study paediatric patients included all patients who were 15 years and younger.

The data collected from the admission records were age, gender, aetiology, site of fracture, associated body injuries and management. Patients were divided into three subgroups of age from 0-5 years, 6-10 years and 11-15 years of age. Patients with soft tissue injuries only, above 15 years of age and adults, were excluded from the study.

Ethical clearance for the study was granted by Human Research Ethics Committee (HREC) of the University of the Witwatersrand, protocol M150833 (**Addendum A**).

Statistical analysis

The data was captured into a data collection sheet and then transferred into statistical software (IBM SPSS version 23.0 (R)). Results were analysed by descriptive statistics and illustrated by tables and graphs. The Fischer's exact test was used to determine the association between the dependent and the independent variables.

RESULTS

From the 4044 patient files analysed, 171 (4.2%) paediatric patients with facial bone fractures were recorded. **Figure 1** illustrates the yearly paediatric facial fracture prevalence between 2011 and 2015.

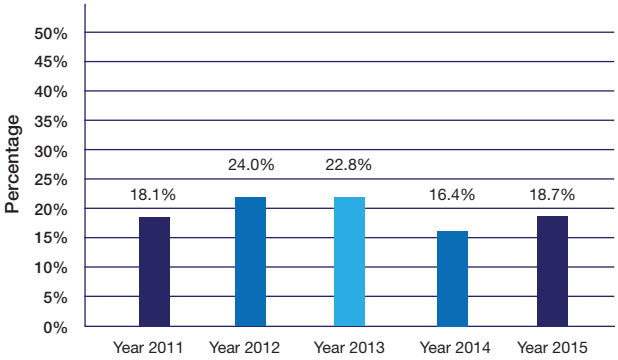

Figure 1. Yearly facial fracture prevalence between 2011 and 2015.

One hundred and nine (63.7%) children were males and 62 (36.3%) were females. The mean age was 6.45 ± 3.47 years. Seventy children (41.0%) were under 5 years of age, 77 (45.0 %) between 6 to 10 years and 24 (14.0%) between 11 to 15 years of age. Thus, 86.0% of patients were 10 years of age and younger.

The most common causes of facial fracture were road traffic accidents (PVA and MVA) in 85 patients (49.7%) and falls in 57 patients (33.3%). Five (2.9%) children sustained facial fractures during sporting events. One (0.6%) child suffered a facial fracture from a bicycle accident.

Table 1. Cause of fracture according to gender of patients

	Female		Male	
Cause of fracture	**N**	**(%)**	**N**	**(%)**
PVA	21	33.9	37	33.9
MVA	13	21.0	14	12.8
Falls	18	29.0	39	36.0
Bicycle	-	-	1	0.9
Sports	-	-	5	4.6
Violence	7	11.3	4	3.6
Hit with gate	1	1.6	7	6.4
Object struck the face	1	1.6	-	-
Not indicated	1	1.6	2	1.8
Total	**62**	**100**	**109**	**100**

Eleven (6.4%) children with facial fractures were involved in violence or abuse, whilst 9 (5.3%) patients were either hit by a gate or other object on the face. The cause was unknown in 3 (1.8%) patients.

The PVA incidence in male and female children were the same, although the MVA incidence rate amongst females was much higher. The facial fracture incidence due to falls was much higher in males. Neither bicycle nor sports injuries were documented amongst females although a 7.6% higher incidence due to violence were noted in females (Table 1).

A higher incidence and total number of PVAs occurred in children 0-10 years of age, although a greater MVA incidence were noted in children older than 10 years of age. Falls were the major cause of facial fracture in children 0-5 years of age, whilst the incidence of falls in children decreased with age. In this study, a higher facial fracture incidence due to sports and violence were noted in children above 10 years of age (Table 2).

Results also showed that children younger than 5 years of age were approximately 16 times more likely, and those between 6-10 years of age almost 10 times more likely, to sustain a facial fracture injury due to falls, than were children 11-15 years of age. There was a significant association between the cause of fracture and the age of patients ($p<0.05$).

There were all together 247 facial bone fractures amongst the 171 paediatric patients. Seventy four fractures of the frontal bone were detected, which was the most common site of fracture, followed mostly by the 53 (21.5%) orbital fractures, and fractures of the maxilla and mandible (Figure 2).

Associated dental injury

Forty nine (28.7%) children with facial fracture had an associated dental injury. The primary or permanent incisors and canines as well as the primary molars were mostly affected. Frequent dental alveolar injuries included mobility, avulsion, displacement, intrusion, fracture or pulpal involvement. Mobility of teeth (in 28 (57.0%) patients) was the most common associated injury in these 49 patients, followed by avulsion and displacement. Sixteen (33.0%) children had multiple dental alveolar injuries.

Associated body injuries

Other bodily injuries noted included injury to the head, to a sinus (which indicated any involvement, opacification or haemosinus) or of any other body part such as the chest, pelvis, limbs and cervical spine. Symptoms such as pain, numbness or nerve damage as well as airway obstruction/involvement were recorded. Of the 171 patients with facial fractures, 43 (25.0%) patients had a single associated bodily injury and 74 (43.0%) patients presented with multiple bodily injuries, whilst 54 (32.0%) of the patient records did not indicate any of these type of injuries. Of the 278 associated body injuries noted, 86 (30.9%) were head injuries. Twelve (7%) patients had associated ophthalmic/globe involvement.

Management

The 247 facial fractures were managed by 216 various treatments. Four (2.3%) of the patient records did not indicate any treatment rendered. One hundred and nine (63.7%) patients were managed conservatively, while 58 (34.0%) required surgical intervention which comprised open or closed reduction, debridement, extractions or other facial or head surgery.

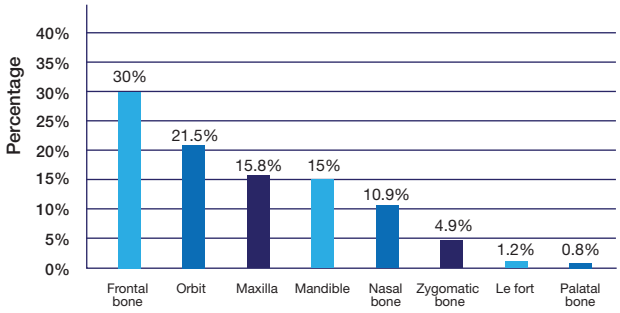

Figure 2. Site of fracture (N = 247).

Table 1. Cause of fracture according to gender of patients

	<1-5 years		6-10 years		11-15 years	
Cause of fracture	**N**	**(%)**	**N**	**(%)**	**N**	**(%)**
PVA	22	31.4	29	37.6	7	29.2
MVA	8	11.4	13	16.9	6	25.0
Falls	31	44.3	24	31.2	2	8.3
Bicycle	-	-	1	1.3	-	-
Sports	-	-	2	2.6	3	12.5
Violence	4	5.7	3	3.9	4	16.7
Hit with gate	3	4.3	3	3.9	2	8.3
Object struck the face	-	-	1	1.3	-	-
Not indicated	2	2.9	1	1.3	-	-
Total	**70**	**100**	**77**	**100**	**24**	**100**

DISCUSSION

A sample size of 171 patients is small compared with the study of Gassner et al.[1] who reviewed more than three thousand patients and the 328 patients in a similar study done approximately 20 years ago in the same unit.[20] However, the current sample size seems to be higher than that of an Indian study of facial fractures which was conducted over a period of ten years.[3] This difference in sample sizes is thought to be related to the new referral system in South Africa, which demands initial assessment of all patients at primary health facilities, which in turn refer to higher level hospitals.

The low facial fracture prevalence of 4.2% in this study demonstrates the impact of the system, compared with other studies who reported prevalences between 4.6% and 19.0%[1,2,5,21-23] (Table 3).

In this study road traffic accidents (RTA) were the most common cause of facial fractures, and were classified into PVA and MVA. This finding concurs with some studies which also reported road traffic accident as the most common cause of paediatric facial fractures.[5,11,12,23-25]

Compared with other local studies that separated PVA and MVA, the findings in this study concurred with Lalloo et al.[25] but differed from Bamjee et al.[20] who reported MVA to be more common than PVA and secondly indicated violence as the most common cause of facial fractures in children.

The increase of PVA as the cause when compared with Bamjee et al.,[20] which was also done in Johannesburg, may be ascribed to the difference in the upper age limit for paediatric cases (18 years in Bamjee et al.[20]), and to changes in the referral system in South Africa.

Anecdotal evidence suggests that political change led to the influx of young people to the cities in search of life opportunities. Lack of recreational facilities, an increase in the informal settlement areas in Johannesburg, driver negligence, insufficient road/pedestrian safety measures, inadequate parental control/supervision or lack of patient education could be an explanation for PVAs being the most common cause of facial fractures in Johannesburg.

Different patterns of aetiology are noted in other international studies. Gassner et al.[1] showed play injuries followed by sporting injuries as the most common causes of facial fracture in children, while other studies revealed falls as the most common cause[2,9,18,21,23,25] (Table 3). Falls were the second most common cause of facial fractures in the current study, and were more frequent in children under 10 years, especially those 0-5 years of age.

The very low number of bicycle accidents and sport injuries seems to suggest that most children were from low socioeconomic background and from schools with little sporting activities. This finding differs with Gassner et al.[1] where play and sporting were the most common causes of maxillofacial injuries.

The incidence of falls tends to decrease with increase in age, and is believed to be associated with development and enhanced control of motoring skills in older children and the lack of defence mechanisms in the very young.[6,16] It can be said that violence does not seem to lead to admissions to a tertiary hospital even with actual change of aetiological patterns, but the change in the referral system has managed to shift high velocity injuries to the tertiary hospital.

Most facial fractures recorded in this study had occurred in children under 10 years of age. This finding concurs with a report on the profile of head injuries, which also occurred mainly in children under the age of five years.[25]

Other studies found a peak in facial fracture incidence in children between 10-15 years of age,[3,10,12,14,18] or an increase in incidence with age.[5,11,12,21,23] Analysis of association between age and aetiology, using Fischer's exact test, showed a statistically significant association between age and cause of fracture with a p-value of 0.01.

Traffic-related strategies have been found to be effective in reducing pedestrian injuries. These include reduced speed limits in residential suburbs, roundabouts, sidewalks, pedestrian refuge islands, skills training, and legislation such as compulsory seat belt use.[25]

The findings of this study suggest that more still needs to be done to reduce road traffic related accidents in Johannesburg. The local municipalities need to make sure that children do not rely on streets as being the only open spaces for playing.

Table 3. Comparison of 5 studies

Study	Country	Study period (years)	Sample	Age limit	Most common aetiology	Most common facial fracture site
Gasnner et al. (1)	Austria	10	3385	15	Play	Maxilla and mandible
Kambalimath et al. 2013 (3)	India	10	112	14	Falls	Mandible
Cavalcanti (4)	Brazil	4	1070	17	Violence	Maxilla
Bamjee et al. (20)	RSA	3,5	326	18	Violence	Mandible
Kotecha et al. 2008 (21)	UK	4	897	16	Falls	Dentoalveolar
This study	RSA	5	171	15	PVA	Frontal bone

The 109 (63.7%) male patients and 62 (36.3%) females resulted in a female to male ratio of 1:1.75. The male predominance concurs with other studies[1-5,9,11,12,14,18-21,23-25] and has been attributed to greater and more dangerous physical activities engaged in by boys[12] and their involvement in outdoor activities and contact sport.[21] However, there are studies that show equal male to female ratios[26,27] which could be explained by societies that do not have different chores for males and female.

Anatomical site

The frontal bone followed by the orbital bone were the most frequent fracture sites in this study. This finding concurs with Van As et al.[24] who also reported these bones as the two major sites of facial fracture in children. Other studies indicated the mandible and maxilla[1,3,5,9,11,12,14,18-20] or the nasal bone[2,10] as the major facial fracture sites.

The variance in the most common sites of fracture may be determined by the cause, age/stage of facial development[22] and mechanism of injury.[1,3,9]

Although the frontal bone was recorded in this study as sustaining overall the highest number of fractures, the incidence of mandibular bone fracture was greater in children older than ten years of age. This might be related to increase in prominence of the mandible[5,11,12,15,17] reduction of soft tissue pad and decrease in elasticity of bone with age.

Associated injuries

Tooth mobility was the most frequent associated tooth injury. Another study revealed the predominance of subluxation.[1] Of the 435 associated facial soft tissue injuries (STIs) noted, 396 (91.0%) were extra oral and 9.0% intraoral which incidence correlates with the 8.0% intraoral incidence reported by Collao-González et al.[2]

Lacerations, abrasions and soft tissue swellings were the most common soft tissue injuries and a similar finding was reported by Gassner et al.[1] and Lalloo et al.[25]

This study revealed that 128 (75.0%) children with facial fractures had multiple associated facial STIs, leading to an incidence greater than other reports.[5,9-11]

The associated bodily injuries amongst 117 (68.0%) children in this study exceeds the results reported by Collao-González et al.[2] and Van As et al.[24] Most children with ophthalmic/globe involvement were under 5 years of age.

Management

This study revealed that the CT scan is the most requested diagnostic imaging. Van As et al.[24] also reported use of CT scan as the primary diagnostic imaging in more than 71% of their patients. Both these studies reported a markedly higher number of frontal and orbital bone fractures, and the proximity of the brain to these bones explains the principal use of CT scans and why neurosurgeons were the most consulted speciality.[3]

In this current study most fractures were managed conservatively, which accords with other studies.[19,21] The elasticity of bone in children tends to result in minimal displacement, and the greater capacity of children's skeleton for remodelling may explain the success of conservative treatment.[7,10,11]

CONCLUSION

This study revealed a facial fracture prevalence of 4.2%. Male was the predominant gender affected, with road traffic accidents being the most common cause of facial fractures. There is a statistically significant association between age and the cause of fracture.

Associated dental injuries, especially tooth mobility, soft tissue injuries and other bodily injuries were common amongst children with facial fractures. Conservative management is the preferred treatment modality in this age group.

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Demographic correlates of oral hygiene among stroke survivors undergoing rehabilitation

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UI Lawal[1], R Ibrahim[2], KJ Ramphoma[3]

ABSTRACT

Introduction

Oral-related health does not primarily attract attention among healthcare providers during planning and processing of rehabilitation after stroke.

Aim

To investigate demographic correlates of oral-hygiene among stroke survivors undergoing rehabilitation.

Methods

A cross-sectional study was conducted to determine the socio-demographic correlates of oral hygiene in stroke survivors receiving rehabilitation at the National Hospital Abuja (NHA), Nigeria. Sixty stroke survivors participated in this study. Sociodemographic factors of age, sex, education, socioeconomic status, type of stroke, duration of stroke and arm dominance were documented. Oral-hygiene was assessed using the Simplified Oral-Hygiene Index (OHI-S) and the Oral Health Impact Profile 14 (OHIP-14). Descriptive and correlation statistics were used to analyse the data collected.

Results

Results showed that more than half of the participants have had either poor or a fair level of oral-hygiene (23% and 30% respectively). Oral hygiene correlated significantly positive with age (r = 0.49) but significantly negative with level of education (r = - 0.67), socioeconomic status (r = -0.61) and place of residence (r = - 0.55).

Conclusion

Oral hygiene is compromised in stroke survivors undergoing rehabilitation and is largely influenced by old age, poor socioeconomic status, low level of education and poor residential status.

ACRONYMS

ADL:	Activities of Daily Living
AKTH:	Aminu Kano Teaching Hospital
CI:	Calculus Index
DI:	Debris Index
NHA:	National Hospital Abuja
OHIP-14:	Oral Health Impact Profile 14
OHI-S:	Simplified Oral-Hygiene Index

Author affiliations:

1. **Isa U. Lawal:** *BSc. (Physiotherapy), MSc.(Ed), PhD.,* Department of Physiotherapy, Faculty of Allied Health Sciences, College of Health Sciences, Bayero University, Kano, Nigeria.
   ORCID Number: 0000-0002-2790-5403
2. **Rabiu Ibrahim:** *BSc. (Physiotherapy), MSc.,* National Assembly Clinic Abuja, Department of Medical Services, Physiotherapy Unit, Abuja, Nigeria.
   ORCID Number: 0000-0002-3560-0159
3. **Khabiso J. Ramphoma:** *BChD, MChD.,* Department of Community Dentistry, School of Oral Health Sciences, Sefako Makgatho Health Sciences University, Pretoria, South Africa.
   ORCID Number: 0000-0001-9975-2912

Corresponding author: Khabiso J. Ramphoma
School of Oral Health Sciences, Sefako Makgatho Health Sciences University, Pretoria, South Africa.
Email: khabiso.ramphoma@smu.ac.za

Author contributions:

RI and IUL developed and conceived of the study title. IUL and RI were responsible for the study design. All authors (IUL, RI and KJR) were involved in determining and developing study materials and methods. All authors contributed in determining the choice of assessment tools included in the study. RI coordinated the data collection. All authors were involved in drafting of the study manuscript. All authors helped in editing the final submitted manuscript. All authors have read and accepted the manuscript.

1. **Isa U. Lawal (IUL):** Principal investigator - 40%
2. **Rabiu Ibrahim (RI):** Research fellow - 36%
3. **Khabiso J. Ramphoma (KJR):** Critical advisor - 24%

INTRODUCTION

Stroke has a significant impact on both the physical and psychosocial well-being of survivors.[1] Traditionally, assessment of the outcome of stroke rehabilitation have been based on indicators of physical function.

Such measures may under-rate the all-inclusive impact of stroke as the focus is only on the physical function, while other health concerns that may arise as a result of the physical impairment are overshadowed.

Individuals who suffered stroke present with different forms of limitations, affecting both the basic and instrumental aspects of Activities of Daily living (ADL), ranging from personal grooming to participation within the community.

These limitations by extension affect specific and general hygiene. One specific aspect of personal hygiene that has received minimal attention, particularly in stroke patients undergoing rehabilitation, is the status of oral hygiene.[2]

Individuals who suffered stroke may have difficulty in independently completing the requisite oral health care tasks because of hemiparesis, hemiplegia, poor grip, ineffective use of the non-dominant hand when this has been spared, lack of coordination, or cognitive deficits.[3]

Consequently and in particular when stroke is accompanied by facial palsy, food can become trapped in the buccal cavity without the patient being aware of the accumulation. Additionally, if optimal brushing is difficult, dental caries and periodontal disease can occur as a result of the increased bacterial load. Moreover, as the saliva becomes populated by high rates of bacteria, these may be aspirated through dysphagia or other conditions, and pneumonia or systemic infection can result.[2]

The literature has evidence that poor oral hygiene occurs among stroke survivors, and that it has been identified as a cause of aspiration pneumonia, systemic infection, endocarditis and even death in patients who have suffered stroke.[2,3]

Notably, the majority of these studies were conducted in the developed parts of the world. There is only limited data from the developing nations on this topic, resulting in a poor evaluation of this crucial aspect of stroke care.

This study investigated the relationship between oral hygiene status and some socio-demographic and clinical characteristics (laterality, duration and type of stroke) in a population of stroke survivors from two Physiotherapy outpatient departments in Nigeria.

METHODS

A cross-sectional survey was conducted on oral hygiene among individuals who had suffered a stroke, and who were attending the Physiotherapy out-patient department of Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria. Participants were sampled through the convenience sampling technique.

Patients who met the inclusion criteria of being diagnosed with a first ever unilateral stroke according to the definition of stroke according to the World Health Organization 4 (and screened by a physician), were ≥18 years of age; with stroke onset ≥14 days; having a score of ≥19 points on the Mini Mental State Examination,[5] were included as participants in the study.

Excluded patients were those still smoking at the time the study was conducted or those who had quit smoking ≤3 months ago and/or had lost at least half of their teeth.

Procedure

A written informed consent document was developed, and it was ensured that all participants read and understood the procedures, and were allowed to ask any possible question(s) before signing consent. Only then did data collection proceed.

The demographic features of each participant were recorded. Assessment of participants for oral hygiene related measures was conducted as detailed below:

Two dental therapists used the Simplified Oral Hygiene Index (OHI-S) to measure oral hygiene status of each patient. The Index is composed of a combination of the Debris Index (DI) and the Calculus Index (CI).

Each of these indices is based on numerical determinations representing the amount of debris or calculus found on the buccal and lingual surfaces of the preselected tooth.

The maxillary and mandibular arches are examined in three segments; each being examined for debris and/or calculus. Six surfaces were selected from the four posterior and two anterior teeth for examination for OHI-S. In the posterior portion of the dentition, usually the first molar but sometimes the second or third molar was examined.

The buccal surfaces of the selected upper molars and the lingual surfaces of the selected lower molars were inspected. In the anterior portion of the mouth, the labial surfaces of the upper right and the lower left central incisors were scored.

For each individual, the debris scores were totaled and divided by the number of surfaces scored. At least two of the six possible surfaces had to be scored and examined before an individual score were calculated. The same methods were used to obtain the calculus score.

The DI and the CI were combined to obtain the OHI-S. The CI and DI values may range from 0 to 3; the OHI-S values from 0 to 6, with lower scores indicating better oral hygiene. The OHI-S is the gold standard for the assessment of oral hygiene.[6]

The data were initially captured in Microsoft Excel 2007; coded in numeric and were exported to SPSS version 20.0 for analysis, including both descriptive and inferential statistics. Visual inspections of box plots, histograms, and skewedness were used to determine variable normality and homoscedasticity. Participants' socio-demographic and study outcome measures were described using frequencies, percentages, means and standard deviations as the case may be for either categorical or continuous variables.

Pearson's moment correlation coefficient and Spearman's Ranking were used to determine the statistical significance and strength of the relationship between variables. The strength of the relationship between independent and dependent variables was described using the correlation coefficient (r) and was based on Cohen's interpretations.[7] A p-value ≤0.05 was deemed statistically significant in all calculations.

Ethical clearance for the study was obtained from the Ethics Research Committee of Aminu Kano Teaching Hospital, Kano with ethical reference number; NHREC/21/08/2008/AKTH/EC/1615.

RESULTS

Demographic features

Sixty stroke survivors participated in this study. The sample consisted of 32 (53.3%) males and 28 (46.7%) females. The mean age of the participants was 55.7±12.9 years (range=22 to 82 years).

Approximately 66.7% of the subjects (n=40) had suffered a stroke more than six months prior to the study, while the remaining 23.3% (n = 14) and 10% (n = 6) had respectively undergone stroke onset between three to six months and less than three months prior to the study.

Most participants (66.7%, n=40) presented with right sided hemiparesis. The majority of the participants had suffered ischaemic stroke (53.5%). Thirty-five stroke survivors (58.3%) had hemiparesis affecting the dominant upper extremity and 25 (41.7%) showed effects on the non-dominant side (Table 1).

Table 1. Means and Standard Deviations of the OHI-S score according to socio-demographic and clinical characteristics.

Variables (n=60)	n (%)		OHI-S Mean ± SD
Gender			
Male	32	(53.3)	2.42 ± 1.34
Female	28	(46.7)	2.22 ± 0.91
Level of education			
None	14	(23.3)	3.82 ± 1.32
Primary	8	(13.3)	2.04 ± 0.70
Secondary	10	(16.7)	2.22 ± 0.54
Tertiary	28	(46.7)	1.71 ± 0.51
Socio-economic status			
Lower	18	(30.0)	3.43 ± 1.26
Middle	36	(60.0)	1.92 ± 0.73
Higher	6	(10.0)	1.47 ± 0.22
Place of residence			
Urban	41	(68.3)	1.91 ± 0.79
Rural	19	(31.7)	3.23 ± 1.31
Type of stroke			
Hemorrhagic	28	(46.7)	2.47 ± 1.26
Ischemic	32	(53.5)	2.20 ± 1.05
Duration of stroke			
< 3 months	6	(10.0)	1.75 ± 1.13
3 to 6 months	14	(23.3)	2.17 ± 0.89
> 6 months	40	(66.7)	2.47 ± 1.23
Side affected/arm dominancy			
Dominant side	35	(58.3)	1.75 ± 1.13
Non-dominant side	25	(41.7)	2.17 ± 0.89

Oral hygiene and socio-demographic characteristics

Study findings showed a significant correlation between age and oral hygiene (r=0.492, p<0.001).

Further-more, significant relationships were observed between the level of education attained by stroke survivors (r=-0.672, p<0.001); level of income (r=-0.608, p<0.001); place of residence (r=0.550, p<0.001) and oral hygiene (Table 2).

Table 2. Pearson's Product Moment Correlations for Socio-demographics and clinical features with OHI-S (n = 60)

Variable	OHI-S	p-value
Age	0.492***	<0.001
Gender	-0.13	0.924
Level of education	-0.672***	<0.001
Level of income	-0.608***	<0.001
Place of residence	0.550***	<0.001
Duration of stroke	0.200	0.120
Type of stroke	-0.115	0.381
Side affected/arm dominancy	-0.163	0.215

***significant at level ≤ 0.001

DISCUSSION

This study investigated the demographic and clinical correlates of oral hygiene post stroke. The findings indicate that oral hygiene has significant correlations with age, level of educational attainment, socioeconomic status, community of residence and laterality.

On the other hand, dominance, gender, onset and type of stroke were shown to have no significant association with oral hygiene among individuals who have suffered stroke.

The majority of the participants in this study were male, which is in line with a previous study carried out in Kano, in Northwestern Nigeria, in which the the number of male stroke survivors was almost twice the number of female participants.[8] Generally, stroke is more prevalent in men than women in most age groups except for very old age, greater than 80 years.[9,10,11] This epidemiologically established gender difference in the distribution of stroke is reflected in this study.

The mean age and age range (55.7±12.9) of the participants is also similar to those reported in a previous study (55.0±16.5).[8] Stroke is mainly a disease of the elderly and the majority of those affected were in their fifth decade of life or more.[12] Additionally, 58% of participants in this study presented with the dominant side affected, specifically suggesting left hemispheric lesion.

A previous study reported a higher frequency of left hemispheric ischaemic stroke, at 54%.[13] The most common stroke type among participants in this study is ischaemic (54%) and this is consistent with several epidemiologic studies.[8,14-16]

The findings of the current study indicated that older stroke patients presented with poorer oral hygiene. Old age as a stage in life is associated with declining personal hygiene which has been linked to self-neglect.[17] Age challenges have been found to influence the ability of stroke survivors to perform self-care.[18]

Even in the absence of stroke, approximately, 40% of individuals aged 60 years and above need some assistance to perform at least one instrumental activity of daily living.[19]

This is expected to worsen when stroke sets in and, as social experience confirms; it is very common that the older one gets, the lesser the concern with

personal hygiene, especially oral hygiene. Hence, in the presence of stroke which can disable its survivors, oral hygiene tends to be forgotten or neglected completely.

Therefore, the finding of poorer oral health status among older stroke patients is not unexpected, calling for further attention to the oral hygiene of especially elderly stroke survivors by the health professionals and family caregivers. This finding is consistent with another study where older stroke survivors were reported to show a poor state of oral health.[20]

There was no significant gender relationship reflected in the oral hygiene of stroke survivors, contrary to findings among healthy individuals where gender was found to be a major determinant of oral hygiene status, with females having the better record.[21] However, a previous study demonstrated that gender was not associated with utilization of oral health services (such as dental visitation) among healthy Nigerian adults.[22]

It is believed that the better oral hygiene reported among healthy women is specifically attributed to enhanced oral hygiene-seeking behaviour exhibited by women as compared with men.[23] Our results showed that this oral hygiene-seeking behaviour is not differentiated between genders and therefore, gender does not influence the oral hygiene status among stroke survivors. This empasises that equal attention in oral health should be given to both male and female stroke survivors undergoing rehabilitation.

The level of educational attainment was found to be significantly related to the oral hygiene status of stroke survivors; the higher the level of education (tertiary) the better the oral hygiene status. This finding is similar to the finding of another study which alluded to the fact that lack of tertiary education was significantly associated with poor oral health.[24] There is a correlation between educational attainment, socioeconomic status, urbanization and oral health status.[25] Having acquired higher education may have the advantage of exposing an individual to the knowledge and importance of oral health, resulting in the individual exercising greater attention to oral hygiene. In contrast, when knowledge is lacking, not much attention will be given to the oral health until such time when a discomforting condition is developed.

Level of income is a major determinant of economic status; the study results showed that about 37% of oral hygiene status is “explained” by the economic status of the individual. Findings indicated that participants belonging to the lower economic class presented with significantly poorer oral hygiene status compared with those belonging to the middle and upper economic classes. However, a previous study reported that the impact of education on oral health is much stronger than the financial capability.[26]

Nevertheless, in most developing countries such as Nigeria, financial capacities at times do have a greater impact on the social wellbeing of an individual. The more financially buoyant an individual, the more ready the access to social/health services. Stroke survivors of the low income class will be left overwhelmed by the costs of treatments and rehabilitation services for their condition and therefore, may have challenges in attending to their oral hygiene or oral health.

This can happen to even those stroke survivors who have attained a sufficient level of education but are of low income class. They may be left with the only option of depending on local means of oral hygiene care practices such as the use of chewing sticks, ashes or charcoal powder which may be inadequate in maintaining sufficient oral hygiene.[27,28]

Place or community of residence has an impact on the oral hygiene of stroke survivors, those who reported living in urban communities showed significantly better oral hygiene status compared with those living in the rural communities. This finding is in agreement with another study that showed that urban people were more likely to have their teeth cleaned compared with rural people.[29]

This could be explained by the fact that traditionally, in developing countries such as Nigeria, and particularly in the Northern part, individuals who belong to the high socio-economic class and those who attained a higher level of education tend to live in urban areas, even if they originated from rural communities. The existence of social amenities, potentialities and opportunities attracted them to the urban areas, consequently leaving the rural communities populated with a lower socio-economic class.

Most of the rural communities are lacking basic social amenities such as oral health care facilities and items used in achieving good oral hygiene like tooth paste and tooth brushes. Stroke survivors who belong to such rural communities may therefore not have adequate access to such items and facilities. Perhaps only those few educated individuals may have to depend on the local means of oral health care. As reiterated earlier, financial capacity and knowledge play roles in one’s ability to keep a good oral hygiene. This calls for more attention to be given to oral health during the assessment and rehabilitation of individuals who suffered stroke, particularly those living in rural communities.

It is expected that those stroke survivors with the dominant arm affected might not be able to carry out optimal brushing or mouth cleaning and as such may have poorer oral hygiene. In contrast, this study finding showed that the affected side has no relationship with oral hygiene maintenance in stroke survivors. This finding is in agreement with a previous study which concluded that paralysis of the dominant hand had no added effect on physical functioning in stroke survivors.[30] Moreover, our study findings indicated that even at three months after onset of stroke, involvement of the dominant arm may have no impact on ADL such as oral hygiene care practices.

However, it is worth noting that some of these stroke survivors are indeed not able to take care of their oral hygiene, and might have to depend on their caregivers for the task. If the latter is dedicated and efficient, the

side affected might not be a hindrance to good oral hygiene, and perhaps this explains the finding of this study; that the side affected has no impact on the oral hygiene of stroke survivors.

The type of stroke (ischaemic versus hemorrhagic) was also demonstrated to have no impact on the oral hygiene of stroke survivors. Both ischemic and hemorrhagic stroke survivors were shown on average to have fair oral hygiene status. This finding is not unexpected, as the type of stroke may not necessarily denote the severity of manifestation, especially at a chronic stage. The area and the extent of the involvement in the brain will rather determine the severity of the manifestation. Even though a previous study reported evidence of better functional prognosis in stroke survivors with hemorrhagic stroke,[31] our findings indicated that the type of stroke was not related to oral hygiene.

Duration (time since the occurrence of stroke) amongst stroke survivors was shown to have no relationship with oral hygiene status. This finding is in the direction of a previous investigation, where the authors demonstrated no significant differences in the Calculus-Plaque index scores between participants having different durations since stroke.[13] These findings are not unexpected as there are stronger factors that determine the oral hygiene status of stroke survivors; such as socioeconomic status, level of education, age, family and whether the patient is an acute, sub-acute or chronic stroke survivor.

The oral hygiene status will depend on these factors rather than the duration of time since the occurrence of the stroke. Also, family caregivers, when present and active, can mask the effect of time on the general hygiene (including oral hygiene) of the stroke survivor. Therefore the implication of these findings is that attention should be given on the oral hygiene of all stroke survivors from day one, irrespective of the duration of the stroke.

CONCLUSION

A number of stroke survivors undergoing rehabilitation do present with poor oral hygiene. Several socio-demographic factors (level of education, level of income, age and community of residence) recorded a significant relationship with the oral hygiene status post-stroke. Therefore, those stroke survivors with poor formal education, low level of income, old age and/or living in the rural areas may require extra attention specifically on oral hygiene and general hygiene during rehabilitation planning and subsequent care.

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The dimensional distortion of acrylic resin denture bases subjected to dual cure methods

SADJ August 2019, Vol. 74 No. 7 p370 - p372

MG Thokoane[1], CP Owen[2]

ABSTRACT

Introduction

Appropriatech is a philosophy under which methods have been proposed to reduce the number of visits necessary for procedures such as complete denture therapy, thereby reducing costs. One such method uses acrylic bases after the first visit which will require a subsequent dual cure which may produce distortion of the base.

Aim

To measure the three-dimensional distortion of different dual curing methods using the same resin.

Methods

A standardised maxillary denture base with teeth was created. Markers were set at different heights, to enable three-dimensional recordings, taken to an accuracy of 4 µm using a reflex microscope. First, the teeth were set in wax on the clear acrylic heat-cured base, and the positions of the markers recorded. These bases were then subjected to a second processing, and measurements again taken. Four dual curing methods of varying temperatures and times were used.

Results and conclusions

All methods produced similar three-dimensional distortions of the denture base but the distortion was small, not affecting the fit or retention of the base. The most rapid method can therefore be used for a second cure onto an existing denture base.

Author affiliations:

1. **Meriting G Thokoane:** *BDS, DPh, MDent.*, Specialist, Department of Prosthodontics, School of Oral Health Science, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
   ORCID Number: 0000-0001-6820-0875
2. **C Peter Owen:** *BDS, MScDent, MChD, FCD(SA),* Professor Emeritus, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.
   ORCID Number: 0000-0002-9565-8010

Corresponding author: C Peter Owen
Professor Emeritus, Faculty of Health Sciences, University of the Witwatersrand, 7 York Road, Parktown, Johannesburg, South Africa.
Email: peter.owen@wits.ac.za

Author contributions:

1. **Meriting G Thokoane:** Helped devise, and carried out the method and data gathering, and contributed to the writing - 70%
2. **C Peter Owen:** Helped devise the method and contributed to the writing - 30%

Keywords

Denture base, distortion, dual-cure, rapid-cure resins.

INTRODUCTION

Mucosa-borne complete dentures are the only treatment available for the majority of patients who cannot afford the alternatives of implant dentistry. Under the philosophy of Appropriatech, abbreviated methods have been proposed to reduce the number of visits necessary, thereby reducing costs.[1]

One such method[2,3] uses acrylic bases after the first visit to record jaw relations, which are then retained as the final bases. This requires a second cure, which raises the potential for distortion of the base.

Previous dual-cure studies have reported distortions that would not be clinically significant. However, they all involve long curing times[4-7] which increase time and costs; if shorter curing cycles could be used, this would be an advantage in many circumstances.

No studies could be found which tested the newer rapid-cure acrylic resins, so this study aimed to establish the distortion from a dual cure, using the same resin but different processing methods.

MATERIALS AND METHODS

Forty heat-cured denture bases were made from casts poured from a single mould. Each base was processed (Sure Acrylic Clear, Kemdent, Swindon, UK) by the same person, using a standard protocol.

After de-flasking and finishing, each denture base had an identical arch of teeth waxed onto it using a standardised mould, and incorporating dowel pins (Pindex, Dentaurum Sweden) in predetermined positions (Fig 1). The brass dowel pins were from a single batch, of a standard size, shape and surface anatomy and were serrated to prevent dislodgement.

The methods used for the second cure are shown in Table 1. All except the first have been shown to be associated with reduced distortion.[4-6] Ten bases per method were used: sample size calculations had shown that at 80% power at the 5% significance level, sample sizes of 3-9 were required to detect large to moderate effect sizes.[8]

The same point on each pin was measured using a Reflex Microscope (Consultantnet Ltd, Cambridge, UK), which measures in three dimensions to an accuracy of 4 µm,[9] and which has been used successfully to measure the 3D distortion of frameworks.[10] The following measurements were made:

1. After waxing the teeth to the base and before flasking
2. Immediately after the second cure and deflasking, but before removing the base from the cast.
3. After removal of the base from its cast.

For each distortion measure, a one-way analysis of variance (SAS Institute Inc., 2002-2010, Cary, NC, USA) was conducted with method as the factor. Where the data did not meet the assumptions of this test, the Kruskal-Wallis test was used. Effect sizes were measured using Cohen's d.

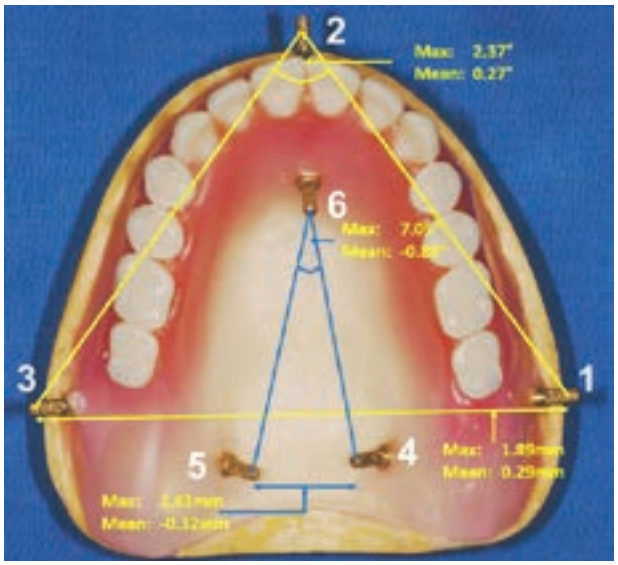

Figure 1. Graphical representation of the maximum and mean 3D changes for the differences between the waxed base and the cured base after deflasking.

Table 1. Curing methods used for the second cure.

No.	Method
1.	Place flask in boiling water* for 20 minutes, remove and plunge into cold water for 20 minutes
2.	Place flask in cold water, allow the water to heat up to 70° C and leave for 1 hour, remove and bench cool
3.	Place flask in cold water. Allow water to heat up to 72° C and leave for 8 hours and bench cool
4.	Place flask in cold water, bring to boil for 40 minutes, bench cool for 45 minutes, then plunged into cold water for 20 minutes

*It should be noted that this study was carried out at altitude, where the boiling point of water is 94°C

RESULTS

There were dimensional changes following the second cure for all curing methods. Measurements were converted to absolute percentage changes for statistical comparisons. Only two emerged as statistically significant.

The first was the absolute 3D change between the waxed base and the deflasked base: the distortion for Method 1 was higher than for Methods 2 and 4 (ANOVA: p = 0.0091).

The effect sizes were large (Cohen's d = 1.2 and 1.7 for Methods 2 and 4, respectively, vs. Method 1). The second was the 3D angular change formed by pins 5, 6 and 4 between the waxed base and the base after removal from the model (ANOVA p=0.0032); the distortion for Method 1 was higher than for Method 4. The effect size was large (Cohen's d = 2.3).

The fact that only two significant differences were found means that it would be prudent to conclude that all methods produce similar distortion on balance and that therefore all methods are acceptable. Tables 2-4 show the mean absolute percentage 3D changes across all methods, and the mean and maximum actual changes for the differences between the waxed base and the final base. Fig 1 shows the maximum and mean changes graphically.

Table 2. Mean absolute percentage 3D changes between the waxed base and the cured base after deflasking.

Dimension measured			
Pins 4 - 5	Pins 1 - 3	Angle 465	Angle 123
2.32%	1.07%	4.34%	1.97%

Table 3. Mean actual 3D changes between the waxed base and the cured base after deflasking.

Dimension measured			
Pins 4 - 5	Pins 1 - 3	Angle 465	Angle 123
-0.32 mm	0.29 mm	-0.86°	0.27°

Table 4. Maximum actual 3D changes between the waxed base and the cured base.

Dimension measured			
Pins 4 - 5	Pins 1 - 3	Angle 465	Angle 123
2.61 mm	1.89 mm	7.05°	2.37°

DISCUSSION

The overall change between the base with teeth in wax and the final base removed from the flasked cast provides the most significant change from a clinical perspective. Although all distances and angles were measured, the prime concern was (a) posterior 3D change which may affect the palatal seal and (b) overall 3D distortion represented by the 3D angular measurements which could affect overall fit and retention.

The amount of distortion is important if the worst distortion is likely to affect the fit and retention of the denture base as well as the positions of the teeth. However, the maximum actual and percentage differences between the waxed base and the off-cast base are such that, in keeping with other studies, these would not be considered to be clinically significant.

CONCLUSION

All methods produced similar three-dimensional distortion of the denture base but the distortion was small and would not affect the fit or retention of the base. The most rapid method, which would save time and therefore money, can be used for a second cure onto an existing denture base.

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Perceptions of quality and safety among dental patients

SADJ August 2019, Vol. 74 No. 7 p374 - p382

E Obadan-Udoh[1], R Ramoni[2], S Van Der Berg-Cloete[3], G White[4], E Kalenderian[5]

ABSTRACT

Introduction

From the perspective of patients, quality of care can be defined as the ability of healthcare products and services to satisfy their stated or implied needs. Dental professionals have a moral obligation to deliver the best quality care in today's increasingly informed, consumer-driven society.

Aim

To jumpstart the discussion on assessing quality of dental care, using patient perceptions.

Design

A cross-sectional study of South African dental patients.

Methods

Questionnaires were distributed to all non-emergency, adult patients at a teaching dental hospital in South Africa.

The outcome variables were:

a) Access to Care;
b) Technical Quality;
c) Structure and Facilities;
d) Communication;
e) Global Rating of Safety.

Author affiliations:

1. **Enihomo Obadan-Udoh:** *DDS, MPH, Dr. Med. Sc,* Department of Preventive and Restorative Dental Sciences, School of Dentistry, University of California San Francisco, California, USA. ORCID Number: 0000-0002-1005-7241
2. **Rachel Ramoni:** *DMD, ScD,* Department of Epidemiology and Health Promotion, School of Dentistry, New York University, New York, USA. ORCID Number: 0000-0002-1459-9638
3. **Sophy Van Der Berg-Cloete:** *BChD, MBA, DHSM,* Department of Dental Management Sciences, School of Dentistry, University of Pretoria, Pretoria, South Africa. ORCID Number: 0000-0001-7560-1095
4. **George White:** *BChD, MBA, PhD,* Department of Dental Management Sciences, School of Dentistry, University of Pretoria, Pretoria, South Africa.
5. **Elsbeth Kalenderian:** *DDS, MPH, PhD,* Department of Preventive and Restorative Dental Sciences, School of Dentistry, University of California San Francisco, California, USA. ORCID Number: 0000-0002-4684-9793

Corresponding author: Enihomo Obadan-Udoh
Department of Preventive and Restorative Dental Sciences, School of Dentistry, University of California San Francisco, 3333 California St., Ste. 495, CA 94118, USA; 415.502.6508
Email: enihomo.obadan-udoh@ucsf.edu

Author contributions:

1. **Enihomo Obadan-Udoh:** Principal researcher - 50%
2. **Rachel Ramoni:** Advisor - 10%
3. **Sophy Van Der Berg-Cloete:** Co-investigator - 20%
4. **George White:** Advisor - 10%
5. **Elsbeth Kalenderian:** Advisor - 10%

ACRONYMS

ADA:	American Dental Association
CQI:	Consumer Quality Index
DAEs:	Dental Adverse Events
DQA:	Dental Quality Alliance
DQOF:	Dental Quality and Outcomes Framework
IOM:	Institute of Medicine
NIDCR:	National Institute of Dental and Craniofacial Research
NIH:	National Institutes of Health
PES:	Patient Experience Survey
PRR:	Prevalence Rate Ratios
QUOTE:	Quality of care through the patient's eyes

Results

Overall, 58.6% of the participants had a positive view about the quality of dental care in South Africa. Age, race, marital status, child status, employment status, household income and educational status were associated with higher quality ratings.

The question: "The instrument used in treating me appeared clean" (97.6%) was rated highly, while the question "Whenever I was sent to a new dentist, I had to repeat the tests that I did at the previous dentist" rated very low (36.9%).

Conclusions

The findings suggest that the dental profession still has challenges in meeting the expectations of patients.

Keywords

Healthcare quality, patient safety, patient-reported outcome measures, dental care.

INTRODUCTION

From the patient's perspective, quality of care can be defined as the ability of healthcare products and services to satisfy their stated or implied needs.[1] As defined by the Committee on Healthcare Quality in America, Institute of Medicine (IOM), one of the seven aims for healthcare quality is Patient-centered Care ("providing care that is respectful of and responsive to individual patient preferences, needs and values, and ensuring that patient values guide all clinical decisions").[2]

The committee further describes the core dimensions of patient-centered care as: 1) Respect for patient values, attention to patient preferences and expressed needs; 2) Coordination and integration of care; 3) Information, communication and education;

4) Physical comfort; 5) Emotional support: relieving fear and anxiety, 6) Involvement of family and friends, 7) Transition and continuity.[2] The Picker Institute lists similar concepts as the most important priorities for patients in healthcare but adds an eighth dimension, namely: Access to care.[3]

Specifically pertaining to ambulatory care, the following are described as conditions: Access to the location of hospitals, clinics and physician offices; Availability of transportation; Ease of scheduling appointments; Availability of appointments when needed; Accessibility to specialists or specialty services when a referral is made; Clear instructions provided on when and how to be referred.[4]

Most of these dimensions for patient-centered care were first described by Gerteis et al. in 1993 when they identified the key factors in patient-centered care as: Respect for patients views, preferences and expressed needs; Co-ordination and integration of care; Information, communication and education; Physical comfort; Emotional support and alleviation of fear and anxiety; Involvement of family and friends; Transition and continuity.[5]

The concept of patient-centered care often creates a conflict between patients and providers because patients prioritize different aspects of the care[6-8] and these priorities may influence their perceptions of quality of care.[9] Whilst some would argue that patient perceptions are subjective and therefore unreliable,[10,11] others believe in the inherent value of these assessments because the patient is the primary recipient of care and therefore has the most important perspective.[12]

They posit that there is indeed an instrumental value to patient perceptions of quality due to the far-reaching consequences on the choice of providers or health plans, compliance with medical advice, health outcomes and the expression of grievances or seriousness of malpractice claims.[9,12-16] Therein lies the dilemma between the subjective versus normative assessments of quality in healthcare.[9,17] Some researchers have proposed shifting the focus from patient satisfaction, a narrow and relative concept[1,18] to a more substantive and robust evaluation of patient perceptions of quality, using tools that measure the actual experiences of care.[1,9,17,19-23] The development of the appropriate tools is still at its infancy, as is also the concept of patient-centeredness and its applications to quality of dental care.[24-27]

In addition to the above-mentioned reasons, the desire to promote greater transparency and accountability of healthcare systems underscores the importance of quality measurement.[9] As dental professionals, we have a moral obligation to deliver the best quality care that meets both professional standards and patient needs, the latter especially so, in an increasingly informed, consumer-driven society.[10,28]

The American Dental Association (ADA) through the Dental Quality Alliance (DQA)[29,30] and the United Kingdom Department of Public Health through the Dental Quality and Outcomes Framework (DQOF)[31,32] have laid the foundation for the development of quality metrics in dentistry.[27] Efforts are also ongoing by the second and fifth authors of this paper through grant funding from the National Institutes of Health (NIH)/ National Institute of Dental and Craniofacial Research (NIDCR) - R01DE0 24166-01A1, to implement dental quality measures in dental practices across the United States (US).[33]

The goal of this paper is to jumpstart the discussion on patient perceptions of quality as a useful tool for assessing the quality dental care. In the future, this will offer the profession a screening tool for the quick evaluation of dental practices for high performance or for the identification of areas in need of improvement.

Subsequent steps will involve defining key concepts and outcome measures for patient-reported dental quality as well as developing standardized instruments for measuring that quality.

Surveys have typically been used to garner information about patient perceptions of quality.[9,34] A national survey of dental patients in the United Kingdom by Tickle et al. showed that about one fifth of respondents rated the quality of dental care they received as suboptimal.[35]

The factors that were important in their assessment of quality were: “access (40%), technical quality of care (35%), professionalism (30%), hygiene/cleanliness (30%), staff attitude (27%), pain-free treatment (23%), value for money (22%), and staff putting patients at ease (21%)”.[35] Positive responses were associated with “good interpersonal communication, politeness and being put at ease” while negative responses were associated with poor wait times and high cost of care.[35]

This study used a self-reported survey to assess the quality of care experience among South African dental patients.

METHODS

Survey design

The survey was developed by the authors through an iterative process and tested for validity and reliability. A simple convenience sampling method was used to collect information from all non-emergency, adult patients (>18 years) at a teaching dental hospital in South Africa.

Patients gave their informed consent after reading an information leaflet detailing the research objectives and by completing the survey. Necessary approvals were obtained from the Ethics Committees at the University of Pretoria and the Harvard School of Dental Medicine prior to the commencement of data collection.

Definitions and measures

The questionnaire was subdivided into five main sections: 1) Past dental history and oral health, 2) Quality of past dental care, 3) Experience of dental adverse events (DAEs), 4) Sequelae and follow-up events after DAE experience, and 5) Biographic data.

Results from sections 3 and 4 are discussed in another paper. This manuscript primarily focuses on section 2 (Quality of past dental care) but utilizes variables from sections 1 and 5 for explanatory purposes.

Outcome variables

The five primary outcome variables were: a) Access to Care (7 items); b) Technical Quality, Efficiency and Effective Organization of Care (10 items); c) Structure and Facilities (6 items); d) Communication, Information and Courtesy (10 items); e) Global rating of safety. The first four outcome variables were obtained by classifying the questions from section 2 into patient-defined dimensions of quality identified by Sofaer et al. in their extensive review titled "Patient Perceptions of Quality".[9]

The original seven dimensions were: 1) patient-centered care; 2) access; 3) communication and information; 4) courtesy and emotional support; 5) technical quality; 6) efficiency of care/organization; and 7) structure and facilities.[9] Each variable was assessed using items that were measured on a 5-point Likert scale ranging from 1 (Always), 2 (Usually), 3 (Sometimes), 4 (Never), and 5 (Not Applicable).

Table 1. Reliability (Internal consistency)

Dimensions of quality	Cronbach's α coefficient
A) Access to Care	0.62
B) Technical Quality, Efficiency and Effective Organization of Care	0.83
C) Structure and Facilities	0.71
D) Communication, Information and Courtesy	0.92
Overall	**0.77**

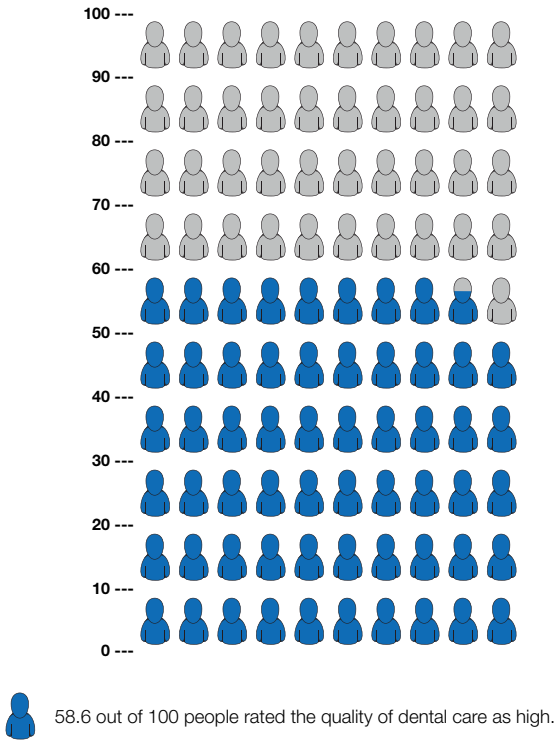

Figure 1. Overall perception of dental quality.

Legend: Pictorial representation of the percentage of patients who rated the quality of dental care received as high (58.6%)

The final responses were collapsed into a 4-point scale and reverse coded to be more intuitive (negative responses were assigned lower values and vice versa). Option 5 (Not applicable) was treated as missing. All four categories had a combined Cronbach's alpha of 0.77 (acceptable) for internal validity (Table 1).

The fifth outcome variable (global rating of safety) was generated from the question "In general, how safe are the dental clinics that you have visited in South Africa?" This question was assessed on a 10-point visual analog scale and collapsed into five categories ranging from 1 (extremely unsafe) to 5 (extremely safe).

Explanatory variables

The past dental history, dental and overall health status, and oral hygiene practices were assessed. We also assessed the relationship between demographic factors such as: gender, age, race, educational level, economic status, employment status, marital status and number of children on each outcome variable.

Statistical analysis

All statistical analyses were performed using STATA 14®. Percent positives were obtained by collapsing the upper two response options for each line item ('Always' and 'Usually' or 'Extremely safe' and 'Safe' for category 5) (Table 2). For inferential analyses, the five categories were converted into binary variables (low vs. high quality) using the mean scores as the cut-off point.

Bivariate analyses using Pearson's chi-squared test were used to identify the explanatory variables with significant relationships with the outcome variables (Table 3).

Further statistical analyses were performed using generalized linear models of the Poisson family with robust variance estimates to generate adjusted prevalence rate ratios (PRR) and identify significantly associated variables with the dimensions of quality and safety.

RESULTS

440 questionnaires were returned (97.8% response rate). The sample characteristics are given as follows: Females (62.7%), 25-44 years (47.8%), whites (64.9%), unemployed (45.8%), high school or vocational school education (52.5%), had children (67.8%), single-never married (36.1%), low income household (57.8%), dental visit within previous 12 months (52.2%), visited a state dental clinic for last dental visit (57.7%), satisfied or extremely satisfied with last dental visit (69.1%), not satisfied with dental health (57.7%), satisfied with overall health (85.1%), clean teeth at least once daily (94.3%) and uses a toothbrush with fluoride or non-fluoride toothpaste (57.3%).

Overall perception of quality and safety

Figure 2 shows the percentage of participants who had positive perceptions of quality and safety by dimension. Access to care received the least favourable rating

Table 2. Detailed Dimensions of Dental Quality and Safety, showing Percentage Positive and Mean scores.

Dimensions of quality	Percent positive (95% CI)	Mean ± SD
A) Access to care		
I was able to get an appointment within 24hrs for a dental emergency.	55.3 (49.8 - 60.7)	2.6 ± 1.1
I was able to get an appointment within one month of my preferred date for routine check-up/cleaning.	59.7 (54.3 - 65.2)	2.7 ± 1.0
I was able to get an appointment within one month of my preferred date to see a dental specialist (e.g. for surgery).	58.4 (52.5 - 64.3)	2.6 ± 1.1
I got turned away when I could not afford to pay for my dental treatment*.	77.8 (72.6 - 83.0)	3.3 ± 1.1
I had to travel more than 45 minutes to get to the dental clinic*.	56.3 (50.8 - 61.8)	2.6 ± 1.2
I was able to see the dental provider within one hour of my appointment.	46.7 (41.1 - 52.2)	2.5 ± 1.0
I found it hard getting into the dental clinic because of my physical disability*.	91.6 (86.9 - 96.2)	3.7 ± 0.8
B) Technical quality, efficiency and effective organization of care		
The clinic staff asked questions to confirm my identity before I was taken into the treatment area.	84.8 (81.1 - 88.5)	3.4 ± 0.9
The dental provider asked questions to confirm my identity before starting treatment.	74.6 (70.1 - 79.2)	3.1 ± 1.1
The dental provider asked about changes to my overall health before starting treatment.	66.6 (61.6 - 71.6)	2.9 ± 1.1
The dental provider asked about changes to the medicines that I take regularly, at every visit.	65.8 (60.6 - 70.9)	2.9 ± 1.2
The dental provider appeared to understand my overall health history well.	74.3 (69.6 - 78.9)	3.1 ± 1.0
The dentist confirmed the location of my dental problem before starting treatment.	93.3 (90.6 - 96.0)	3.6 ± 0.7
Before starting treatment, the dentist confirmed that I didn't feel any pain after giving the injection.	87.9 (84.2 - 91.5)	3.5 ± 0.8
The dentist protected my throat (with gauze or an elastic sheet on a bracket) when there was a potential for something to go down my throat.	78.0 (73.2 - 82.8)	3.2 ± 1.1
The dentist followed up with me after any major treatment to ensure that I did not have any problems.	56.0 (50.1 - 61.8)	2.7 ± 1.2
Whenever I was sent to a new dentist, I had to repeat the tests that I did at the previous dentist*.	36.9 (31.0 - 42.8)	2.1 ± 1.1
C) Structure and facilities		
The clinic was kept clean.	95.9 (93.8 - 98.0)	3.7 ± 0.6
The treatment area was well organized.	91.1 (88.0 - 94.2)	3.6 ± 0.7
The instruments used in treating me appeared clean.	97.6 (95.9 - 99.3)	3.8 ± 0.5
The dental providers washed their hands before starting treatment.	92.5 (89.6 - 95.4)	3.6 ± 0.7
I noticed blood stains in the treatment area*.	93.4 (90.5 - 96.2)	3.8 ± 0.7
The dental staff used a lead cover/apron to protect me when I needed to have an x-ray.	92.0 (89.0 - 95.0)	3.7 ± 0.7
D) Communication, information and courtesy		
The dentist listened to me carefully.	89.0 (85.6 - 92.4)	3.5 ± 0.7
I believe the dentist understood my dental problems.	87.7 (84.2 - 91.3)	3.4 ± 0.8
The dentist explained the treatment that I needed in a way that I could easily understand.	88.9 (85.5 - 92.3)	3.5 ± 0.8
The dentist asked for my permission before starting any major treatment.	87.1 (83.4 - 90.8)	3.4 ± 0.8
The dentist told me what he or she was going to do before he or she did a procedure.	89.1 (85.7 - 92.5)	3.5 ± 0.8
The dentist explained the things I needed to do at home in a way that I could easily understand after every treatment.	85.2 (81.2 - 89.1)	3.4 ± 0.9
The staff spoke to me with respect.	88.6 (85.2 - 91.9)	3.6 ± 0.8
The dentist spoke to the other dental staff with respect.	94.6 (92.3 - 97.0)	3.7 ± 0.6
The dentist explained the results of any tests to me in a way that I could easily understand.	88.6 (85.2 - 92.0)	3.5 ± 0.8
Whenever I was sent to a new dentist, the purpose of the referral was very clear to me.	86.7 (82.8 - 90.6)	3.5 ± 0.8
E) Global rating of safety		
On a scale of 1 to 10, with 1 being 'extremely unsafe' and 10 being 'extremely safe', how safe (harmless) are the dental clinics that you have visited in South Africa?	83.9 (79.3 - 88.5)	8.15 ± 2.07

Percentage positives were obtained by combing the responses from all participants who responded with "always" (4) or "usually"(3) on the Likert scale (1 to 4); the higher the percentage, the more positive the experience; Percent positives for each construct represent the percentage of participants who selected the two highest response options for each line item ('Always' and 'Usually' or 'Extremely safe' and 'Safe' for category 5);
§The mean score represents the average score obtained from all participants for every item on the Likert scale (1 to 4). Higher values represent more positive experiences by participants;
*Original items were reverse-coded for data analysis to mirror the other items, which ranged from the least positive (1) to the most positive (4) experience.

of quality (mean score: 2.8±0.68). Only 48.6% of participants rated this dimension as high quality. The global rating of safety received the highest score (mean score: 4.3±0.98); over 80% of participants had a positive perception of safety.

This rating was not correlated with their past experiences of DAEs (Pearson's rho (r): -0.21). Overall, slightly above half (58.6%) of the participants had a positive view about the quality of dental clinics in South Africa.

The item "Whenever I was sent to a new dentist, I had to repeat the tests that I did at the previous dentist" received the lowest percentage positive score (36.9%; 95% CI: 31.0-42.8), while the item "The instruments used in treating me appeared clean" received the highest score (97.6%; 95% CI: 95.9-99.3) (Table 2).

Table 3. Distribution of Patient-Reported Dimensions of Quality and Safety by Participant Characteristics (Bivariate Analysis; N (%))

Characteristic	Total, *N* (%)	Access to care	Technical quality	Structure & facilities	Communication	Global safety rating
Total, N	440	389	383	376	374	249
Mean ± SD	-	2.8 ± 0.7	3.1 ± 0.7	3.7 ± 0.5	3.5 ± 0.6	4.3 ± 0.98
Percent positive, % range	-	48.6 (43.6 - 53.6)	55.9 (50.9 - 60.9)	62.8 (57.9 - 67.7)	63.9 (59.0 - 68.8)	83.9 (79.3 - 88.5)
Gender						
Male	114 (37.3)	60 (42.3) §	56 (35.2)	66 (37.3)	65 (35.9)	80 (38.6)
Female	192 (62.7)	82 (57.8)	103 (64.8)	111 (62.7)	116 (64.1)	127 (61.3)
Age						
18-24 yrs	39 (13.3)	20 (15.2)	15 (10.1)	21 (12.5)	21 (12.3)	28 (14.0)
25-44 yrs	140 (47.8)	61 (46.2)	75 (50.3)	78 (46.4)	83 (48.5)	97 (48.5)
45-64 yrs	77 (26.3)	28 (21.2)	37 (24.8)	47 (28.0)	46 (26.9)	48 (24.0)
65 yrs+	37 (12.6)	23 (17.4)	22 (14.8)	22 (13.1)	21 (12.3)	27 (13.5)
Race						
Black African	89 (29.2)	39 (27.7)	42 (26.4)	51 (29.1) §	47 (26.1) §	45 (21.7)
White	198 (64.9)	91 (64.5)	103 (64.8)	109 (62.3)	117 (65.0)	145 (70.0)
Colored or Mixed	18 (5.9)	11 (7.8)	14 (8.8)	15 (8.6)	16 (8.9)	17 (8.2)
Employment status						
Employed	115 (39)	53 (38.4)	57 (37.7)	65 (38.9)	68 (39.3)	79 (38.9)
Unemployed	135 (45.8)	59 (42.8)	67 (44.4)	75 (44.9)	79 (45.7)	89 (43.8)
Retired	45 (15.2)	26 (18.8)	27 (17.8)	27 (16.2)	26 (15.0)	35 (17.2)
Educational level						
Less than high school (GR 12)	40 (14.2)	19 (14.5)	19 (13.1)	23 (14.3)	27 (16.6)	26 (13.2)
High school graduate or vocational training	148 (52.5)	70 (53.4)	79 (54.5)	87 (54.0)	83 (50.9)	98 (50.0)
College graduate or higher	94 (33.3)	42 (32.1)	47 (32.4)	51 (31.7)	53 (32.5)	72 (37.7)
Children						
Yes	202 (67.8)	91 (65.5)	104 (67.5)	117 (68.8)	117 (66.1)	134 (65.6)
No	96 (32.2)	48 (34.5)	50 (32.5)	53 (31.2)	60 (33.9)	70 (34.31)
Marital status						
Single-never married	112 (36.1)	41 (28.9)	52 (32.1)	60 (33.7)	59 (32.2)	63 (31.9)
Married or civil partnership	108 (34.9)	58 (40.8)	58 (35.8)	68 (38.2)	69 (37.7)	71 (36.0)
Divorced, separated or widowed	90 (29)	43 (30.3)	52 (32.1)	50 (28.1)	55 (30.1)	63 (31.9)
Annual household income						
Low income (<R50,000)	148 (57.8)	60 (51.7)	80 (59.3)	88 (60.3)	92 (59.7)	99 (576.5
Middle income (R50,000 to 149,999)	61 (23.8)	32 (27.6)	29 (21.4)	30 (20.5)	36 (23.4)	41 (23.8)
High income (R150,000+)	47 (18.4)	24 (20.7)	26 (19.3)	28 (19.2)	26 (16.9)	32 (18.6)
Last dental visit (Time)						
Less than 12 months	228 (52.2)	113 (60.1)	126 (59.2)	137 (58.6)	141 (59.2)	128 (61.2)
More than 12 months	179 (41)	75 (39.9)	87 (40.8)	97 (41.4)	97 (40.8)	81 (38.7)
No previous dental visit	30 (6.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Last dental visit (Location)						
State dental clinic	252 (57.7)	109 (58.3)	134 (63.2)	151 (64.8) §	150 (63.2)	128 (61.8)
Private dental clinic	147 (33.6)	72 (38.5)	70 (33.0)	77 (33.1)	80 (33.8)	73 (35.2)
Other. e.g. non-licensed	38 (8.7)	6 (3.2)	8 (3.8)	5 (2.1)	7 (3.0)	6 (2.9)
Satisfaction with last dental visit						
Extremely satisfied or satisfied	295 (69.1)	149 (80.1) §	157 (74.8) §	185 (79.7) §	186 (79.2) §	162 (77.8) §
Neutral	76 (17.8)	21 (11.3)	37 (17.6)	25 (10.8)	32 (13.6)	30 (14.4)
Dissatisfied and extremely dissatisfied	56 (13.1)	16 (8.6)	16 (7.6)	22 (9.5)	17 (7.2)	16 (7.6)

Characteristic	Total, *N* (%)	Access to care	Technical quality	Structure & facilities	Communication	Global safety rating
Oral health status						
Satisfied with dental health	184 (42.3)	88 (46.8)	97 (45.5)	100 (42.7)	115 (48.5) §	100 (48.0) §
Not satisfied with dental health	251 (57.7)	100 (53.2)	116 (54.5)	134 (57.3)	122 (51.5)	108 (51.9)
General health status						
Satisfied with overall health	369 (85.2)	167 (88.8)	189 (88.3)	202 (86.0)	213 (89.5) §	184 (88.0)
Not satisfied with overall health	64 (14.8)	21 (11.2)	25 (11.7)	33 (14.0)	25 (10.5)	25 (11.96)
Oral hygiene habits						
Clean teeth at least once daily	349 (94.3)	157 (97.5)	173 (94.5)	192 (97.0)	193 (97.0)	189 (95.4)
Clean teeth less than once daily	21 (5.7)	4 (2.5)	10 (5.5)	6 (3.0)	6 (3.0)	9 (4.5)
Cleaning product						
Toothbrush and fluoride toothpaste or non-fluoride toothpaste	212 (57.3)	57 (35.2)	78 (42.4)	80 (40.6)	80 (40.2)	66 (33.6)
Others. e.g. Chew-stick	158 (42.7)	105 (64.8)	106 (57.6)	117 (59.4)	119 (59.8)	130 (66.3)
DAE experience						
Experienced no DAE	240 (54.5)	102 (54.0)	117 (54.7) §	127 (53.8) §	126 (52.7) §	91 (43.5) §
Experienced one or more DAEs	200 (45.5)	87 (46.0)	97 (45.3)	109 (46.2)	113 (47.3)	118 (56.4)

*Binary variables for patient-reported dimensions of quality were obtained by categorizing constructs into "1" High quality (above the mean of collapsed items within that construct) and "0" Low quality (below the mean of collapsed items within that construct); Percentages represent the proportion of participants who rated the dimension of quality and safety as high.
§ Significant p-values ≤ 0.05 for Chi-squared ($\chi 2$) or Fisher's Exact Test.

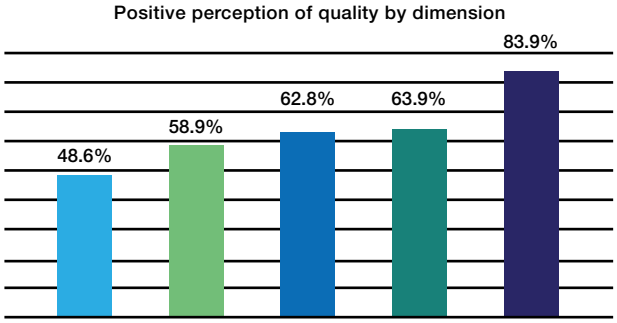

Figure 2. Positive perception of dental quality and safety by dimension.

Legend:
- Access to care
- Technical quality, efficiency and effective organization of care
- Structure and facilities
- Communication information and courtesy
- Global rating of safety

Description: Bar chart illustrating the five dimensions of quality and the percentage of patients who had positive perceptions of each dimension. Access to care had the lowest rating (48.6%); while an overwhelming number of patients rated safety as very high (83.9%).

Dimensions of quality and associated factors

Initial bivariate analysis using Pearson's chi-squared ($\chi 2$) test identified significant associations between:

a) Access to care and gender, satisfaction with last dental visit;
b) Technical quality and satisfaction with last dental visit, past DAE experience;
c) Facilities and race, location of last dental visit, satisfaction with last dental visit, past DAE experience;
d) Communication and race, satisfaction with last dental visit, oral health status, general health status, past DAE experience;
e) Global safety rating and satisfaction with last dental visit, oral health status, past DAE experience.

Satisfaction with last dental visit was significantly associated with all the dimensions of quality and safety; followed by past DAE experience, which was associated with all factors except access to care (Table 3).

The factors that were significantly associated with the dimensions of quality and safety after controlling for other covariates in the generalized linear model.

a) Access to care

Participants who had a high school, vocational (PRR: 0.64; P: 0.04) or college education (PRR: 0.41; P:<0.001), visited the dentist more than 12 months prior (PRR: 0.7; P: 0.03), and experienced one or more DAEs (PRR: 0.7; P: 0.02) were less likely to rate the access to care as high.

On the contrary, high income (Adjusted PRR: 1.65; P: 0.03), married (PRR: 2.63; P: <0.001) or divorced (PRR: 2.3; P: <0.001) participants who had children (PRR: 2.25; P: <0.001) and visited private dental clinics (PRR: 1.45; P: 0.02), were more likely to rate the access to care as high.

b) Technical quality
Similarly, participants who were middle-aged (25-44yrs) (PRR: 2.11; P: 0.02); 45-64 yrs (PRR: 2.18; P: 0.03)) coloured or mixed race (PRR: 2.01; P: 0.01), high school or vocational school graduates (PRR: 1.79; P: 0.04), and cleaned their teeth less than once daily (PRR: 2.05; P: 0.01), were more likely to rate the technical quality as high. Individuals who had at least one dental visit in the preceding 12 months (PRR: 0.69; P: 0.04) were less likely to rate the technical quality as high.

c) Structure and facilities
Participants who were neutral about their last dental visit (PRR: 20.29; P: <0.001), visited a non-licensed dental provider (PRR: <0.01; P: <0.001) and belonged to the middle income (R50, 000 to R149, 000 (PRR: 0.65; P: 0.02)) economic bracket, had negative perceptions of the quality of the structure and facilities at the dental clinic. Retired participants (PRR: 1.62; P: 0.01) had positive perceptions of the quality of the structure and facilities at dental clinics.

d) Communication
Having a dental visit more than 12 months ago (PRR: 0.71; P: 0.02), and being neutral (PRR: 0.58; P: 0.01) or dissatisfied (PRR: 0.46; P: 0.02) with the last dental visit was associated with a decreased likelihood of rating the quality of communication as high.

e) Global safety rating
Participants who were dissatisfied or extremely dissatisfied (PRR: 0.59; P: 0.03)) with their last dental visits had a decreased likelihood of rating the overall safety of dental clinics as high.

DISCUSSION

Our results reveal a sub-optimal perception of dental quality among South African dental patients. 41.4% of participants did not view the services received at dental clinics as high quality. Compared with their counterparts in the United Kingdom (UK), they fared worse, where 20% of UK respondents rated their care as sub-optimal.[35]

When categorized into specific dimensions of quality, access to care received the lowest quality rating from 51.4% of participants. This calls for more attention by dental stakeholders in South Africa, especially as 'access to care' was mentioned as the most important factor affecting a patient's perception of dental quality in the UK as well.[35] Despite this fair overall rating of quality, it is important to note that majority of participants (83.9%) rated the dental clinics as "safe" or "extremely safe".

This high global rating is consistent with expectations because patients tend to be skewed towards the more positive response options when asked about overall healthcare ratings.[9] Their true care experiences are usually highlighted when pressed for the details about specific aspects of care, such as waiting times and medication errors.[9] In this study, there was no correlation between the overall perception of safety and the actual experiences of DAEs by participants, which underscores this theory even further.

Participants who had a previous DAE experience were less likely to rate the quality of access to dental care as high. Duplicate tests, poor wait times and the difficulty in getting emergency appointments received the most negative responses while clinic cleanliness/hygiene and staff courtesy/ respect received the most positive responses. These findings compare with a study about patient-reported measures of quality from five countries (United States, Australia, Canada, New Zealand, and United Kingdom).[36]

The UK (36%) and Canada (37%) ranked lowest on emergency waiting times, while the US ranked last on efficiency because patients had to repeat tests multiple times (22%), or repeat their medical history to multiple providers (57%).[36] Another study in the US identified waits and delays, poor communication, and problems with the environment and amenities as the most commonly reported problems with service quality.[16]

They also found that despite the high incidence of service quality incidents, the patients (two-thirds) still rated the overall quality of care as excellent, which again confirms the theory that global ratings are skewed towards more positive responses.[16]

One explanation given was that patients consider their overall hospital experience when giving global ratings and this may not capture good experiences, such as emotional support or favorable clinical outcomes, that were not covered in the survey questions.[16]

Patient satisfaction emerged as the factor most associated with an increased positive perception of quality across all five dimensions of quality and safety (bivariate analysis). While satisfaction has been intricately linked to the perception of quality,[11,37] it is but one perception of quality that is predominantly affected by one's expectations.[38] The conceptual framework described by Sofaer et al. identified sociocultural norms, previous experiences, personal characteristics, knowledge of what to expect, extent of choice, patient needs, and reputation of provider as the baseline factors influencing patient expectations.[9]

They surmised that patient expectations and patient experiences of care were the primary influencing factors on a patient's perception of care, which ultimately affects their definition and perception of quality.[9] The degree to which one's perception is affected by expectations and/or experiences varies between individuals and over time within-person.[9]

In dealing with this issue, Sixma et al. demonstrated that a more reliable approach was to look at an algorithm of performance, importance and impact scores for the various aspects of healthcare.[1] Sixma's conceptual framework was based on the prior work of Zastowny et al.[39] in the Patient Experience Survey (PES) and has influenced the development of instruments, such as the QUOTE [20-22,40-44] (Quality Of care Through the patient's Eyes) and CQI (Consumer Quality Index),[19,23,45-50] for assessing patient-reported care quality across various disciplines. Dentistry is yet to develop a validated patient-reporting instrument of its own.

In this study, patient characteristics such as age (middle-aged), race (coloured or mixed), marital status (married, divorced), child status (no children), employment status (retired), household income (>R150, 000 or 9200 USD) and educational status (high school or vocational education) were associated with an increased likelihood of having a better experience of care and higher rating of quality.

This is similar to findings from another study where being older, less educated, married and of a high social status was significantly associated with greater patient satisfaction.[51]

One explanation for this finding is that healthcare providers tend to be more respectful and responsive to the needs of middle-aged or older patients compared to younger ones as well as wealthier individuals.[51]

Perhaps, on the contrary, highly educated and single patients have greater expectations of care quality and apply more stringent assessments to their ratings of care quality compared with less educated and married individuals. In a study by Haviland et al., race was also found to be a significant factor affecting one's rating of healthcare services.[52] This was consistent with findings by Tickle et al. among dental patients in the UK.[35]

Although our expectation was that the 'white' population would have higher ratings of care quality due to tenuous racial history of the sub-region[53], it was the 'colored or mixed' race that had significantly higher ratings of care quality (technical quality and effectiveness). This calls for a further exploration of the impact of socio-demographic variables on patients' perceptions of dental quality.

CONCLUSION

Patient perceptions of quality offer an insight into our performance as dental providers. The degree to which the patient's needs and expectations are met often determines their perceptions of quality. Our study findings suggest that the dental profession has huge challenges in meeting these expectations.

Working to develop standardized instruments for dentistry will afford researchers the opportunity to assess patient experiences of dental care quality more reliably rather than just being limited to patient satisfaction measures. In the end, providing care that is patient-centered is an indication of quality and that should be our ultimate goal.

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Missing or incomplete dental records: prevalence at Medunsa Oral Health Centre

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SR Mthethwa[1], SA Matjila[2]

ABSTRACT

Introduction

Incomplete or missing records compromise the validity and reliability of investigations.

Aims and objectives

This study describes the extent of the problem of missing or incomplete records at Medunsa Oral Health Centre. Dental records of repeat patients who consulted during July 2017 were assessed for completeness. The proportion missing was determined.

Design

This was a retrospective, descriptive cross-sectional study in which existing dental records were reviewed.

Methods

A systematic random sample of 110 dental records of repeat patients who consulted at Medunsa Oral Health Centre during July 2017 was traced in records rooms.

Eleven routine data items were selected for evaluation of completeness. A yes or no checkbox was ticked in Microsoft Excel software to indicate whether or not the information was entered in the record.

Results

A response rate of 79.1% was obtained. The first visit of 87.3% of patients occurred in the past six years. A scant 3.6% of the records were fully completed; half were less than 80% completed. Records of a third of patients who had visited the hospital for the first time in 2011 could not be found.

Conclusions

The standard of record-keeping in this random sample falls far short of the HPCSA standard.

Author affiliations:

1. **Sibusiso R Mthethwa:** *BDS, MPH, PhD.,* Sefako Makgatho Health Sciences University, Pretoria, South Africa.
   ORCID Number: 0000-0003-0420-808X
2. **Sello A Matjila:** *BDT, BDS, Dip Odont, MBL.,* Sefako Makgatho Health Sciences University, Pretoria, South Africa.
   ORCID Number: 0000-0001-5446-6904

Corresponding author: Sibusiso R Mthethwa
Medunsa Campus, PO Box D24, Sefako Makgatho Health Sciences University 0204.
Tel: +27 (0)12 521 5888
Email: rocky.mthethwa@smu.ac.za

Author contributions:

1. **Sibusiso R Mthethwa:** Conception; design; acquisition of data; analysis and interpretation of data; drafting the article - 90%
2. **Sello A Matjila:** Acquisition of data; revising the article critically for important intellectual content - 10%

ACRONYMS

ICD-10:	International Classification of Diseases and Related Health Problems (10th revision)
MOHC:	Medunsa Oral Health Centre

INTRODUCTION & BACKGROUND

Health records may be used for research purposes.[1-3] However, incomplete or missing records are an obstacle to record-based research. They compromise the validity and reliability of investigations.[1] The Health Professions Council of South Africa (HPCSA) recommends that health records should be retained for at least six years.[2] Two recent independent studies, in the fields of physiotherapy and dentistry respectively, reported highly variable incidences of missing records - suggesting that this guideline is not routinely observed. Wegner and Rhoda (2013) found that only 39% of the records of patients who received lower limb amputation within a two year research period at four rural district hospitals could be located.[4] Mthethwa and Chabikuli (2016) reported a non-response rate approximating one in ten in a study investigating the efficiency of the referral system at Medunsa Oral Health Centre (MOHC), a dental school and referral hospital in Garankuwa on the outskirts of Pretoria.[5]

The purpose of keeping records is to ensure the continuity of care and to share relevant information with other members of the multidisciplinary team.[2] Therefore, records must be sufficiently comprehensible so that another practitioner relying on the record can assume ongoing care of the patient.[6] Incomplete records, however, sadly are common. A survey of anaesthetic records at a hospital in Cape Town found that less than a third (29.9%) of a selected sample of 284 records were legible and complete.[1] These findings are consistent with those of Mthethwa and Matjila (2018) who found that a little more than five percent (5.4%) of records of patients who had been prescribed antibiotics at MOHC did not record a diagnosis.[7]

An association between the quality of records and quality of care at health-care facilities in the Netherlands has been reported.[3] It was found that the poor quality (completeness, readability and adequacy) of the available patient information was associated with higher rates of adverse events).[3]

Inadequate care occurring as a consequence of poor quality records could result in patient dissatisfaction with the health services delivered. The patient could

thus potentially file a malpractice complaint against a health-care practitioner. In such cases, medical records also serve as a medico-legal document.[2]

Treating patients without complete information poses an important challenge to patient safety, increasing the likelihood of medical errors, adverse events, duplication of laboratory tests and procedures, and increased health care costs.[8-10]

A review of the medical records of over 14,000 admissions to 28 hospitals in New South Wales and South Australia revealed that 1.8% of the 2353 adverse events reported were due to 'acting on insufficient information' with 26.4% of these leading to permanent disability.[11]

The incidental findings of incomplete or missing dental records in studies carried out at MOHC warranted an examination of the extent of the problem. Dental records consist of a variety of material generated and stored in handwritten and electronic format which includes: Notes made by clinicians and staff; completed written medical history; consent documents; copies of correspondence about and with the patient; radiographs, tracings, and measurements; digital records including CAD/CAM records; diagnostic images, reports and study casts; special test findings; photographs; records of financial transactions; and appointment books.[6]

OBJECTIVES OF THE STUDY

To estimate the proportion of missing dental records of repeat patients who consulted at the diagnostic unit during July 2017.

To evaluate the completeness of dental records of repeat patients who consulted at the diagnostic unit during July 2017.

MATERIALS AND METHODS

Study design

This was a retrospective, cross-sectional descriptive study in which existing dental records were reviewed.

Target population

The sampling frame consisted of the dental records of 543 repeat patients, not on the hospital appointment system, who consulted at the diagnostic unit of MOHC during the month of July 2017 .

Study sample

The ideal sample size was estimated at 110 dental records in Epi Info Version 3.5.4 software at the confidence interval of 95% and absolute precision of 5% assuming a non-response rate of 10%

Sampling method

A systematic random sample was selected i.e. a list of the entire patient population using patient names was prepared in Excel; the sample size of 110 was divided into the total population (543) to calculate the K^{th} number, the sampling interval. The K^{th} number was 5. A random starting point was therefore between 1 and 5, and 5 was selected. We started with the fifth person and picked every fifth person on the list.[13]

DATA COLLECTION

Permission to enter the records rooms was obtained from the Records Officer following receipt of ethical clearance. Between September 2017 and March 2018 and under the guidance of record clerks, paper-based records of repeat patients who had consulted at the diagnostic unit of MOHC during the month of July 2017 were traced, using folder numbers.

Retrieved records were assessed for completeness. Eleven routine data items were selected for evaluation of completeness. These comprised: chief complaint and history; dental history; completed health questionnaire; extra-oral findings including diagnosis/differential diagnosis; intra-oral findings including diagnosis/differential diagnosis; referral priorities for specific problems; signed consent form; treatment; tariff code; ICD code, and student/doctors name and signature. Data were captured in *Microsoft Excel* software - a yes or no checkbox was ticked to indicate whether or not the information had been entered in the record .

Definition of variables and terms

Diagnostic unit refers to a screening and referral clinic. At MOHC new and repeat self-referred and referred patients, who are not on the hospital appointment system, routinely move between the diagnostic unit to be examined by experienced dentists and clinical units where dental students under faculty supervision provide treatment or treatment appointments are scheduled.

Repeat patients are self-referred and referred patients, not on the hospital appointment system, who, according to their folder numbers, were not visiting the clinic for the first time.

An incomplete record is any record missing any of the required content.

A missing record was defined as any record that was not able to be found because it was not in its expected place (records room).

Year of first visit refers to the year the patient first visited the hospital according to the folder number.

Ethical considerations

Ethical approval for the study was granted by the Ethics Committee of the Sefako Makgatho Health Sciences University. (Clearance certificate number) Permission to conduct the study was granted by the Chief Executive Officer (CEO) of MOHC.

STATISTICAL ANALYSIS

Data were captured, coded and cleaned in *Microsoft Excel* software and then transferred to *Statistical Analysis Software (SAS)* software for analysis. Means, frequencies and proportions (percentages) were calculated.

RESULTS

Data of a systematic random sample of 110 records were analysed.

A response rate of 79.1% was obtained i.e. one out of five records was lost to follow up. Records of a third (3/9) of patients who had visited the hospital for the first time in 2011 could not be found.

Furthermore, records of 22% (10/45) of patients who had visited the hospital for the first time within the last two years could not be found. The first visit of 87.3% (96/110) of patients had occurred in the past six years. A little more than a quarter (28/110) had made their first visit in the previous year.

A scant proportion (3.6%) of the records was fully completed. Half of the records were less than 80% completed.

Details of past medical and dental history were entered in more than 70% of the records.

On the one hand, data on intra-oral findings were entered in a little more than sixty percent (62.7%) of the records. On the other hand, data on extra-oral findings were not entered in an identical proportion of records (62.7%).

Data on referral priorities, treatment, signature by either the student or dental practitioner, and tariff code were entered in 70% of the records. A consent form was not signed in a little more than sixty percent (60.9%) of the records. Data on ICD codes were not entered in a little less than sixty percent (58.2%) of the records.

DISCUSSION

This study set out to describe the extent of the problem of incomplete or missing dental records at MOHC.

Year of first visit

The results of this study indicate that the first visit of 87.3% of patients had occurred in the past six years. This finding is significant in that it allowed the study to investigate whether the HPCSA's recommendation that health records should be retained for at least six years was observed at MOHC. Data on the number of subsequent visits and the nature of treatments was not collected as it was deemed irrelevant for this purpose.

Another important finding was that a little more than a quarter (28/110) of patients had made their first visit in the past year. This finding is significant in that a repeat visit, if not for emergency care, indicates that the appointment system at MOHC is not effective.

In their description of the referral system which operates between the diagnostic unit and clinical units, Mthethwa and Chabikuli (2016) assert that patients with less urgent problems are referred for general dental care and/or for initial assessment in the relevant specialty clinics. They are placed on a waiting list for care and are informed when a booking becomes available.[5]

Table 1. Accessibility of records by year of first visit of patients who had attended for a repeat visit in July 2017.

Records	Year of first visit								Total
	2009 n (%)	2010 n (%)	2011 n (%)	2012 n (%)	2013 n (%)	2014 n (%)	2015 n (%)	2016 n (%)	
Missing	0 (0)	3 (23.1)	3 (33.3)	0 (0)	2 (15.4)	5 (29.4)	5 (29.4)	5 (17.9)	23 (20.9)
Found	1 (100)	10 (76.9)	6 (66.7)	12 (100)	11 (84.6)	12 (70.6)	12 (70.6)	23 (82.1)	87 (79.1)
Total	1 (100)	13 (100)	9 (100)	12 (100)	13 (100)	17 (100)	17 (100)	28 (100)	110 (100)

Table 2. Levels of completeness of records.

Proportion of entered data items	n (%)
21% ≤ 40%	2 (1.8)
41≤ 60%	6 (5.4)
61 ≤ 80	47 (42.8)
81 ≤ 92	28 (25.4)
100%	4 (3.6)
TOTAL	87 (79.1)
*23 (20.9%) records missing	

Table 3. Completeness of medical and dental history data.

Items	Recorded n (%)	Unrecorded n (%)
Chief complaint and history	87(79.1)	0
Dental history	81(73.6)	6(5.5)
Completed health questionnaire	82 (74.5)	5 (4.5)
*23 (20.9%) records missing		

Table 4. Completeness of clinical examination data.

Items	Recorded n (%)	Unrecorded n (%)
Extra-oral findings including diagnosis/differential diagnosis	18 (16.4)	69 (62.7)
Intra-oral findings including diagnosis/differential diagnosis	69 (62.7)	18 (16.4)
*23 (20.9%) records missing		

Table 5. Completeness of treatment plan data.

Items	Recorded n (%)	Unrecorded n (%)
Referral priorities for specific problems	85 (77.3)	2 (1.8)
Treatment	82 (74.5)	3 (2.7)
Tariff code	77 (70.0)	10 (9.1)
ICD code	23 (20.9)	64 (58.2)
Signed consent form	20 (18.2)	67 (60.9)
Student/doctors name and signature	81 (73.6)	6 (5.5)
*23 (20.9%) records missing		

Accessibility of records

The current study obtained a response rate which was a little less than eighty percent (79.1%). This response rate was relatively lower (91.3% vs 79.1%) than that obtained by Mthethwa and Chabikuli (2016) in a previous research study.[5]

It is difficult to explain this result, but it might be related to a recently introduced practice of allowing final year students to file in a special room the records of their patients who are on the appointment system.

These records are meant to be returned to the main records room by the end of the current week. However, this does not always happen as is demonstrated by the fact that some study records were found in the special records room.

This suggests that the coordination of record keeping between the main and special record rooms is not efficient. There are, however, other possible explanations. A further study with more focus on the reasons for the decreased response rate is recommended.

In this study, records of a third (3/9) of patients who had visited the hospital for the first time six years ago could not be found. This result has not previously been described. It is disappointing and suggests that the HPCSA guideline that health records should be retained for at least six years is not routinely complied with at MOHC. However, with a small sample size, caution must be applied in interpreting these data.

The current study found that records of 22% (10/45) of patients who visited the hospital for the first time within the last two years could not be found. It is perhaps encouraging to compare this figure with that reported by Wegner and Rhoda (2013) who found that only 39% of requested records of patients who had received lower limb amputation within the two year research period, could be located.[4]

Levels of completeness of records

The results of this study show that a very small percentage (3.6%) of records was fully completed and that half were less than 80% completed.

The present findings seem to be consistent with other research which found that 21% of dental practitioners in Chennai (India) did not maintain any form of dental record and that only 12% maintained complete dental records.[12] The findings are out of keeping with the HPCSA's exhortation to health professionals to keep complete records.

The significance of accurate and complete records cannot be overemphasized. Legible, accurate and complete records are essential, among other things: in furthering the diagnosis or ongoing clinical management of the patients[2]; in forensic identification[13] and in any malpractice suit.[14] The extent of the problem of incomplete dental records is an important issue for future research.

Completeness of medical and dental history data

The current study found that details of past medical and dental history were not entered in records of between 20 and 25 percent of patients. This rather disappointing finding has important implications for patient safety and quality of care. It is generally accepted that past medical history is a powerful diagnostic technology[15] and an essential component of risk assessment for the likelihood of a patient experiencing a medical emergency.[16] A patient's medical history increases the dentist's awareness of diseases and medication which might interfere with the patient's dental treatment.[17]

It is also commonly accepted that a thorough past dental history can aid significantly in treatment planning, case selection, and ultimately malpractice defense.[18] It enables an evaluation of the patient's attitude toward dental care and his/her previous experience of dental treatment and its nature.[16] The previous use of local anaesthetic agents and any associated problems can be checked and adverse events, such as post-extraction haemorrhage, may be highlighted.[16]

Completeness of clinical examination data

The results of this study show a disparity in the recording of intraoral and extraoral examinations. Intraoral findings were entered in 62.7% of patient records in contrast to 16.4% for extraoral findings. The findings of the current study are consistent with other research which found that extraoral examination is offered less frequently to patients in the dental setting.[19] This is unfortunate since extraoral and intraoral soft tissue examination is an essential part of any new patient examination.[16] A complete examination covers the following three areas: **a.** the general examination - briefly assesses the patient's general appearance; **b.** the extraoral head and neck soft tissue examination - focuses on the head and neck, **c.** the intraoral soft tissue examination - determines whether the soft tissue is within normal limits.[20]

Completeness of treatment plan data

The current study found that referrals to clinical units were not entered in the records of one out five (22.7%) patients. Considering the functioning of MOHC's internal referral system, this result was unexpected. At MOHC all patients not on the hospital referral system consult at the diagnostic unit and are referred to clinical units where dental students under faculty supervision provide treatment or treatment appointments are scheduled.

A possible explanation for this result might be that the original folder could not be found and so a new one was created, using the old folder number. Another possible explanation is that the dentist the patient consulted deemed it unnecessary to make a referral after reassuring the patient/parent - a child that is brought to the hospital due to parental concern about delayed eruption is a good case in point. Further work is required to establish why referrals were not entered in patients' records.

A most relevant finding was that details about the clinical procedures performed were not entered in the records of one out of four (25.5%) patients. This result is contrary to expectations. The HPCSA asserts that it is compulsory to maintain this information for each patient consulted. It is difficult to explain this result.

Another important finding was that tariff codes were not entered in 30 percent of patients' records. The tariff reflects the opinion of the Medical and Dental Board on the amounts that should be charged for the respective services in instances where a practitioner and a patient have not agreed to an alternative fee.[21] The reason for the lack of recording of tariff codes is not clear but it may have something to do with the fact that some categories of patients are exempted from paying user fees.

At MOHC patients are classified based on individual or household annual incomes for the determination of fees. Patients qualifying for full subsidisation are classified H0. Patients qualifying for partial subsidisation are classified H1, H2 & H3.[22] User fees have been shown to deter utilisation of public sector health services, even when needed, particularly among the poorest in African countries.[23] Notwithstanding patient classification, the failure to record tariff codes has a negative impact on correct patient billing and revenue collection.

The results of this study indicate that one out four (26.4%) dental records was not signed by either the student or dental practitioner who attended to the patients. This unexpected finding contravenes Rule 15 of the HPCSA's ethical rules which states that:
"Any student, intern or practitioner who, in the execution of his or her professional duties, signs official documents relating to patient care, such as prescriptions, certificates (excluding death certificates) patient records, hospital or other reports, shall do so by signing such document next to his or her initials and surname in block letters."[2]

The current study found that ICD codes and patient signature on a consent form were not entered in 58.2% and 60.9% of the records respectively. ICD-10 stands for International Classification of Diseases and Related Health Problems (10th revision). It is a coding system developed by the World Health Organisation (WHO) that translates the written description of medical and health information into standard codes.

These codes are used to inform medical schemes about the conditions for which their members received treatment so that claims can be settled correctly.[24] It is in the best interest of MOHC that accurate ICD codes are entered in the patients' records since medical schemes have the right to reject claims on the basis of inaccurate ICD-10 coding.[25]

It is widely recognized that obtaining a patient's consent to treatment is not just a matter of asking for a signature on a consent form - it is a communication process. For consent to be valid, it must be obtained from a competent, informed person, free from undue duress. The person giving consent must be given all relevant information, including the material risks and consequences of each option, including no treatment.[26] In most routine dental examinations and treatments the patient's consent is obtained verbally.[6,27] However, the treatment must still be witnessed and documented in the patient's records.[27]

Limitations of the study

A potential threat to the internal validity of this study was the loss to follow up of 20.9% (23/110) of the study sample.

CONCLUSION

The standard of record-keeping in this random sample falls far short of the HPCSA standard.

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Cephalometric analysis: manual tracing of a lateral cephalogram

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P Hlongwa

ABSTRACT

Cephalometric analysis remains a preferred tool in the diagnosis and treatment planning of orthodontic and of orthognathic surgical cases. A cephalometric tracing can be prepared and analysed manually or by a computer using cephalometric tracing software.

A number of software programmes on cephalometric analyses have been introduced but their widespread use has been restricted by cost factors, especially in situations having a constraint on resources. This report will give a step-by-step procedure to enable the identification of cephalometric points and planes used in orthodontic diagnosis and treatment planning and to facilitate the manual tracing of a lateral cephalogram.

INTRODUCTION

Cephalometrics ...literally "head measuring"... is the recording and interpretation of measurements of the skull made on standardized radiographs of the living head.

Since the introduction of cephalometry by Broadbent and Hofrath in the 1930s,[1,2] the cephalometric technique has been regarded as a most important tool for orthodontists and maxillo-facial surgeons engaged in studying dental malocclusions and the underlying skeletal discrepancies.

Applications for cephalometric analysis include case diagnosis, treatment planning, prediction of growth and the evaluation of treatment results.[3] Manual tracing of cephalometric films is performed by identifying radiographic landmarks on acetate overlays and using these reference points to construct lines, planes and angles to enable the measurement of linear and angular values, using a millimetre scale and a protractor.

This manual process can be time-consuming and the measurements obtained may be subject to error. Whilst advances in computer science have led to the widespread application of computers in cephalometry,[4] offering enhanced accuracy, nevertheless, the skills of manual analysis are still required.

Author affiliations:
Phumzile Hlongwa: *BOH, BDS, M Dent (Ortho), PhD.,* Department of Ortho-dontics, School of Oral Health Sciences, Faculty of Health Science, University of the Witwatersrand, Johannesburg, South Africa.
Corresponding author: Phumzile Hlongwa
Department of Orthodontics, School of Oral Health Sciences, 8th Floor, Charlotte Maxete Academic Hospital, 5 York Road, Parktown, Johannesburg, South Africa. Email: phumzile.hlongwa@wits.ac.za

AIMS AND OBJECTIVES

To enable the manual tracing of a cephalogram showing a true lateral view of the skull, and the identification of many of the cephalometric points and planes used in orthodontic diagnosis and treatment planning.

MATERIALS AND METHODS

Materials required for manual cephalometric tracing

- Acetate tracing paper: a sheet 210 mm x 160 mm.
- Viewing box
- Protractor
- 300 mm ruler
- Tracing template
- Adhesive tape
- Eraser
- HB lead pencil
- 4H lead pencil
- Blue, red and green coloured pencils

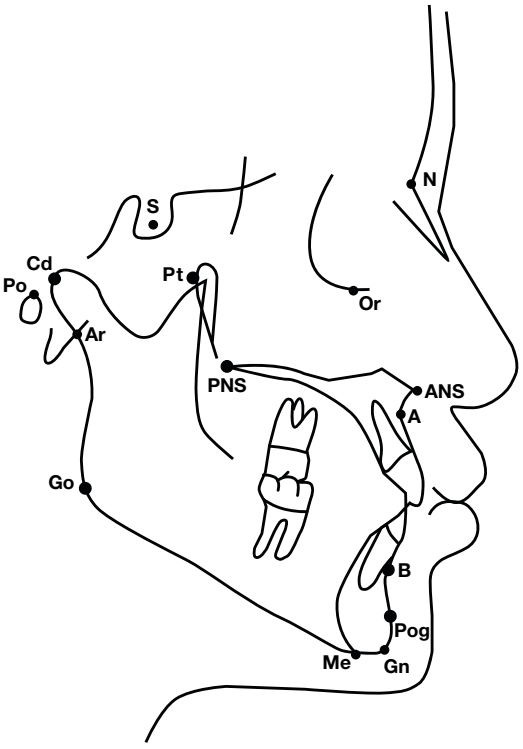

Figure 1. Cephalometric hard tissue landmarks: S - Sella; **N** - Nasion; **Po** - Porion; **Cd** - Condylion; **Pt** - Pterygomaxillary fissure; **Or** - Orbitale; **Ar** - Articulare; **PNS** - Posterior nasal spine; **ANS** - Anterior nasal spine; **A** - A point; **B** - B point; **Pog** - Pogonion; **Gn** - Gnathion; **Me** - Menton; **Go** - Gonion.

Step-by step procedure

Step 1: Aligning the tracing paper on the lateral cephalogram radiograph

1.1. Draw two crosses about 3 cm apart on the top left hand corner of the radiograph.
1.2. Overlay the sheet of acetate tracing paper on the radiograph and attach the top edge with adhesive tape.
1.3. Trace the crosses onto the tracing paper for ease of subsequent superimpositioning of the tracing.
1.4. Write the patient's name, age and date of radiograph above the crosses on the tracing paper.

Step 2: Identify and trace hard tissue (HT) structures and identify the following hard tissue landmarks (Fig. 1)

2.1. Trace the cranial base.
2.2. Trace upper and lower central incisors, following the correct long axes.
2.3. Trace upper and lower first permanent molars in relationship to each other.
2.4. Trace the mandible and maxilla.
2.5. Sella (**S**): Mid-point of sella turcica.
2.6. Nasion (**N**): Junction of frontonasal suture.
2.7. Porion (**Po**) Top of external auditory meatus.
2.8. Orbitale (**Or**): Inferior border of orbit.
2.9. Pterygomaxillary fissure (**Pt**): most posterior and superior point on the outline of the pterygomaxillary fissure.
2.10. Condylion (**Cd**): Most superior point on the head of the condyle.
2.11. Articulare (**Ar**): a point on the posterior border of the ramus at the intersection with the basilar portion of the occipital bone.
2.12. Posterior nasal spine (**PNS**): Posterior point of bony hard palate.
2.13. Anterior nasal spine (**ANS**): Anterior point of maxilla.
2.14. **A**-point: Deepest point on the maxilla below ANS.
2.15. **B**-point: Most posterior point on the bony curve of the mandible above pogonion.
2.16. Pogonion (**Pog**): Most anterior point of bony chin.
2.17. Gonion (Go): Most posterior and inferior point on the outline of the angle of the mandible.
2.18. Gnathion (**Gn**): Most antero-inferior point on the bony chin.
2.19. Menton (**Me**): Lowest point on the symphysis of the mandible.

Step 3: Identify the soft tissue (ST) outlines and the following landmarks (Fig. 2)

3.1. Trace the soft tissue outline.
3.2. Soft tissue Glabella (**G'**) Most prominent point in the sagittal plane between the supraorbital ridges.
3.3. Soft tissue Nasion (**N'**) Deepest part of the soft tissue outline in front of Nasion.
3.4. Tip of Nose (**P**) - Pronasale.
3.5. Subnasale (**Sn**) Junction of nasal septum and upper lip in mid - sagittal plane.
3.6. Soft tissue A - point (**SLS**) Deepest midline point on outline of the Superior labial sulcus.
3.7. Labialis Superior (**Ls**) Most anterior point on outline of upper lip (vermillion border).
3.8. Stomium Superior (**Stms**) Lowest midline point on outline of upper lip.
3.9. Stomium Inferior (**Stmi**) Highest midline point on outline of lower lip.
3.10. Labialis Inferior (**Li**) - Most anterior point on outline of the lower lip (vermillion border).
3.11. Soft tissue B - point (**ILS**) Deepest midline point on outline of the Inferior labial sulcus.
3.12. Soft tissue Pogonion (**Pog'**) Most anterior point on outline of ST chin.
3.13. Soft tissue Menton (**Me'**) Lowest point on outline of soft tissue chin.

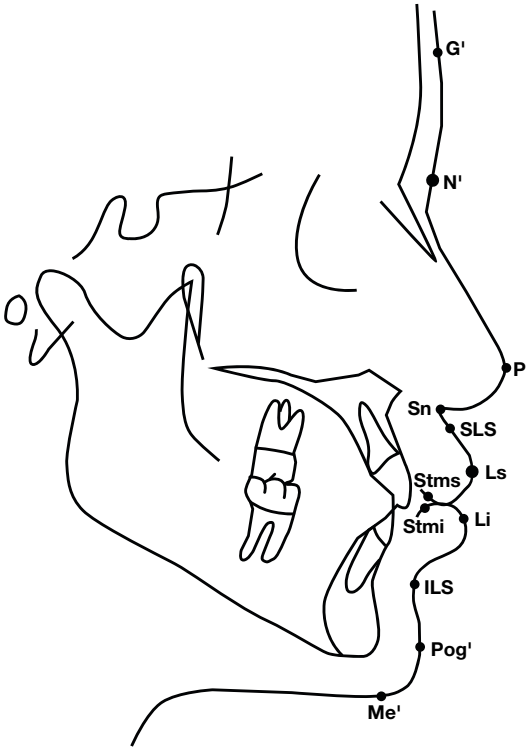

Figure 2. Cephalometric soft tissue landmarks: G'- Soft tissue Glabella; **N'** - Soft tissue Nasion; **P** - Pronasale; **Sn** - Subnasale; **SLS** - Soft tissue A point; **Ls** - Labialis superior; **Stms** - Stomium superior; **Stmi** - Stomium inferior; **Li** - Labialis inferior; **ILS** - Soft tissue B point; **Pog'** - Soft tissue Pogonion; **Me'** - Soft tissue Menton.

Step 4: Connect the following landmarks (Fig. 3)

4.1. Sella and Nasion – **SN** line.[5]
4.2. Porion and Orbitale (Frankfurt Horizontal plane – **FH**).[3]
4.3. Mesiobuccal cusp of maxillary first molar and cusp of the first premolar – (Occlusal plane).[5]
4.4. Straight line through Gnathion(**Gn**) and Gonion (**Go**) [**MP** - Mandibular plane].[3]
4.5. Sella and Gnathion (**Y** - axis).[5]
4.6. Nasion and A - point (**NA** - line).[3]
4.7. Nasion and B - point (**NB** - line).[3]
4.8. Nasion and Pogonion (**N** - Pog).[3,5]
4.9. A - point and Pogonion (**APo** - line).[6]
4.10. Erect perpendicular lines from A point and B point to the Occlusal Plane. (Wits- lines).[7]
4.11. Draw short lines through the long axes of the upper and lower incisors, crossing NA (upper) and NB (lower).[3]
4.12. Draw a line perpendicular to FH line in front of the profile. Three lines are then drawn at 90° to this line from, respectively, Nasion, ANS and Menton.[8]
4.13. Connect soft tissue Pogonion and soft tissue Nasion, as well as soft tissue Pogonion and Labialis Inferius (H- angle).[8]

Step 5: Measure the following angles (Figures 3 and 4).

5.1. Angle between SN line and FH line.[5]
5.2. Angle between SN line and Occlusal plane.[5]
5.3. Angle between SN line and Mandibular plane.[3]
5.4. Angle between FH line and Sella – Gnathion (Y-axis).[5]
5.5. Angle between SN and NA line (SNA°).[3]
5.6. Angle between SN line and NB line (SNB°).[3]
5.7. Difference between SNA and SNB = (ANB°).[3]
5.8. Angle between FH and NPog line (Facial angle).[3,5]
5.9. Angle between long axis of U1 and NA line.[3]
5.10. Angle between long axis of L1 and NB line.[3]
5.11. Angle between long axis of U1 and L1 (Interincisal angle).[3,5]
5.12. Total facial angle (TFA) – G'-P-Pog': Angle formed by the intersection of the line soft tissue glabella-pronasale and the extended line soft tissue po-gonion-pronasale to form the contained angle for measurement.[8-10]
5.13. Soft tissue angle of convexity (AC)– G'-Sn-Pog'-Angle formed by the intersection of lines sub-nasale- glabella and pogonion-subnasale extended (measured at the upper contained angle).[8]
5.14. Soft tissue facial angle (STFA) – N'-Pog' and FH: Angle formed by the intersection of the line soft tissue pogonion-soft tissue nasion and the Frankfort Horizontal plane, measured as the lower contained angle.[8]
5.15. Merrifield's Z angle (ZA) – Pog' to most protrusive lip, extended to FH: the angle between the "profile line" and the Frankfort horizontal plane.[11]
5.16. Nasolabial angle (NA) – Cm-Sn-Ls: Angle between the intersection of lines tangent to the columella and upper lip.[8-10]
5.17. Pogonion-labial angle (PLA) – Li-ILS-Pog': Angle between the intersection of the line labialis inferius-to inferior labial sulcus and a line tangent to the soft tissue pogonion, passing through labialis inferior.[9,10]
5.18. Pogonion-menton angle (PMA) – Pog'-Me': Angle between the intersection of lines tangent to the soft tissue pogonion and soft tissue menton.[9,10]
5.19. Holdaway angle (HA): Angle formed between the soft tissue facial plane line (soft tissue nasion-soft tissue pogonion) and the H line[8] (soft tissue pogonion to labialis inferior).

Step 6: Measure the following linear measurements (mm) (Fig 3)

6.1. SN length.[12]
6.2. NB line to A-point (Convexity).[6]
6.3. Most anterior point of labial U1 to NA-line.[3]
6.4. Most anterior point of labial L1 to NB-line.[3]
6.5. APog-line to incisal edge of L1.[3]
6.6. Distance between A and B perpendicular points on the occlusal plane (Wits analysis).[7]
6.7. Upper lip length (ULL): Discrepancy in the vertical dimension, extent of upper incisor visibility in resting position.[9] (upper stomium to ST subnasale).
6.8. Lower lip length (LLL): Discrepancy in the vertical dimension, extent of the lower lip curl, presence or absence of labio-mental fold.[9] (lower stomium to ST pogonion).
6.9. Upper lip prominence (ULP-NB line): Protrusive/retrusive upper lip relative to the NB Line.[9]

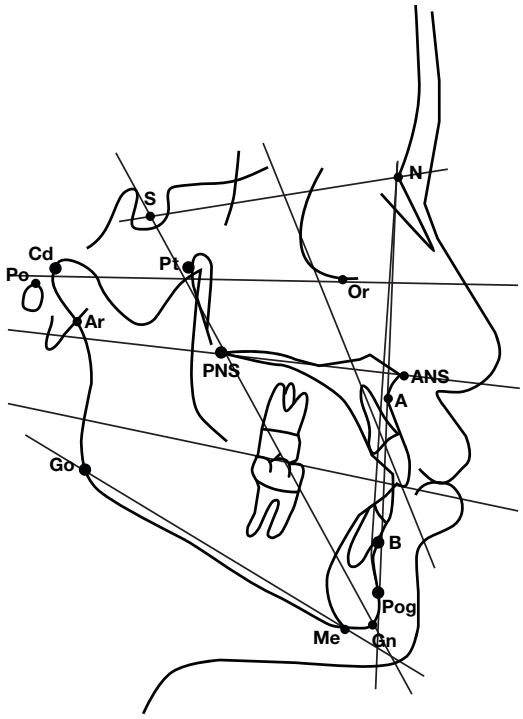

Figure 3. Cephalometric tracing: lines are constructed to join the landmarks for analysis of angular relationships.

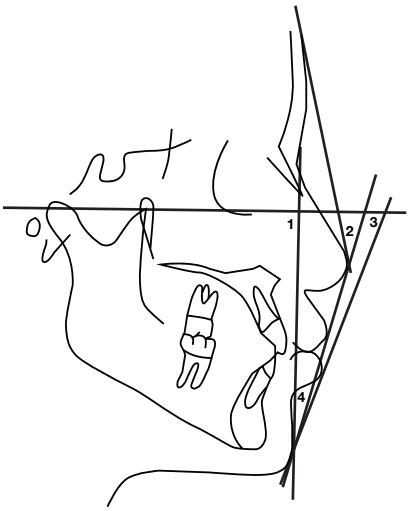

Fig. 4 (a)

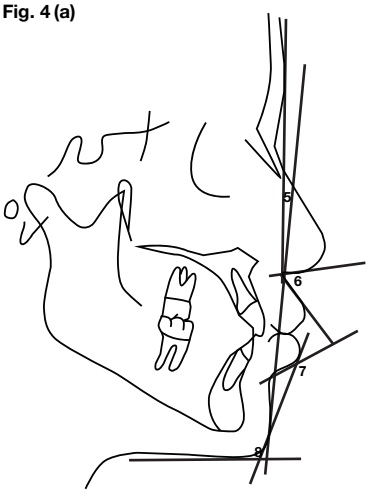

Fig. 4 (b)

Figure 4. Soft tissue angles: (a) 1-Soft tissue facial angle; **2**-Total facial angle; **3**-Z angle; **4**-Holdaway angle; **(b) 5**-Soft tissue angle of convexity; **6**-Nasiolabial angle; **7**-Pogonion-labial angle; **8**-Pogonion-menton angle.

6.10. Lower lip prominence (LLP-NB line): Protrusive/retrusive lower lip relative to the NB Line.[9]
6.11. Lower lip position (LLP-H): Retruded or protruded lower lip relative to H line.[8]
6.12. Interlabial gap (ILG): The space between the upper and lower lips when they are relaxed, with the head in a normal upright position and the teeth in centric relation.[8-10]
6.13. Hard tissue pogonion to soft tissue pogonion (Pog-Pog'): Soft tissue thickness measured between the hard tissue pogonion and soft tissue pogonion.[9]
6.14. Hard tissue menton to soft tissue menton (Me-Me'): Soft tissue thickness measured between the hard tissue menton and soft tissue menton.[9]
6.15. Measure distance between upper facial height (Nasion to ANS) and lower facial height ANS to Menton).[9]

Step 7: Place your values in the table on p393 (Table 1) and analyze your findings

DISCUSSION

Six steps have been presented in the manual completion of a cephalometric tracing. This tracing incorporates a number of cephalometric analyses.[3,5-12] By comparison of angular measurements with reference norm[3] values the clinician will interpret the results of the analysis to give a diagnosis of the presenting dento-skeletal soft tissue pattern. Comparison of the findings of the pre-treatment and post-treatment measurements will allow the clinician to assess the outcome of treatment.

CONCLUSION

Manual cephalometric tracing still has a role to play in orthodontic diagnosis as well as in undergraduate and postgraduate teaching and training in Orthodontics. Jackson et al.[13] reported a high reproducibility of landmarks and measurements for both hand-tracing and digitized cephalometry. In financially constrained situations where computer cephalometric software is not affordable, manual tracing is still a useful tool. A cephalometric analysis template is proposed for easy documentation of the cephalometric measurements.

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Table 1. Cephalometric Analysis Template.

Cephalometric Analysis Template										
	Cephalometric measurements	**Reference norm values**	**Pre-Tx**	**Post-Tx**	**Interpretation**					
Skeletal	Facial Angle°				N		<		>	
	Pog - NB mm				N		P		R	
	N-Pog – A mm				N		P		R	
	SNA°				N		P		R	
	SNB°				N		P		R	
	ANB°				I		II		III	
	WITS mm				I		II		III	
	Y-Axis°				N		<		>	
	SN Length mm				N		<		>	
	FH to SN°				N		<		>	
	PP to SN°				N		<		>	
	OP to SN°				N		<		>	
	MP to SN°				N		<		>	
	Gonial Angle°				N		<		>	
	UFH mm				N		<		>	
	LFH mm				N		<		>	
Dento-alveolar	U1to NA°				N		P		R	
	U1to NA mm				N		P		R	
	L1 to NB°				N		P		R	
	L1 to NB mm				N		P		R	
	Inter-Incisal°				N		<		>	
	APog to L1 mm				N		P		R	
Soft Tissue	TFA°				N		<		>	
	CA°				N		<		>	
	STFA°				N		<		>	
	ZA°				N		<		>	
	NA°				N		<		>	
	PLA°				N		<		>	
	PMA°				N		<		>	
	UL mm				N		<		>	
	LL mm				N		<		>	
	ULP-NB mm				N		<		>	
	LLP-NB mm				N		<		>	
	LLP-H mm				N		<		>	
	Inter-labial gap mm				N		<		>	
	Pog-Pog' mm				N		<		>	
	Me-Me' mm				N		<		>	
Cephalometric Diagnosis										

N - normal ; **<** - small; **>** - greater; **P** - protrusive; **R** - retrusive; **I** - Class I; **II** - Class II; **III** - Class III; **Tx** - treatment

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What's new for the clinician: excerpts from and summaries of recently published papers

SADJ August 2019, Vol. 74 No. 7 p396 - p400

Compiled and edited by V Yengopal

1. The importance of preventative maintenance in implant therapy

FO Costa, SD Ferreira, JR Cortelli, RPE Lima, SC Cortelli, LOM Cota.
Clin Oral Invest. 2019; 23: 3161.17: 71-6.

The ability to replace teeth in a stable, predictable way has changed the way edentulous patients are treated. It has been estimated that five to 10 years after placement, 10% of implants in 20% of patients will have an inflammatory process around the devices.[1] These inflammatory conditions have been classified as peri-implant mucositis and peri-implantitis.

Peri-implant mucositis (PM) is a reversible inflammatory condition whose main clinical characteristic is bleeding on probing. Erythema, swelling, and/or suppuration may also be present. Peri-implantitis (PI) is an irreversible plaque-associated pathological condition occurring in tissues around dental implants, characterized by inflammation in the peri-implant mucosa and subsequent progressive loss of supporting bone.[1]

Regular appointments for preventive maintenance therapy (PMT) aim to maintain the health of peri-implant tissues in the long term.[1] Subgingival microbioma studies revealed that a group of bacteria, especially T*annerella forsythia, Treponema denticola, Porphyromonas gingivalis, Prevotella intermedia, Fusobacterium nucleatum, Campylobacter rectus, Prevotella nigrescens, Eubacterium nodatum,* and *Peptostreptococcus micros*, have an important role in periodontitis (PE).[1]

Additionally, microbiological reviews have shown that the peri-implant microbioma, whether in health or disease, is similar to that around natural teeth.[1] Costa and colleagues (2019)[1] reported on a trial that sought to evaluate, in a longitudinal period of five years, the peri-implant condition and the differences in the frequencies of *T. forsythia, T. denticola, P. gingivalis, P. intermedia, F. nucleatum,* and *Actinomyces naeslundii* in individuals initially diagnosed with PM in the presence and absence of PMT.

Veerasamy Yengopal: *BChD, BScHons, MChD, PhD*, Community Dentistry Department, School of Oral Health Sciences, University of Witwatersrand, Medical School, no. 7 York Road, Parktown 2193, South Africa.
ORCID Number: 0000-0003-4284-3367
Email: veerasamy.yengopal@wits.ac.za

ACRONYMS

BOPi:	Bleeding on Probing
CAL:	Clinical Attachment Level
GNTP group:	Absence of dental visits during the evaluation period
GTP group:	At least five dental visits during the evaluation period
PDi:	Peri-Implant Probing Depth
PE:	Periodontitis
PI:	Peri-Implantitis
PLI:	Plaque Index
PM:	Peri-Implant Mucositis
PMT:	Preventive Maintenance Therapy

MATERIALS AND METHODS

This Brazilian study took place after a five-year period during which a large task force was employed for the recruitment of the 212 initial participants who had received implant therapy.

Contacts were made through direct approach, telephone calls, telegrams, emails, and/or text messages. Eighty individuals who were diagnosed with PM at the initial examination (T1—year 2006) were recovered and underwent a new periodontal peri-implant clinical examination and micro-biological collection (T2—year 2011).

These individuals were divided into two groups: one group with preventive maintenance therapy during the study period (those carrying out regular PMT with dental visits at least once a year (GTP; $n=39$) and another group without preventive maintenance therapy (GNTP; $n=41$).

In terms of clinical examinations, the following clinical parameters for four peri-implant sites in each implant were evaluated using standardized criteria: suppuration, peri-implant probing depth (PDi), bleeding on probing (BOPi), and plaque index (PLI) around all implants.

Additionally, complete periodontal examinations were performed and included plaque index, periodontal probing depth (PD), clinical attachment level (CAL), and bleeding on periodontal probing (BOP) for four sites in each tooth.

During interviews at T2 (T2—year 2011), special attention was given to the occurrence and frequency of periodontal and peri-implant preventive maintenance within the five years following T (year 2006). Frequency of PMT was determined by self-reported information and confirmed in dental records (GTP group: at least five dental visits during the evaluation period (mean 5.6 ± 0.3 visits); GNTP group: absence of dental visits during the evaluation period).

During PMT visits, the following procedures were performed: (1) periodontal and peri-implant status assessment, (2) application of disclosing agents and oral hygiene instructions, and (3) coronal prophylaxis and non-surgical and surgical mechanical debridement, when necessary.

Peri-implant mucositis was defined as the presence of visual inflammation and BOPi. Peri-implantitis was defined as the presence of PDi ≥ 5 mm associated with BOPi and/or suppuration with peri-implant bone loss. Cases where the radiographs did not confirm the peri-implant bone loss were diagnosed as PM.

Also, sub-gingival samples were collected at T1 and T2 in eight peri-implant sites, two in each quadrant (the peri-implant sites with the higher PDi associated with BOPi were evaluated at both times), for each individual.

Quantification of the total number of bacterial cells, *A. naeslundii, P. gingivalis, T. forsythia, T. denticola, P. intermedia,* and *F. nucleatum* was carried out by quantitative real-time polymerase chain reaction (qPCR) using TaqMan assay (TaqMan® Universal PCR Master Mix II).

RESULTS

The characteristics of the sample at T1 (2006) and T2 (2011) are presented in Table 1. Individuals in the GNTP group had significantly higher values of plaque index when compared with GTP after five years (1.9 ± 0.5 vs. 1.4 ± 0.7; $p = 0.001$).

There was a significantly higher incidence of PI in GNTP (43.9%) than in the GTP (18%) group. It is noteworthy that patients with PI in GTP, despite maintenance and necessary surgical treatment, still persisted with PI diagnosis in the final exam. All subjects ($n = 12$) who presented PM resolution at T2 were in the GTP group.

There was an increase in the number of individuals with PE in GNTP when comparing T1 (22.0%) with T2 (41.5%) (see Table 1).

For the bacterial analysis, in the GTP group, there was a significant decrease in Total Bacterial load, in the frequency of the bacteria analysed in the orange complex, and in the isolated frequency of *T. forsythia, P. gingivalis, P. intermedia,* and *A. naeslundii* at T2 (unadjusted and adjusted models). Additionally, there was a significant increase in the isolated frequency *F. nucleatum* (unadjusted model) at T2.

Table 1. Characteristics of the sample at T1 and T2.

Variables	Baseline (T1)			Final examination (T2)		
	GNTP $n = 41$	GTP $n = 39$	p	GNTP $n = 41$	GTP $n = 39$	p
Gender[a]						
Male	22 (53.7%)	24 (61.5%)	0.476	22 (53.7%)	24 (61.5%)	0.476
Female	19 (46.3%)	15 (38.5%)		19 (46.3%)	15 (38.5%)	
Age (years)[b]	22 (53.7%)	24 (61.5%)	0.476	22 (53.7%)	24 (61.5%)	0.476
Smokers/Former smokers[a]						
Yes	13 (31.7%)	8 (20.5%)	0.255	14 (34.1%)	8 (20.5%)	0.172
No	28 (68.3%)	31 (79.5%)		27 (65.9%)	31 (79.5%)	
Diabetes[a]						
Yes	6 (14.6%)	5 (12.8%)	0.814	6 (14.6%)	7 (17.9%)	0.688
No	35 (85.4%)	34 (87.2%)		35 (85.4%)	32 (82.1%)	
Number of teeth[b]	849	805	0.927	846	797	0.794
	20.6 ± 6.2	20.6 ± 7		20.6 ± 6.2	20.3 ± 6.9	
Average of lost teeth[b]	2.9 ± 3.9	4.3 ± 5.6	0.283	2.9 ± 3.9	3.0 ± 4.8	0.607
Implant number[b]	183	157	0.143	180	156	0.419
	4.4 ± 3.8	3.9 ± 2.1		4.4 ± 3.8	4.5 ± 3.1	
Installation time of the prosthesis (months)[a]	21.3 ± 7.1	24.7 ± 17.4	0.454	80.5 ± 9	77.4 ± 12.5	0.457
Plaque index[b]	1.6 ± 0.6	1.4 ± 0.6	0.176	1.9 ± 0.5	1.4 ± 0.7	0.001
Periodontal diagnosis[a]						
Healthy	32 (78.0%)	29 (74.4%)	0.698	24 (58.5%)	28 (71.8%)	0.214
PE	9 (22.0%)	10 (25.6%)		17 (41.5%)	11 (28.2%)	
Peri-implant diagnosis[c]						
Healthy	0	0	NA	0 (0.0%)	12 (100%)	0.000
PM	41	39	NA	23 (56.0%)	20 (51.2%)	
PI	0	0	NA	18 (43.9%)	7 (18%)	

[a]Chi-square test [b]Average ± standard deviations compared by Mann-Whitney test [c]Fisher's exact test

In intra-group comparisons, there was a significant increase in Total Bacterial load, in the frequency of the bacteria analysed in the orange complex, and in the isolated frequencies of *P. gingivalis, P. intermedia,* and *F. nucleatum* in GNTP. There was an increase in the frequency (unadjusted model) of the red complex and *A. naeslundii*.

At T2, individuals diagnosed with PM and PI in the GNTP group presented a significantly higher TBL when compared with GTP. In both groups, individuals who progressed from PM to PI showed a significant increase in TBL. The GTP individuals who remained with PM showed a decrease in TBL.

CONCLUSIONS

the researchers concluded that there was a significant longitudinal increase in Total Bacterial count in the GNTP group compared with the GTP group.

Preventative maintenance therapy was shown to be beneficial in maintaining peri-implant clinical stability and homeostasis of the microbiological condition.

Implications for practice:

Preventative maintenance therapy has been shown to be crucial for total bacterial control and clinical stability of the implant. Thus, frequent recall of these patients is an important indicator of future success and functioning of the implant.

Reference

1. Costa FO, Ferreira SD, Cortelli JR. Lima RPE, Cortelli SC, Cota LOM. Microbiological profile associated with peri-implant diseases in individuals with and without preventive maintenance therapy: a 5-year follow-up. Clin Oral Invest. 2019; 23: 3161.

2. Effect of a single-tufted toothbrush on the control of dental biofilm in orthodontic patients: A randomized clinical trial

Smaïl-Faugeron, V, Muller-Bolla, M, Sixou, J-L, Courson, F. Int J Paediatr Dent. 2019; 29: 573-84.

Local anaesthesia is frequently indicated in paediatric oral health care, and two techniques may be used: conventional intra-mucosal infiltration anaesthesia (CIA), frequently used by practitioners, and intraosseous anaesthesia (IOA), which delivers the local anaesthetic within the spongy bone adjacent to the tooth to be anaesthetized.

Needle- and injection-related fears are common sources of dental anxiety in children in the case of CIA. Indeed, the needle is not only visible, but also injecting too quickly into the mucosa can lead to pain or discomfort. With IOA, the fear of the needle would be decreased because the pen grip is very close to the needle.

Also, pain during injection would be decreased because IOA can be delivered by a computerized system (QuickSleeper™ system), which delivers local anaesthesia at a constant rate and pressure.

Smaïl-Faugeron and colleagues (2019)[1] reported on a trial that sought to compare pain during the insertion of the needle and injection with IOA against CIA for treating first permanent molars with deep carious lesions or moderate to high severity (MIH) lesions in children and adolescents.

Secondary objectives were to compare the two anaesthesia types in terms of pain latency, the need for additional anaesthesia and pain felt during the treatment.

ACRONYMS

CIA:	Conventional Intra-Mucosal Infiltration Anaesthesia
IOA:	Intraosseous Anaesthesia
MIH:	Moderate to High Severity
RCT:	Randomized Clinical Trial
VAS:	Visual Analogue Scale

METHODS

This was a multicentre randomized clinical trial (RCT) using both a split-mouth and parallel-arm design. For the split-mouth RCT, two permanent first molars located in the same dental arch were included per patient, and for the parallel-arm RCT, only one permanent first molar was included per patient.

The following inclusion criteria were established: patients between 7 and 15 years of age; mentally and generally disease-free; cooperative (score 0 to 2 on the Venham distress scale); with one (for the parallel-arm trial) or at least two (for the split-mouth trial) first permanent molars with deep caries (i.e. dentinal lesion involving more than 50% of the entire dentin thickness evaluated by radiography) or MIH lesion, with preserved pulp vitality as determined by clinical and radiographic observations (treatments could be conservative or endodontic limited to pulpotomy); and without the use of analgesic drug for 48 hours before randomization.

The exclusion criteria were periodontal alterations (periodontal pockets or dental mobility) or radiological defects (bone loss, furcation or periapical radiolucency and pre-operative clinical and radiographic observations of irreversible radicular pulpal inflammation or pulpal necrosis.

Before either type of anaesthesia was administered, a topical anaesthesia Xylocaïne® visqueuse 2% was applied for one to two minutes on previously dried mucosa. For CIA, a 16-mm-long needle was used to inject in the maxillary region and a 35-mm-long needle was used for mandibular anaesthesia.

IOA was carried out using the QuickSleeper™ system following the three-step procedure described by the manufacturer. The anaesthetic solution used in both techniques was 4% articaine with 1:200 000 adrenalin.

All outcomes were recorded on the day of the intervention. The primary outcome measure was pain felt during the insertion of the needle and injection of the anaesthetic, assessed at the end of the anaesthesia, with a Visual Analogue Scale (VAS) ranging from 0 cm (no pain) to 10 cm (very much pain).

Three secondary outcomes were evaluated: latency, the need for additional anaesthesia during the treatment and pain felt during the treatment. The latency was assessed examining the sensitivity of the vestibular sulcus for CIA or lingual sulcus for IOA by using a probe at the end of the injection (an exam was conducted every minute until the sulcus was insensitive to the probe). Patient assessed the pain felt during the treatment, recording on the VAS at the end of the dental treatment session.

For anaesthesia allocation, a computer-generated, permuted-block randomization sequence was used for the parallel arm RCTs. For the split-mouth RCT, one permanent first molar was randomly allocated to one of the techniques (e.g., IOA) and the other permanent first molar belonging to the same dental arch in the same child was allocated to the other technique (e.g., CIA).

A 7- to 21-day interval was established between the two procedures. For the parallel-arm RCT, one patient with one permanent molar first was randomly allocated to one of the techniques (IOA or CIA). Patients - evaluators - were unaware of which of the two techniques was used, whereas practitioners were not.

RESULTS

For each patient enrolled in the split-mouth RCT, about five were enrolled in the parallel-arm RCT, which allowed for not losing any eligible patients. In total, 158 children aged 7-15 years for whom parental consent had been obtained were deemed eligible for inclusion.

Of these, 30 (mean age: 9.0 years, SD: 2.3) participated in the split-mouth RCT and 128 (mean age: 10.4 years, SD: 2.5) in the parallel-arm RCT. For the parallel-arm RCT, 63 patients were allocated to the IOA group and 65 to CIA group.

Split-mouth RCT results

The mean VAS scores were 0.73 ± 1.31 cm for the IOA and 1.43 ± 1.45 cm for the CIA groups. The mean (95% CI) for the difference in paired proportions was -0.70 ± 0.36 cm (-1.44 to 0.04), indicating that patients felt less pain on the insertion of the needle and the injection with IOA compared with CIA, but this difference was not statistically significant ($P = 0.06$).

The mean latency was 1.07 ± 0.25 minutes for the IOA and 2.83 ± 2.64 minutes for the CIA groups. The mean (95% CI) for the difference in paired proportions was -1.77 ± 0.51 (-2.77 to -0.77), indicating that latency was statistically decreased with IOA compared with CIA with a statistically significant difference ($P = 0.001$).

For pain felt during treatment, the mean VAS scores were 1.07 ± 1.76 cm for the IOA and 0.53 ± 0.82 cm for the CIA groups. The mean (95% CI) for the difference in paired proportions was 0.53 ± 0.37 cm (-0.19 to 1.25), indicating that patients felt less pain during treatment with CIA compared with IOA, but this difference was not statistically significant ($P = 0.14$).

Parallel-arm RCT results

The mean VAS scores were 1.17 ± 1.40 cm for the IOA and 1.86 ± 1.81 cm for the CIA groups. The mean (95% CI) for the difference in paired proportions was -0.69 ± 0.29 cm (-1.25 to -0.12), indicating that patients felt less pain on the insertion of the needle and the injection with IOA compared with CIA, with a statistically significant difference ($P = 0.02$).

The mean latency was 1.63 ± 0.97 min for the IOA and 3.08 ± 2.11 min for the CIA groups. The mean (95% CI) for the difference in paired proportions was -1.44 ± 0.29 (-2.02 to -0.87), indicating that latency was statistically decreased with IOA compared with CIA with a statistically significant difference ($P = 2.87.10^{-6}$).

For pain felt during the treatment, the mean VAS scores were 0.90 ± 1.51 cm for the IOA and 0.88 ± 1.64 cm for the CIA groups.

The mean (95% CI) for the difference in paired proportions was 0.03 ± 0.28 cm (-0.52 to 0.58), indicating that patients felt less pain during treatment with CIA compared with IOA, but this difference was not statistically significant ($P = 0.92$).

Combined treatment effect from split-mouth and parallel-arm RCTs

For all outcomes, findings from the two types of trials were consistent: for pain felt during insertion of the needle and injection, p value was equal to 0.98; for latency, p value was equal to 0.58; for need for additional anaesthesia, p value was equal to 0.66; and for pain felt during treatment, p value was equal to 0.27.

Hence, there was no significant difference for all of these variables when the results of the two types of study designs were combined.

CONCLUSIONS

For all outcomes, findings from the two types of trials were consistent: for pain felt during insertion of the needle and injection, latency, the need for additional anaesthesia and for pain felt during treatment, there were no signiicant differences between the two techniques (IOA vs CIA).

Implications for practice

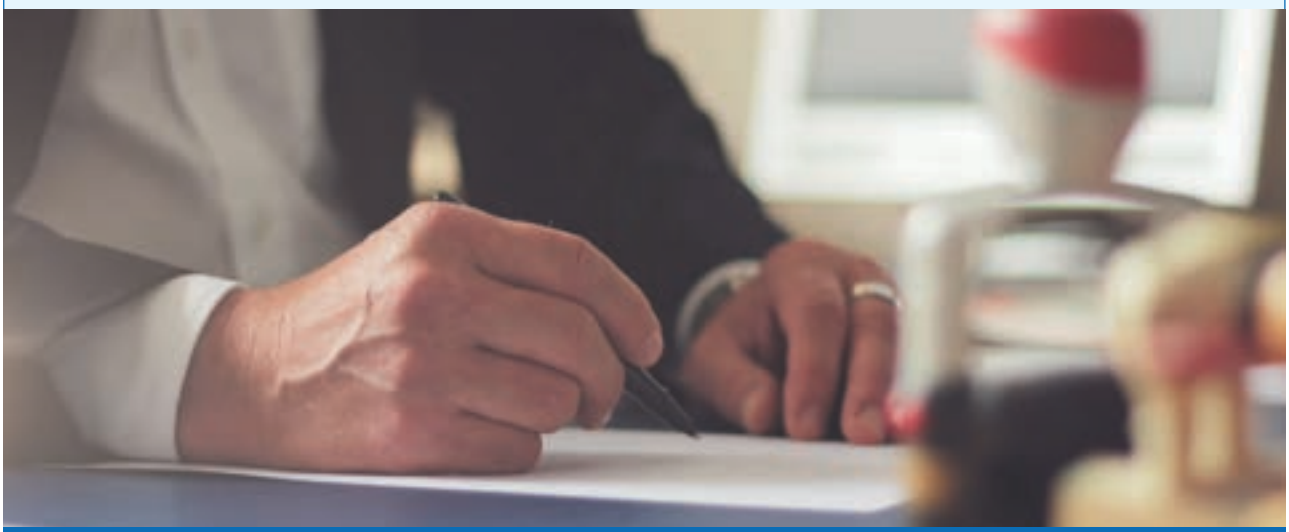
The evidence for computerised injection systems suggest that they are still not superior to the conventional methods of administering local anaesthesia for the outcomes that were assessed in this study.

Reference

1. Smaïl-Faugeron, V, Muller-Bolla, M, Sixou, J-L, Courson, F. Evaluation of intraosseous computerized injection system (QuickSleeper™) vs. conventional infiltration anaesthesia in paediatric oral health care: A multicentre, single-blind, combined split-mouth and parallel-arm randomized controlled trial. Int J Paediatr Dent. 2019; 29: 573 - 84.

Do the CPD questionnaire on page 405

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.



Online CPD in 6 Easy Steps

1. Go to the SADA website www.sada.co.za.
2. Log into the 'member only' section with your unique SADA username and password.
3. Select the CPD navigation tab.
4. Select the questionnaire that you wish to complete.
5. Enter your multiple choice answers. Please note that you have two attempts to obtain at least 70%.
6. View and print your CPD certificate.

http://dx.doi.org/10.17159/2519-0105/2019/v74no7a8

Maxillofacial Radiology 173

SADJ July 2019, Vol. 74 No. 7 p401

CJ Nortjé

Below are more images of articular disorders which may affect the functioning of the TMJ. Discuss the most important radiological features discernible and what is your diagnosis?

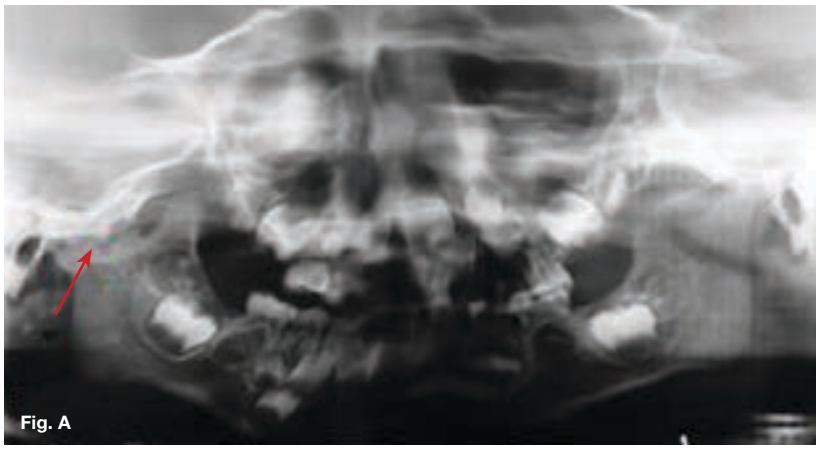


Fig. A

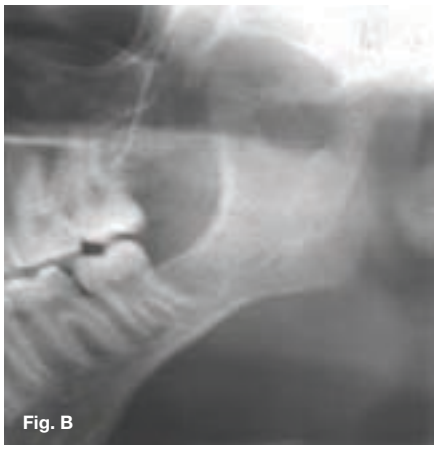


Fig. B

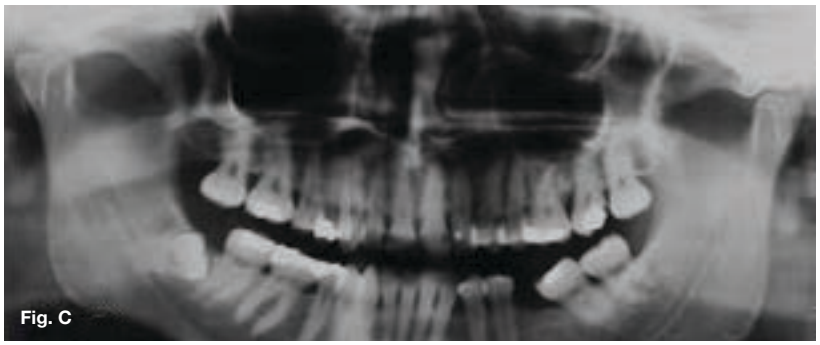


Fig. C

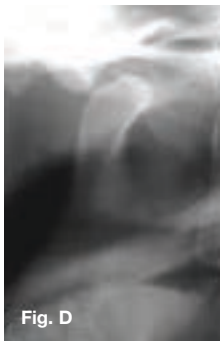


Fig. D


Fig. E

INTERPRETATION

Fig. A is an example of fibrous ankyloses of the right TMJ which is the fibrous union of the condyle of the man-}dible with the glenoid fossa (red arrow), resulting in immobility of the joint. Fibrous ankyloses of the TMJ, which is a variant of osseous ankyloses; the osseous components are united by fibrous tissue that has not undergone ossification. The causes are therefore the same as those for osseous ankyloses, namely inflammation resulting from localized infection; trauma to the joint and the various types of arthritis which may affect the joint. Fibrous ankylosis is a fibrous connective tissue process which results in decreased range of motion, which is why fibrous ankylosis is also known as false ankylosis. Because of the large number of possible causes, there is no clear demographic features associated with fibrous ankylosis. Fig. B is an example of hypoplasia of the condyle which refers to a smaller condyle than normal condyle resulting from lack of full development, as opposed to loss of condylar mass resulting from an acquired disease. Hypoplasia is often a coincidental finding on radiographs made for unrelated reasons; thus its prevalence or distribution in the population is not known. It does not appear as a common finding. The patient may have no signs of or symptoms. Deviation of the mandibular midline to the affected side ay be noted in unilateral cases, or retrognathia may be present. Fig. C Bifid mandibular condyle is a rare condition more frequently unilateral and typically discovered incidentally on imaging. The nature of this developmental condition is unknown but it may be attributed to the failure of resorption of fibrous or vascular tissue during the embryonic period leading to maldevelopment of the mandibular condyle. Figs. D&E are examples of bilateral condyle dislocation when the mandibular condyle is displaced from the glenoid fossa usually anterior to the articular eminence. The patient is not able to return the position of the condyle to the glenoid fossa by normal masticatory muscle action. Dislocation of the TMJ may result from a variety of causes, ranging from a yawn to a blow to the jaws, especially while the mouth is open. The dislocation may be unilateral or bilateral. Extensive dental procedures, such as a third molar extraction, have also been implicated. Condylar dislocation may be more likely in individuals with shallow anterior articular eminences and those patients with lax capsules and ligaments.

Christoffel J Nortjé: *BChD, PhD, ABOMR, DSc.* Faculty of Dentistry, University of the Western Cape.
ORCID Number: 0000-0002-9717-5514
Email: cnortje@uwc.ac.za

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Supererogation: the dwelling of heroes and saints

SADJ August 2019, Vol. 74 No. 7 p401 - p403

PD Motloba[1], NL Makwakwa[2], ML Machete[3]

CASE

After managing several patients on the Transnet Phelophepa Health Care program, the students retired to the cabin and reminisced over the occurrences of the day. A particular case stood out for most of them, as they recalled the story of an eighty something year old, old timer, Motsamai Keikemetse.

He was particularly grateful for the treatment he received at the train. Several extractions, new pairs of glasses and comprehensive medical examination were undertaken without any payment. All this care he retorted, could only be described as a miracle. Yet, he spent the night at the train station because he did not have money to travel home that late. Like most villagers, he relied on the kindness of strangers and available public transport to commute to and from the train.

As the dental students interrogated this case, several suggestions came through on how each of the students could have intervened. For some students, all was well and nothing out of the ordinary happened to the old timer. For some, had his situation been known a bit earlier, serious intervention would have been warranted to ease his life woes.

For others, such actions were seen as intrusive on the man and his way of life, and are, in fact, interferences. This case scenario questions the categories of actions likely to be considered and executed by students whether they are justified or not.

Author affiliations:
1. **Pagollang D Motloba:** *BDS (Medunsa), MPH (Epidemiology) (Tulane), M Dent (Comm Dent) (Medunsa), MBL (Unisa),* Chief Specialist, Head of Department Community Dentistry*.
   ORCID Number: 0000-0003-1379-7576
2. **Nokukhanya L Makwakwa:** *BDT, BDS (Medunsa) Postgraduate Dip in Clinical Dentistry (UWC), MPH (UL),* Registrar Community Dentistry*.
   ORCID Number: 0000-0001-5669-795X
3. **Motimedi L Machete:** *BDS (UL), MDS (SMU),* Lecturer, Community Dentistry*.
   ORCID Number: 0000-0002-0218-8428

*School of Oral Health Sciences, Sefako Makghatho Health Science University (SMU), South Africa.
Corresponding author: Pagollang D Motloba
HOD, Community Dentistry, School of Oral Health Sciences - Sefako Makghatho Health Science University (SMU), South Africa.
Tel: +27 (0)12 521 4848
Email: pagollang.motloba@smu.ac.za
Author contributions:
1. **Pagollang D Motloba:** Primary author - 50%
2. **Nokukhanya L Makwakwa:** Co-author - 30%
3. **Motimedi L Machete:** Co-author - 20%

Figure 1. The Good Samaritan by Vasily Surikov.

Without placing any moral judgments on their utility and value, one would ask if there is any system to classify and order actions as performed by health professionals. Are some actions morally superior or preferable to others? And if so, how do we know which option to choose under what clinical circumstance?

INTRODUCTION

The media is littered with a litany of accusations of misconduct by health professionals. Hence, the urgent need to interrogate this unfortunate deterioration in relationship between the profession and the public.

The causes of this deepening mistrust emanate in part from professional arrogance, negligence, ignorance, unintended medical errors and unprofessional behaviour, amongst others.

For example, health professionals have been accused of being paternalistic in their dealings with patients; having defrauded patients; having poor bedside or chairside manners; having caused patients physical, psychological and emotional harm. This decline continues unabated, prompted, lest we forget, by Life Esidimeni and similar atrocities.

Unless the profession honestly examines its moral character and conduct and how it treats the public, nothing will change. The *status quo* ought to change, or else health professionals will continue to enjoy and abuse their unwarranted stature and prestige, to the detriment of the unsuspecting public.

This position of privilege bestowed on health professionals requires from those professionals a greater measure of compassion, reciprocity and responsibility towards the society.

Maybe this expectation of clinicians is unjustifiable and probably unachievable from fallible beings. If so, why then should clinicians enjoy higher social standing and be regarded as having higher moral capacity than ordinary citizens, and why has the society accorded this status to health professionals? Is this position a necessary condition or is there reason to expect conduct that is above reproach from these cadres? And if so, what actions are morally, legally and socially expected, optional or forbidden from clinicians?

Duties performed by practitioners as enshrined in codes of conduct and ethical guidelines are unclear and yet prescriptive. They do not provide clarity on the moral character and value of an act, but rather whether the act is permissible or prohibited. Yet, increasingly, practitioners have gone beyond the call of duty, or are expected to do so by the communities they serve. This has created unrealistic expectations from the profession.

Is it reasonable for health professionals to strive for altruism, sainthood or even heroism in discharging their duties? In other words, is the health profession the kingdom where saints and heroes dare to dwell… or ought to?

Supererogation: normative description

Heroic and saintly acts are supererogatory deeds that go beyond the ordinary and mundane activities. Humanity yearns to celebrate brave men and angels and to vilify as fiends those who fail or elect not to be courageous.

These reactions are testament to the insatiable desire for heroes, saints and martyrs. There seems to be an increasing expectation for saints among the health professionals in particular!

Debates on the conceptual definition of supererogation traverse moral, ethical and religious considerations. Since time immemorial, Christian belief and other religious teachings have demanded acts of faith beyond common courtesy. For example, the faithful have been called to "love thy enemy", and "forgive many times over" and "turn the other cheek". This call to act beyond the common cause provides a foundation for religious belief and sets a goal for achieving piety.

The philosophical interrogation of the morality, duty and virtue of supererogatory acts highlights a dual taxonomy including and extending from deontological to axiological moral perspectives. The former viewpoint emphasises a duty based definition, while the latter highlights value based notions. In other words the nature of philosophical debates on obligation for supererogation range from considering actions that are "good" to do, to those we "ought" to do; or from value or virtue to duty or obligation.

Therefore supererogation lies at the intersection of the axiological and the deontic theories; that is between the 'good' and the 'ought' to activities. Common language expresses supererogation as performing those activities classified as "beyond the call of duty.", or "paying out more than is due", or "doing more than you're expected or obligated to."

Supererogation – duty or virtue?

Can actions be considered supererogatory? And if so what characterises these actions? Is it their intrinsic value or is it the good or deontological thrust or force that confers this character?

Since moral norms provide a yardstick for conduct, it follows, *prima facie*, that all moral actions would fall into one of three categories: those actions that are required, forbidden, or permissible (i.e. either necessary, prohibited or optional). In other words, this triad of actions can be good to do, hence required; or bad to do, hence forbidden; or morally neutral or inconsequential, hence optional. Intuitively this classification represents all possibilities of the actions which may be expected of health professionals. For example, a dentist is **obligated** to treat, **prohibited** from harming and **may** provide services to patients or choose to refer.

Urmson[1] posited another category of actions, that is supererogatory, or morally praiseworthy, but not morally required activities, an example being those acts by saints and heroes. The existence of the fourth category of actions, the supererogatory acts was explicated by Mellema[2,3] and by Hale[4] as actions that fulfil the following criteria: (1) acts without moral duty, (2) acts that are morally praiseworthy, and (3) acts which are not morally blameworthy when omitted.[2] This current classification gives effect to the fourfold description of the required, forbidden, permissible, and supererogatory. The litmus test for a supererogatory action entails excluding whether those acts are the 'one should do', 'ought not to do', 'advisable to do', **but** 'ought not to do but may as well do'.

This Western interpretation of supererogation is diametrically opposed to African ethics. African morality[5] is weighted more on duty and obligation than on rights as a means to conduce welfare. According to this morality, duty and supererogatory obligations are indistinguishable, because an act that is morally good and commendable in its value and consequences cannot be optional. It is hence commonplace that '…an African will give his best house and evening meal to a guest without the slightest thought that he is doing anything extraordinary'.

CASE DISCUSSION

Interestingly, the responses of the students to the case of Mr Keikemetse represent a diversity of moral viewpoints, which could be attributed largely to the upbringing and culture of the students.

For a majority of African students, it was morally required or obligatory to intervene and assist the old timer. Yet for the white students, whose moral norm emanates largely from libertarian and rights based viewpoints, it was neither obligatory or necessary to assist. These views as held by students do not suggest any superiority in moral positions, but simply the plurality of moral standpoints.

It is critical to recognise that the views of students did not incorporate the expectations of the communities. This means that, in considering the merits of this case, the students were oblivious to the needs and desires of the society they serve. They expressed their opinions on the matter and not necessarily how they would act when faced with this reality. That situation would in all probability impact on their decision and the intention to act or not in a particular manner.

By implication, this would mean that clinicians should always be cognisant of the culture and practices of the people they serve. This would surely be a critical consideration in their decision making. For example, if it is an expectation that elderly persons should be assisted, surely every practitioner as members of the society will be expected to do so despite his or her own moral viewpoints.

It is thus imperative to bring to the centre of debate the application of African moral philosophical viewpoints such as Ubuntu as a guide.[6] It is our opinion that teaching this moral philosophy will enable practitioners to navigate ethical dilemmas that are bound by context. As the saying goes 'whilst in Rome do as the Romans do.'

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CPD questionnaire

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

GENERAL

The epidemiology and management of traumatic facial fractures in children seen in a tertiary hospital in Johannesburg, South Africa

1. The unerupted dentition of the mandible and maxilla and the lack of sinus pneumatisation results in reduced strength and stability of the jaws.
   A. True
   B. False

2. Identify the CORRECT answer:
   In this study, the greater incidence of MVA were noted amongst children?
   A. 1 – 5 years of age
   B. 6 – 10 years of age
   C. 11 – 15 years of age

3. Identify the CORRECT answer:
   In this study, there is a significant association between:
   A. cause of fracture and gender
   B. gender and age
   C. cause of fracture and age
   D. age and site of fracture
   E. site of fracture and gender

4. Identify the CORRECT answer:
   During which period of age in years did the majority of falls among children occur?
   A. 2 – 6
   B. 3 – 7
   C. 4 – 7
   D. 0 – 5
   E. 4 – 8

Demographic correlates of oral hygiene among stroke survivors undergoing rehabilitation

5. Identify the CORRECT answer:
   Poor oral hygiene post-stroke occurs among stroke survivors and has been identified as a cause of:
   A. aspiration pneumonia, systemic infection, endocarditis and sometimes death.
   B. poor eating habits, dental caries and poor ADL
   C. reduced mobility and function
   D. dental caries and even death

6. Identify the CORRECT statement:
   A significant positive linear relationship between poor oral hygiene and age among stroke survivors suggests that:
   A. the elderly stroke survivors are less likely to suffer poor oral hygiene
   B. the elderly stroke survivors have equal chances of suffering poor oral hygiene as the young ones
   C. the elderly stroke survivors are more likely to suffer poor oral hygiene
   D. poor oral hygiene is never influenced by the age of the stroke survivors
   E. All of the above

7. Identify the CORRECT statement:
   An inverse relationship between oral hygiene and the socio-demographic factors of education and socioeconomic status simply suggests that:
   A. neither factor has any influence on the standards of oral hygiene
   B. lower educational qualification and low socioeco nomic status are correlates of poor oral hygiene.
   C. oral hygiene is a choice and is not a factor of education or social class.
   D. stroke survivors who are highly educated pay little attention to oral hygiene.

The dimensional distortion of acrylic resin denture bases subjected to dual cure methods

8. Identify the CORRECT answer:
   The philosophy of Appropriatech in Prosthodontics most likely applies to:
   A. using short cuts in the making of a prosthesis
   B. using methods and materials that are cost-effective
   C. accepting that not all prostheses can be perfect
   D. achieving patient satisfaction with cheaper prostheses

9. Identify the CORRECT answer:
   Which of the following dual-cure methods has previously not been associated with reduced distortion of the denture base:
   A. Place flask in boiling water for 20 minutes, remove and plunge into cold water for 20 minutes
   B. Place flask in cold water. Allow water to heat up to 72° C and leave for 8 hours and bench cool
   C. Place flask in cold water, allow the water to heat up to 65° C and leave for 2 hours, remove and bench cool

Perceptions of quality and safety among dental patients

10. Identify the INCORRECT statement:
    A. Overall, slightly above half (58.6%) of the participants had a positive view about the quality of dental clinics in South Africa
    B. Access to Care received the least favourable rating of quality
    C. The statement "The instruments used in treating me appeared clean" received the highest score
    D. The global rating of safety received the highest score; over 40% of participants had a positive perception of safety

11. Identify the INCORRECT statement:
    A. Patients who had experienced a Dental Adverse Event were more likely to view the services received at South African dental clinics as poor quality.
    B. 20% of UK respondents rated their care at dental clinics as sub-optimal
    C. Duplicate tests, poor waiting times and the difficulty in securing emergency appointments received the most negative responses
    D. Clinic cleanliness/hygiene and staff courtesy/respect received guarded responses

Missing or incomplete dental records: prevalence at Medunsa Oral Health Centre

12. Identify the CORRECT statement:
    The response rate obtained in this study was:
    A. 20.9%
    B. 50%
    C. 60%
    D. 79.1%

13. Identify the CORRECT statement:
    The proportion of fully completed records was:
    A. <5%
    B. 6 - 10%
    C. 16 – 20%
    D. None of the above

14. Identify the CORRECT statement:
    A consent form was not signed in:
    A. 40% of the records
    B. 50% of the records
    C. <60% of the records
    D. <70% of the records
    E. None of the above

15. Health records should be retained for at least six years.
    A. True
    B. False

Maxillofacial Radiology Case 173

16. Fibrous ankyloses are also known as false ankyloses.
    A. True
    B. False

17. Extraction of a third molar may result in condylar dislocation.
    A. True
    B. False

Clinical Windows - What's new for the clinician

18. In the Costa et al. trial, there was a significant longitudinal increase in Total Bacterial count in the GNTP group (absence of dental visits during the evaluation period)
    A. True
    B. False

19. In the Smaïl-Faugeron et al. trial, ALL patients in both study designs (split-mouth & parallel-arm) received both injection techniques.
    A. True
    B. False

20. In the Smaïl-Faugeron et al. trial, for the parallel-arm randomized clinical trial (RCT) results, the pain felt during the treatment was significantly greater for the IOA (intraosseous anaesthesia) compared with CIA (conventional intra-mucosal infiltration anaesthesia).
    A. True
    B. False

ETHICS

Supererogation: the dwelling of heroes and saints

21. Duties performed by practitioners as enshrined in codes of conduct and ethical guidelines are clear and yet prescriptive.
    A. True
    B. False

22. Supererogatory activities are in that class of actions that go 'beyond the call of duty'.
    A. True
    B. False

23. Identify the CORRECT answer:
    All moral actions fall into one of three categories:
    A. Those actions that are correct, forbidden or permissible
    B. Those actions that are necessary, legal or optional
    C. Those actions that are necessary, legal or compulsory
    D. Those actions that are required, forbidden or permissible

24. Clinicians should always be cognisant of the culture and practices of the communities they serve.
    A. True
    B. False

25. Identify the CORRECT answer:
    Libertarian moral norms and rights emanate largely from respecting the patients':
    A. Human rights
    B. Autonomy
    C. Confidentiality
    D. Anonymity

THE SOUTH AFRICAN DENTAL JOURNAL
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