UNIVERSITY OF THE WITWATERSRAND

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MDent (Maxillofacial & Oral surgery)

Topic: Have things changed: An audit of Maxillofacial & Oral surgery procedures for the years 2008 & 2018

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DECLARATION

I, Dr Pranusha Ramlakhan, declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Masters of Dentistry in Maxillofacial & Oral surgery at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

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March 2022

To my loving husband, Renesh Sha

and

son, Uddhav Sha

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- Above all, I wish to humbly dedicate this work to Lord Krsna, whose mercy and guidance saw me through this research project and the degree program

ABSTRACT

Introduction:

Clinical audits have become a critical component of clinical governance in today's surgical practice, as well as a prerequisite for surgeons' continued professional development. The accuracy of medical records is essential in patient diagnosis and treatment, as well as in allocating resources to fulfil clinical demands.

Study aim:

This study aimed to carry out an audit of Maxillofacial and Oral Surgery (MFOS) patients treated at Chris Hani Baragwanath Academic Hospital (CHBAH) over two 12-month periods a decade apart.

Method:

This was a clinical audit performed as a quantitative retrospective chart review of patients who underwent procedures at the Maxillofacial and Oral Surgery (MFOS) Unit at Chris Hani Baragwanath Academic Hospital (CHBAH), from January 2008 to December 2008 and from January 2018 to December 2018. Age, gender, diagnosis, and procedure done under both local and general anaesthesia were among the data collected from the register. The audit compared the pathologies, diagnoses, and procedures between the two decades.

Results:

The study consisted of 4198 subjects (1936 from 2008 and 2262 from 2018) treated under both general and local anaesthesia. There was a significantly higher number of male subjects ($p<0.001$) and higher mean age of patients (33.03 years, $p=0.001$) in 2018 compared to 2008. There were 1320 and 1660 local anaesthetic procedures performed in 2008 and 2018, respectively ($p=<0.001$). Trauma (mandibular fractures in particular) was the most common preoperative diagnosis in 2008 (n=587) and 2018 (n=394). A statistically higher number of open reduction internal fixation ($p<0.001$) and closed reductions ($p<0.001$) for fractured mandible was performed in 2008 compared to 2018. Conversely, there were statistically more dentoalveolar procedures in 2018 compared to 2008 (all $p=<0.00$).

Conclusion:

Although craniofacial trauma remains the most common preoperative diagnosis for treatment under general anaesthesia, our data show a significant decline in trauma-related surgery. Conversely, the number of other surgical procedures performed under local anaesthetic has significantly increased from 2008 to 2018. We recommend that more surgical audits be conducted to include data such as bed facilities, human resources, waiting periods in the clinic and theatre, and referral patterns from surrounding hospitals. The credence and scientific value of data from audits such as this will be significantly enhanced by the introduction of a computer-based data collection system.

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Keywords: Maxillofacial and Oral Surgery, audit, local and general anaesthetic

NOMENCLATURE

CHBAH	Chris Hani Baragwanath Academic Hospital
CMJAH	Charlotte Maxeke Johannesburg Academic Hospital
CRFM	Closed reduction fracture mandible
GA	General Anaesthetic
HIV	Human Immunodeficiency virus
LA	Local Anaesthetic
MFOS	Maxillofacial and Oral Surgery
ORIF	Open reduction and internal fixation
SPSS	Statistical Package for Social Sciences
TMJ	Temporomandibular joint

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Chapter 1: INTRODUCTION

The Chris Hani Baragwanath Academic Hospital (CHBAH) is the third largest hospital in the world, with approximately 3200 beds and 6760 employees. It is located in Soweto, south of Johannesburg, South Africa. Approximately 70% of all admissions are trauma emergencies. Every year 150 000 inpatients and 500 000 outpatients are registered. The Department of Maxillofacial and Oral Surgery (MFOS) at CHBAH consults on average between 450 and 550 patients a month. Of these patients, approximately 150 – 170 patients are treated under local anaesthetic and 50 – 60 patients are treated under general anaesthetic.

Maxillofacial and Oral Surgery scope of practice includes but is not limited to:

a. Management of maxillofacial trauma
b. Surgical treatment of congenital abnormalities, including cleft lip and palate surgery
c. Craniofacial surgery
d. Management of benign and malignant tumours
e. Orthognathic surgery
f. Surgical and non-surgical management of TMJ diseases and disorders
g. Pre-prosthetic surgery (including implantology)
h. Dentoalveolar surgery and management of pain and anxiety
i. Oral pathology/oral medicine, including the management of diseases of oral and maxillofacial regions

Surgical audits are a normal part of surgical practice. It is a systematic, critical assessment of the quality of surgical care provided, to increase care quality, continue surgical education, and guide proper health resource utilization. It provides several advantages, including data collection accuracy, clinical learning and training needs analysis, clinical outcome indicators, surgical protocol development, operational effectiveness metrics, possibilities to discover and rectify problems, and research guidelines (Neuhaus, 2006).

There is a paucity of clinical audits in MFOS in South Africa. Damtew (unpublished, 2009) conducted only one study at Wits Oral Health Centre, to the best of our knowledge. The study contrasted two time periods in 1987 and 2007 to investigate the changing trends in MFOS at CHBAH. There were no significant variations in the demographic profiles of patients treated or the procedures done, according to this study. However, from trauma-related surgery to wisdom tooth extraction surgery, there was a change. In addition, there was a noticeable trend away from general anaesthetic and toward local anaesthesia.

This study compared a shorter period for both 1987 and 2007 (6 months). It is not easy to establish patterns and trends over a shorter period. Surgical audits performed throughout the years reveal evolving trends in the scope of practice, disease patterns, treatment processes, and patient demographics. Collation and systematic collection of clinical data such as this are imperative for the design, promotion and improvement of oral health systems.

Chapter 2: STUDY AIM AND OBJECTIVES

The aim of the study was to perform a retrospective audit of Maxillofacial and Oral Surgery patients treated at CHBAH over two 12-month periods a decade apart.

The objectives of the study were to determine:

1. Number of patients treated in January to December 2008 and January to December 2018
2. Demographics of patients
3. Preoperative diagnosis
4. Type and setting of surgical procedures performed
5. Compare this data in order to determine any changing trends in the scope and practice of MFOS in the two selected time periods.

Chapter 3: LITERATURE REVIEW

3.1. Search strategy

A literature search was done using electronic databases on Wits Lib guide, namely Science Direct, PubMed, Clinical Key, and Google Scholar, the following keywords were used the search, Maxillofacial trauma, Socio-demographics of Maxillofacial trauma, trends in Maxillofacial trauma, types of Maxillofacial injuries and audits in Maxillofacial Surgery, aetiology of trauma, audit of pathology in Maxillofacial, TMJ surgery in MFOS and frequency of dentoalveolar surgery in Maxillofacial.

Laskin *et al.*, (2016) reported that the earliest known mention of the scope of Maxillofacial Surgery occurred in Egypt by Edwin Smith Papyrus (2700BC). Bandages obtained from an embalmer and soaked in honey and egg white were used to treat mandibular fractures were mentioned in 28 case histories published by military physicians.

In the 4th century in Greece, Hippocrates began formal medical treatment, including dental treatment. Mandibular fractures were managed by using gold wire or thread to approximate and hold loose teeth. Hippocrates also devised a method to manually reduce temporomandibular joint (TMJ) dislocations, which is still being used today.

Medicine was taught at universities during the middle Ages, but surgery was learnt through apprenticeship and left entirely to practitioners because it was considered demeaning. Ambriose Pare (1510-1590) specialized in the treatment of broken jaws, mandibular dislocations, and different tumours, as well as the management of gunshot wounds and the development of a procedure for bullet localisation and removal. It was thought that the poisons in the gun powder were responsible for the majority of the damage caused by gunshot wounds and that the wounds had to be cauterized with hot irons and boiling oil to remove them. He discovered that treating these wounds with egg yolk, rose water, and turpentine was a less invasive option.

Celsus (25BC – 50BC) incised and drained dental abscesses and treated jaw fractures with bandages. Rhazes (865- 923 AD), Albacasis (936AD – 1013AD) and Avicenna (980 – 1037AD) expanded surgical scope to treating oral fistulas, ranulas, epilus and frenectomy as well as management of infections, jaw fractures and dislocations. Johannes Scultetus (1595-1645) was the first to describe the marsupialization of cyst of the jaw.

3.2. Value of Audits

Clinical audits have become a critical component of clinical governance in today's surgical practice, as well as a prerequisite for surgeons' continued professional development. The clinical audit process enables surgeons and hospitals to accurately report their outcomes, as well as analyse and compare performance indicators and outcomes, conduct in-depth peer review, identify ways to improve care and outcomes, reduce the cost of providing better patient care, and aid surgeons' continuing education.

The quality of medical records, according to Azzolini *et al*., (2019), is a significant component in the patient's diagnostic and treatment journey. It is beneficial to provide continuity of care and accountability, both of which are critical goals for healthcare systems. Hospital management should encourage higher clinical documentation quality through clinical governance tools such as audits to improve the quality of health services and the standard of clinical practice. Azzolini *et al*., (2019) concluded that identifying key flaws in health records through a standardized and repeatable quality assessment, as well as clinical and organizational audits targeted at developing best practices in hospital settings, might lead to better healthcare documentation.

3.3. Standardisation of the scope of Maxillofacial and Oral Surgery procedures

There have been attempts to standardize the scope of maxillofacial practice, Laskin *et al.*, (2016) divided this scope into three categories:

1. Area of expertise
2. Area of competence
3. Area of familiarity

Oral pathology, dentoalveolar surgery, trauma and implantology was classified as the area of expertise; orthognathic surgery, TMJ and local reconstructive surgery were classified as the area of competence; and cleft lip and palate, regional reconstructive, oncologic, craniofacial and cosmetic surgery classified as the area of familiarity. The proportion of exposure to these procedures was not indicated in the paper.

3.4. Aetiology and demographics of Maxillofacial and Oral Surgery injuries

Boffano *et al.,* (2014) reviewed the aetiology of maxillofacial injuries published on MEDLINE and MeSH during the period 1980 – 2013. Baffano *et al*., (2014) found in North America males represented a higher number with the ratio being 2:1 and in Brazil a slightly higher male ratio of 4.3:1. Male: female ratios in Asia were substantially higher, ranging between 21:1 and 20:1, although there was no consistent trend throughout the 30 years. Male: female ratios in Europe ranged from 1.8:1 to 6.6:1. The inability to statistically compare data from groups of trauma patients was one of the study's weaknesses. The aetiology was varied, with motor vehicle accidents being the most common cause, with falls and sports injuries on the rise. The use of alcohol was common in patients presenting with a traumatic injury. According to a study by Murphy *et al*., (2010) a sizeable portion of adults receiving treatment exhibited a pattern of substance abuse behaviour: 40.2% of patients had a positive blood alcohol concentration and more than 60% tested positive for intoxicants.

The study by Martinez *et al.,* (2014), found a notable increase in maxillofacial injuries from 458 in 1990 to 1732 in 2010. Age groups of patients who sustained maxillofacial fractures showed variable changes: decrease in 21 – 40 age groups from 61.7% in 1990 to 35.3% in 2010 and a significant increase in the group aged 66 years and older from 0.2% in 1990 to 14.5% and in 41 – 65 age groups from 13.1% in 1990 to 35.4% in 2010.

3.5. Fracture patterns

Classification of facial trauma is divided into vertical facial thirds. The upper third includes the frontal bone, the mid-third includes the maxilla, zygomas, orbits, nose, and naso-orbital ethmoidal complex whilst the lower third includes the mandible. Lee *et al*., (2012) reviewed data from over 2500 patients treated over ten years and discovered that the lower third of the face fractured 33.1 percent of the time, the middle third 63.5 percent of the time, and the upper third fractured 3.3 percent of the time.

Mogajane *et al*., (2018) identified 194 patients, 82 percent of whom were male and the majority (75 percent) of whom were between the ages of 20 and 39, with a peak frequency in the third decade. The most common cause of maxillofacial fractures was assault (60.3 percent), followed by road

traffic accidents (17.5 percent). The majority (65.5 percent) occurred at night. The mandible (73.0 percent) was the most commonly fractured face bone, followed by the zygoma.

The lower third of the face had the highest proportion of fractures (73.0%), followed by the middle third (19.0%), multiple sites (7.0%), and the upper third of the face (7.0%), according to Mogajane *et al*., (2018). Further investigation revealed that the angle of the mandible was the most often fractured site at both hospitals (35.5 percent angle fractures at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) and 33.8 percent at Polokwane Mankweng Hospital Complex, followed by the mandibular body (25.7 percent). A fractured zygoma was the most common midface fracture (28.1 percent). The middle third had 7.8% of all fractures, with Le Forte I and zygomatic arch fractures accounting for 7.8% of all fractures. In the middle third, Le Fort II fractures accounted for 3.15 percent of all fractures.

A total of 7.0 percent of the fractures were at multiple fracture sites. According to Mogajane *et al*., the mandible was the most injured site of the face, accounting for 73.0% of the entire study population's incidence, followed by the zygoma.

Because of its prominence, mobility, and selection as a target of intentional violence, the mandible is the most commonly injured bone in maxillofacial trauma, according to Oji *et al*. (1999). While the mandible is a sturdy bone in general, it does have a few weak spots that are prone to fracture. According to Mogajane *et al*., (2018), the angle of the mandible was the most typically impacted region in his research population (35.0 percent). The condyle, followed by the angle, is the most usually afflicted region of the mandible, according to Boffano *et al*., (2015). The majority of the fractured body and angle of the mandible was recorded on the right side, according to Beaumont *et al*., (1985), in contrast to studies where assault resulted in left side facial injuries, implying that most patients were assaulted from behind, while fleeing imminent danger, or were kicked.

3.6. Public economic problem associated with maxillofacial injuries

Maxillofacial injuries, according to Boffano *et al*., (2014), are significant public health and economic issues because their treatment, as well as time spent in the hospital and away from work, is costly. They are frequently linked to high morbidity, deformity, and psychiatric issues. Epidemiology differs greatly from country to country and is influenced by a variety of factors such as culture,

socioeconomic status, and population density. The density and infrastructure of urban and rural populations differ. The magnitude of the causative force, impact duration, the acceleration imparted by it to the part of the body struck, and the rate of acceleration will all influence the severity and pattern of the fracture. According to Shankar *et al*., (2012), the surface area on which the impact occurs is also important. Fracture incidence and demographic distribution vary by geography, socioeconomic trends, motor vehicle accidents, alcohol and drug usage, and season.

3.7. Types of Maxillofacial injuries

Brasileiro *et al*., (2006) discovered that geographic region, cohort socioeconomic status, and investigation time, all influence maxillofacial fracture presentation patterns. According to Thorn *et al*., (1986), the anatomical locations of mandibular and zygomatic complex fractures account for the majority of all facial fractures, and their prevalence varies depending on the mode of injury and demographic characteristics, particularly gender and age. According to Gassner *et al*., (2003), knowing the etiology, severity, and temporal distribution of maxillofacial trauma allows clinicians and researchers to set clinical and research priorities for successful treatment and prevention

Rikhotso *et al.*, (2008) found the most frequent cause of condylar fractures was blunt trauma due to interpersonal violence (73.81%), followed by road traffic accidents (16.67%) and falls (7.14%). There was one case of gunshot injury and one case of sports-related injury. Of the 84 patients with mandibular condylar fractures, 69 (82%) were males and 15 (18%) were females, with a mean age of 33.12 ±12.01 years. Amongst males, an assault was the most common cause of condylar fractures (75.36%), followed by road traffic accidents (17.39%) and falls (5.8%). Amongst females, assault (80%) was once again the most common cause.

A 15-year review in Nigeria was conducted by Arotiba *et al.,* (1997) whose finding was that 30% of tumours diagnosed between 1980 and 1994 were histologically odontogenic. These odontogenic tumours were most common in the second to the fourth decade, with a peak incidence in the third decade. When compared with a study by Wu *et al.,* (1985) Arotiba *et al.*, (1997) found the most common odontogenic tumour in Africa to be ameloblastoma whereas in Hong Kong the most prevalent was odontoma. Arotiba *et al*., (1997) found that the second most common tumour was fibromyxoma. Resection of the tumour with an adequate margin of normal bone was found to be the most adequate treatment option.

Gunshot wounds are commonly seen in most trauma centres. Norris *et al.*, (2015) found that the rate of firearm-related deaths remained unchanged in the last 10 years. During the study period, 6.9% of gunshot patients had injuries involving the facial region, of which 87% were men, and neck zone III was the most commonly injured region. Fractures were treated within 72 hours and 22% required secondary surgical procedures. Airway compromise was the most common life-threatening early problem, 70% requiring airway management. Overall mortality was 9%.

Adebayo *et al.*, (2008) conducted an audit of Oral and Maxillofacial Surgical conditions in Nigeria between the period 2000 and 2004. There were 110 indications for surgical intervention, of which 46.4% were complaints of trauma and the remaining were tumours (39%) and cysts (12.7%). His findings were that scarcity of skilled practitioners and equipment was a major problem in the delivery of oral and maxillofacial services. Health promotion activities and poverty alleviation were needed to improve awareness for early diagnosis

3.8 . Treatment modalities

In his literature study of patients with mandibular fractures, Lee *et al*., (2012) found that in developing nations before the year 2000, they were generally treated with a closed reduction (82.3 to 98 percent). Limitations to open reduction and internal fixation (ORIF) with mini plates and screws included the high cost of internal fixation equipment as well as a lack of training. In the study, Al Ahmed *et al*., (2004) reported that the proportion of patients treated with closed reduction decreased to 67 percent of all cases, while ORIF increased to 49.1% of cases. According to Buchanan *et al*., (2005), one-third of fractures were managed conservatively (29 percent of mandibular, 55 percent of zygoma, and 59 percent of nasal fractures).

3.9 Pathology

The discipline of maxillofacial and oral surgery has greatly evolved over the years and this has led to the management of not only trauma but also to the management of cyst and tumors of the jaws, orofacial sepsis, and TMJ conditions (Akinmoladum et al., 2015). As the years progress we are seeing a change in the cases that are treated. According to Dimba et al. (2007), malignancies were identified in 53.83 percent of their patients at Nairobi Dental Hospital. The distribution indicated that around 60.61 percent of the tumors were malignancies and 39.40 percent were benign tumors, with the mandible being the most prevalent site of origin. Ameloblastomas were the most prevalent

benign lesion, whereas oral squamous cell carcinoma was the most common malignancy. As the HIV pandemic has progressed, the percentage of patients diagnosed with Kaposi sarcoma had increased in comparison to other malignancies.

According to Adebayo et al., (2005) ameloblastomas are the most frequent tumor among Nigerian Africans, accounting for 73 percent of odontogenic tumors and 24 percent of all oral and perioral tumors and tumor-like lesions. Morsy et al., (2019) reported that the most frequently operated benign conditions at the National Referral Hospital in Tanzania from 2013 to 2017 were ameloblastomas, ossifying fibroma, and pleomorphic adenomas. The proposed treatment options for ameloblastomas ranged from conventional to radical methods of therapy. The traditional techniques involved curettage, enucleation as well as cryosurgery; while the extreme techniques were marginal, segmental as well as composite resections. The majority of ameloblastomas were treated radically by mandibulectomy and cystic lesions were managed by enucleation.

3.10 TMJ Related conditions

Trauma, infections, and other systemic disorders are the most prevalent causes of temporomandibular joint (TMJ) ankylosis, which is a debilitating condition of the masticatory system. Hypomobility has an impact on both the surrounding structures and the joint itself. Ankylosis that develops in childhood frequently results in facial asymmetry. An intracapsular compression fracture or suppurative arthritis of the middle ear infection is the most common causes of ankylosis in youngsters. Treatment of ankylosis is undoubtedly one of the most difficult aspects of TMJ surgery (Guven et al., 2008)

Vasconcelos et al., (2008) reported that the primary goal of temporomandibular joint (TMJ) ankylosis is to provide a satisfying mouth opening, restore normal jaw function, and prevent re-ossification in the long run, especially in children. Simple arthroplasty, interposition arthroplasty (using temporal muscle fascia, ear cartilage, or alloplastic material), and joint reconstruction utilizing acrylic, titanium, or autogenous material prostheses have all been described in the literature as therapies for this problem. Sporniak-Tutak et al., (2011) reported that due to the failure rate (defined as re-ankylosis) being relatively significant, no one standard treatment procedure for TMJ ankylosis has been described. Gap arthroplasty, interpositional arthroplasty (using temporal muscle

fascia), and condylectomy are the most popular procedures at the institute where the study was conducted.

Morsy et al., (2019) reported an incidence of 77.3% of arthroplasty was performed and the preferred type was gap arthroplasty.

3.11 Impacted teeth

One of the most common operations in oral and maxillofacial surgery is the surgical extraction of third molar teeth. Pain, recurring swelling, and infection are the most prevalent reasons for third molar tooth extraction Jerjes et al., (2010). The decision to operate under local anaesthetic, intravenous sedation, or general anaesthesia is based on several considerations, including surgical difficulties, potential complications, the patient's preference, fear and anxiety, and the surgeon's experience as reported by Jerjes et al., (2010). Ali et al., (2016) conducted a study on impacted third molars in Gujarat, India, and observed that impacted mandibular third molars are more common in the third decade of life, in females, and urban populations, and that mesioangular impaction is more common than other types of mandibular third molar impaction. General anesthesia could not reduce postoperative pain after surgical removal of an impacted third molar, according to a study by Ku et al., (2021), and prolonged operation time could be related to the degree of postoperative discomfort.

3.12. Cancellation of surgery

In most trauma centres cancellations of surgery daily are common occurrences. Cancellations have an adverse effect on both service and patients. Sundaram *et al.*, (2007) and Robb *et al.*, (2004) conducted an audit of cancellations and found a shortage of beds to be the main reason for surgery cancellations.

Chapter 4: MATERIALS and METHODS

4.1. Study design

This study is a retrospective clinical audit. As per South African Department of Health guidelines, the study was designed as a quantitative retrospective chart review observational study of patients who had MFOS surgical procedures performed at Chris Hani Baragwanath Academic Hospital (CHBAH), from January 2008 to December 2008 and from January 2018 to December 2018 (Ideal Clinic Manual Version 18).

4.2. Setting

Department of Maxillofacial and Oral Surgery at Chris Hani Baragwanath Academic Hospital.

4.3. Patient selection

Inclusion:

- All patients treated in the MFOS department from January 2008 to December 2008 and from January 2018 to December 2018
- Required either local or general anaesthetic for a procedure to be performed
- Were logged and recorded in the department register for procedures
- Both adult and paediatric patients

Exclusion:

- Inadequate records

4.4. Measurements and data collection

Logistic Data:

- Year - 2008 or 2018
- Month
- Anaesthetic - local or general
- Age (corresponding with the relevant year 2008 or 2018)
- Gender

Diagnosis:

- Craniofacial fractures (mandible, maxilla, zygoma, Orbit, Naso-orbito-ethmoid, frontal sinus, Le Fort)
- Sepsis (mandible or maxilla)
- Pan-facial fractures
- Gunshot wound
- Orofacial abscess
- Foreign Body
- Post-traumatic deformity
- TMJ ankylosis
- Resection
- Gap Arthroplasty
- Bone Grafts
- Biopsy
- Removal of impacted teeth
- Extraction of teeth

Surgical Procedures:

- Open reduction and internal fixation of fractures (including panfacial fractures)
- Closed reduction fracture mandible
- Debridement septic fractures (mandible, maxilla)
- GSW debridement
- Incision and drainage of abscess
- Temporomandibular joint reduction
- Oro-antral communication closure
- TMJ Reconstruction
- Bone graft
- Removal of hardware and other foreign bodies
- Resection of mandible (lesion)
- Surgical extraction

- Osteotomies
- Biopsy
- Enucleation cyst
- Sutures
- Evacuation of hematoma
- Hemi-mandibulectomy and hemi-maxillectomy
- Alveoplasty
- Removal of submandibular/sublingual gland
- Eminectomies
- Archbar fixation/removal
- Debridement of socket/orbital rim/sinus/bone graft
- Coronoidectomy
- Cancrum Oris debridement

4.5. Sample size, statistical method and data analysis

Sampling began once study approval was obtained. Sampling continued until all patients from January 2008 to December 2008 and from January 2018 to December 2018 were collected.

The software used for statistical analysis was Statistical Package for Social Sciences (SPSS) version 23.0. The sample size was 4198 subjects. A confidence interval of 95% with a p-value of 0.05 was chosen. Tests for descriptive statistics included mean, median, range, standard deviation, variance, and standard error. Data were tested for parametric distribution.

The cohort was divided into 2 groups for 2008 and 2018. Various diagnoses were recorded for each year and compared. Diagnoses were treated under local anaesthetic or general anaesthetic. The procedures performed to treat the diagnoses were recorded and compared for 2008 and 2018. Comparison between groups was done with Pearson’s chi-squared tests, Fisher's exact tests, and t-tests (independent samples as the groups are not matched). Missing data was identified and declared in the software as missing. Statistics consultation was used for assistance.

4.6. Ethical considerations

As this was a retrospective study there was no need to obtain informed consent from each patient for the use of his/her medical information. Human Immunodeficiency Virus (HIV) status and personal information such as marital status, employment history, etc. was not required and did not form part of the data collection. Names and patient numbers were anonymized. The study forms part of a clinical audit which is recommended by both the South African Department of Health and Gauteng Provincial Department of Health (Ideal Clinic Manual, Version 18).

However, to ensure ethical compliance, the protocol for this study has been reviewed by the Chris Hani Baragwanath Academic Hospital administrators and the Human Research Ethics Committee (Medical) at the University of the Witwatersrand (Ethics number M200766). Permission to review the files was obtained from the Head of the Department of Maxillofacial and Oral Surgery and the CEO of CHBAH.

Chapter 5: RESULTS

The study consisted of 4198 subjects treated under both general and local anaesthetics, 1936 from 2008 and 2262 from 2018. There were 45 missing data points for age and 2 for gender. The rest of the database was complete.

The average number of cases between the 2 years observed was 2099. The goodness for fit test using the 2099 cases as the expected value and the observed values for 2008 and 2018 has a Chi-square of 25.46946, corresponding with p=0.001. The Department of Maxillofacial and Oral Surgery had a statistically higher number of cases in 2018 compared to 2008.

Cross-tabulation shows that there was a significantly higher number of local anaesthetic procedures done compared to general anaesthetic procedures (p=<0.001). There was also a significantly higher number of male subjects than female subjects (p<0.001). There was a higher mean age (33.03 years, p=0.001) of patients in 2018 (See Table 1).

Table 1: Distribution of cases according to type of anaesthetic, age and gender

Cross tabulation					**Chi²**		**df**			**P value**
		Anaesthetic								
		Local	General	Total						
Year	2008	1320	616	1936	13.720		1			**<0.001**
	2018	1660	602	2262						
	Total	2980	1218	4198						
		Gender								
		Female	Male	Total						
Year	2008	535	1399	1934	13.299		1			**<0.001**
	2018	743	1519	2262						
	Total	1278	2918	4196						
Age							T test			
		No.	Mean	Std. Error Mean	Std. Deviation	Range	t	95% CI		P value
								Lower	Upper	
Year	2008	1928	31.84	0.280	12.281	1-85	-3.069	-1.938	-0.427	**0.002**
	2018	2217	33.03	0.265	12.485					
	Diff.	-	-1.183	0.385	-					

Tabulated below is the list of preoperative diagnoses from 2008 and 2018 (Table 2). This shows that trauma (mandibular fractures in particular) was the most common preoperative diagnosis in 2008 and 2018. This data is represented graphically (Figures 1). Figure 2 shows the number of surgical procedures carried out in both periods and highlights the increase in wisdom teeth treated. Table 3 shows the distribution of the cases between local and general anaesthetics for 2008 and 2018. The study found that there were more cases treated in 2008 under local and general anaesthetics, and that closed reduction fixation of fractures was treated significantly more under local anaesthetic in 2008. In 2018 there was an increase in the number of extractions and removal of wisdom teeth. The total number of cases treated for each year under local and general anaesthetic is tabulated showing a significant increase in the number of dentoalveolar surgery done in 2018 under local anaesthetic and an increase in the number of septic cases treated in 2018 (Table 4). Figure 3 shows the distribution of each treatment category by year and anaesthetic, highlighting the increase in the number of cases for removal of wisdom teeth.

Table 2: Diagnosis and procedures for 2008 and 2018

Table 2: Diagnosis for 2008 and 2018			
Condition	**2008**	**2018**	**Both**
Fracture mandible	587	394	982
Fracture maxilla	1	1	2
Orofacial Sepsis	213	214	427
Dento-alveolar fracture mandible	11	6	17
Dento-alveolar fracture maxilla	56	28	84
Fracture zygoma complex	65	40	105
Le Fort fractures	22	7	29
Pan-facial fractures	15	10	25
Gunshot wounds	20	12	32
Foreign Body	9	9	18
Fracture orbit	5	1	6
Fracture nasal bone	5	1	6
Post traumatic osteotomy	8	0	8
Resections	15	14	29
Gap Arthroplasty	5	3	8
Bone Graft	10	8	18
Biopsy	184	164	348
Removal of impacted teeth	709	981	1690
Extraction of teeth	96	119	215

Removal of Wires	45	194	239

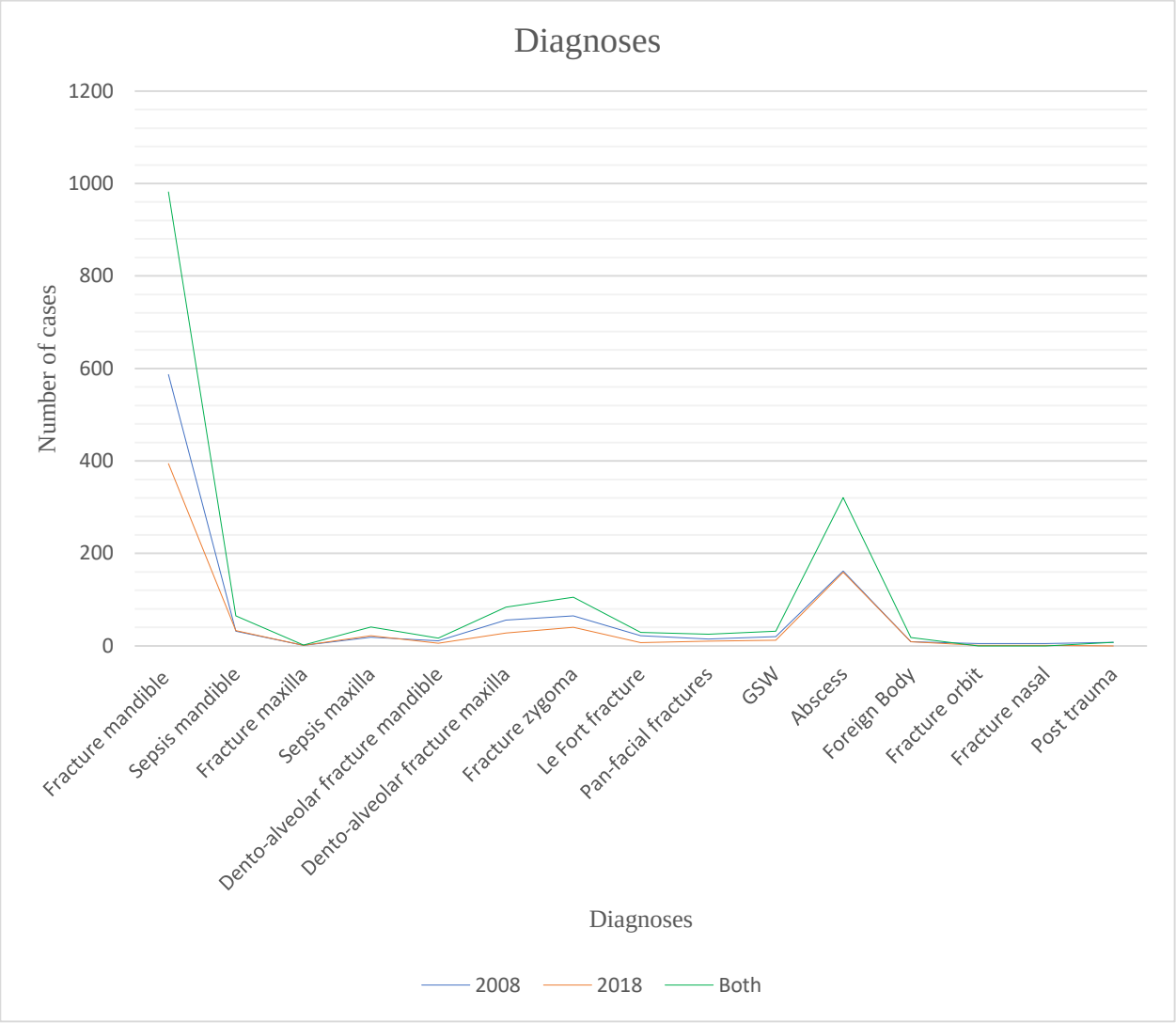

Figure 1: Graphs of Diagnosis and procedures for 2008 and 2018

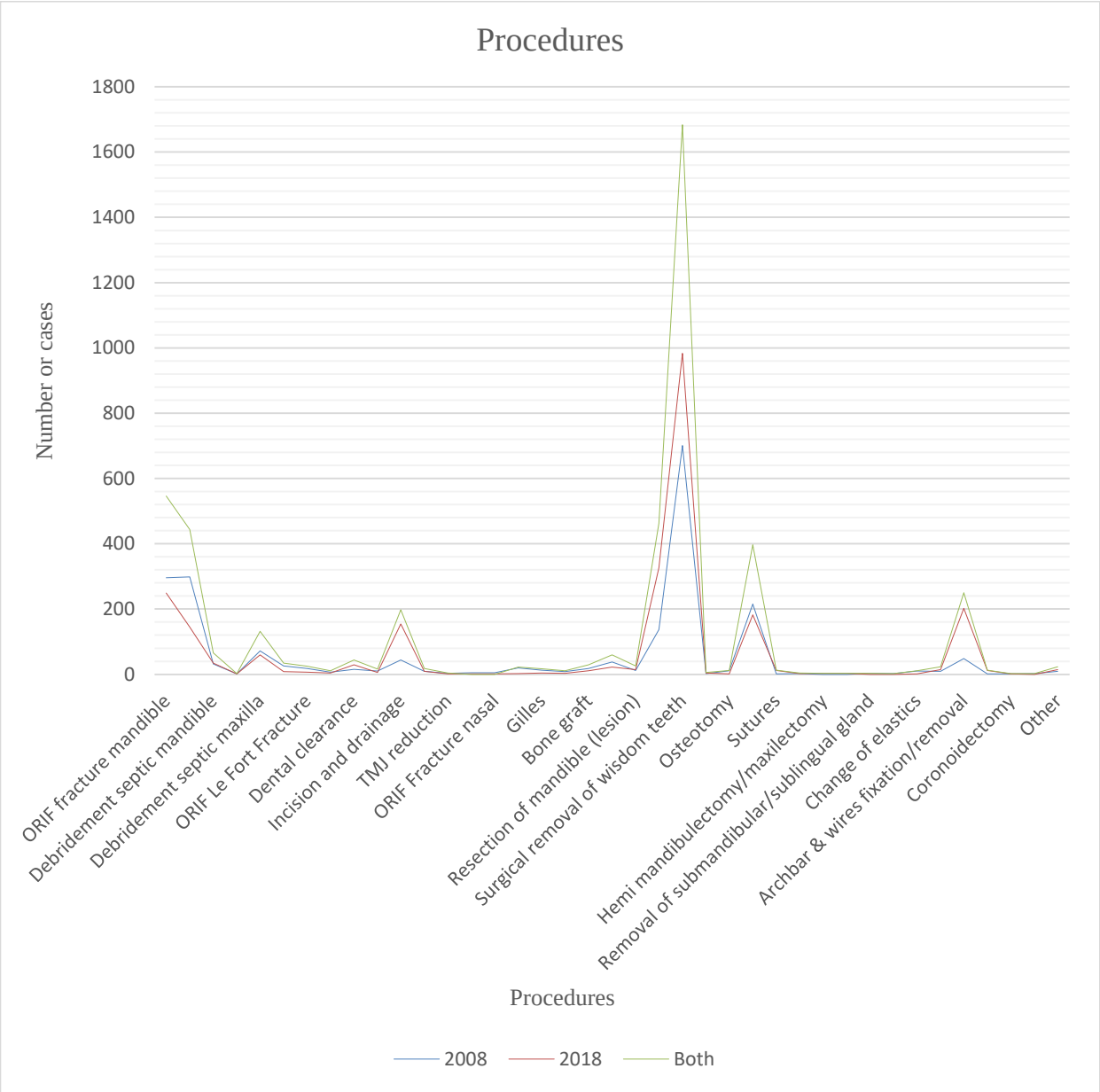

Figure 2. Graph showing number of each procedure done

Table 3: Diagnoses and procedures under anaesthetic in 2008 and 2018

Table 3: Diagnoses and procedures under anaesthetic in 2008 and 2018						
			2008		2018	
			LA	GA	LA	GA
Diagnoses	Trauma	Fracture mandible	284	303	125	269
		Fracture maxilla	0	1	0	1
		Dento-alveolar mandible	9	2	6	0
		Dento-alveolar maxilla	54	2	28	0
		Fracture zygoma	0	65	0	40
		Le Fort fracture	0	22	0	7
		Pan-facial	0	15	0	10
		Fracture orbit	0	5	0	1
		Fracture nasal	0	5	0	1
		Post trauma	0	8	0	0
		GSW	0	20	1	11
	Infection	Sepsis mandible	0	32	4	29
		Sepsis maxilla	1	18	5	17
		Abscess	3	159	14	145
	Foreign body	Foreign body	3	6	5	4
Procedures	Traumatology	ORIF fracture mandible	0	296	0	249
		CRFM fracture mandible	284	15	125	20
		ORIF facture maxilla	0	1	0	1
		ORIF fracture zygoma	0	26	0	8
		ORIF Le Fort Fracture	0	18	0	7
		ORIF pan-facial fractures	0	7	0	4
		ORIF Fracture orbit	0	5	0	1
		ORIF Fracture nasal	0	5	0	1
		Gilles lift	0	13	0	4
		GSW debridement	0	10	1	5
	Dentoalveolar Surgery	Dental clearance	13	2	29	0
		Biopsy	130	85	134	35
		Dental extraction	111	26	308	18
		Surgical removal of wisdom teeth	700	1	980	3
		Sutures	1	0	8	4
		Change of elastics	10	0	0	1
		Archbars & elastics	9	0	12	2
		Archbar fixation/removal	0	2	4	3
		Open and stretch	0	2	0	4
		Removal of plate	3	35	8	14
		Removal of wires	45	1	195	0

		Removal of foreign body	3	6	5	4
		TMJ reduction	0	5	0	3
		OAC closure	3	17	1	1
		Evacuation haematoma	0	2	0	2
	Sepsis – Drainage of Sepsis & Debridement	Debridement septic mandible	0	32	4	30
		Debridement septic maxilla	63	9	51	9
		Incision and drainage	3	41	12	142
		Cancrum Oris	0	2	0	0
		Debridement of socket/orbital rim/sinus/bone graft	0	1	10	2
	Pathology	Hemi mandibulectomy/maxillectomy	0	0	0	3
		Resection of mandible (lesion)	0	12	0	14
		Enucleation cyst	0	0	0	13
		Removal of submandibular/sublingual gland	0	3	0	0
		Bilateral eminectomy	0	2	0	0
	Reconstruction	Alveoplasty	0	0	3	0
		Osteotomy	0	11	0	1
		Coronoidectomy	0	1	0	1
		Gap arthroplasty	0	8	0	3
		Bone graft	0	18	0	11
	Other	Other	0	9	5	9

Table 4: Total number of cases treated for each year under local and general anaesthetic

Table 4: Total number of cases treated for each year under local and general anaesthetic				
	2008		2018	
	LA	GA	LA	GA
Traumatology	284	396	126	300
Dento-alveolar Surgery	1028	184	1684	94
Orofacial Sepsis	66	85	77	183
Pathology	0	17	0	30
Reconstruction	0	38	3	16
Other	0	9	5	9

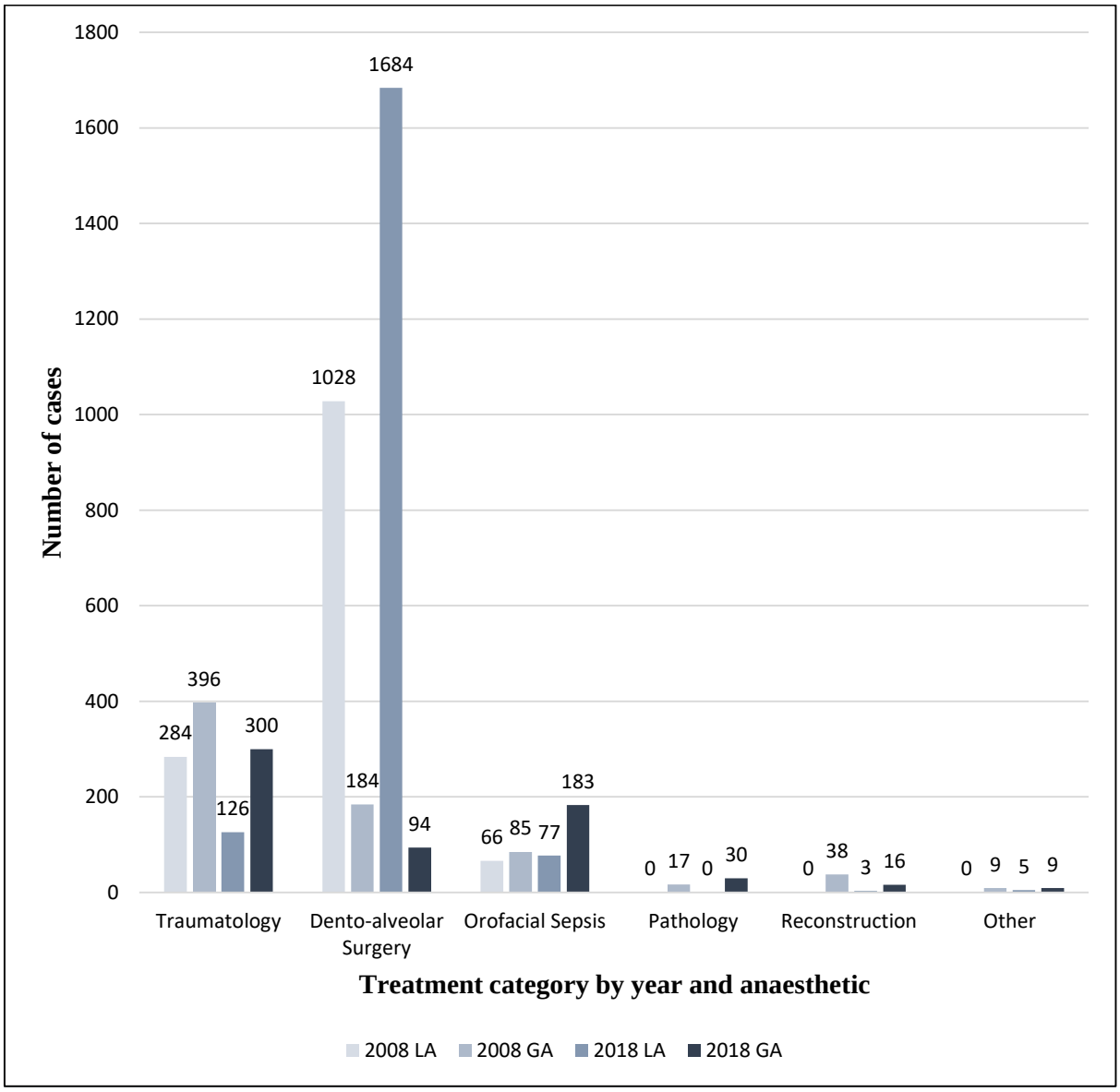

Figure 3: Total number of cases treated for each year under GA and LA

The diagnosis for 2008 and 2018 are compared in Table 5. Only the diagnosis with counts of about 5 were able to be analyzed. Pearson's chi-square was used for larger numbers and Fishers exact for lower numbers. Results show that in 2018 a statistically lower number of fractured mandibles, dentoalveolar fractures of the maxilla and Le Fort fractures were incurred as compared to 2008 (all p values <= 0.001). There was no diagnosis that was statistically higher in 2018 compared to 2008.

Table 5: Comparison of diagnosis for 2008 and 2018

Table 5: Comparison of diagnosis for 2008 and 2018							
Cross tabulation							
		No	Yes	Total	Persons Chi^{2}or Fishers Exact	df	P value
		Fracture mandible					
Year	2008	1349	587 (30%)	1936	Persons Chi^2 = 96.970	1	**<0.001**
	2018	1868	394 (17.4%)	2262			
	Total	3217	981	4198			
		Septic mandible					
Year	2008	1904	32	1936	Fishers exact = 0.258	1	0.350
	2018	2229	33	2262			
	Total	4133	65	4198			
		Dento-alveolar fracture mandible					
Year	2008	1925	11	1936	Fishers exact = 2.374	1	0.097
	2018	2256	6	2262			
	Total	4181	17	4198			
		Dento-alveolar fracture maxilla					
Year	2008	1880	65	1936	Fishers exact = 14.566	1	**<0.001**
	2018	2234	40	2262			
	Total	4093	105	4198			
		Le Fort fracture					
Year	2008	1914	22	1936	Fishers exact = 10.397	1	**0.001**
	2018	2255	7	2262			
	Total	4169	29	4198			
		Pan facial fracture					
Year	2008	1921	15	1936	Fishers exact = 1.951	1	0.116
	2018	2252	10	2262			
	Total	4173	25	4198			
		Gunshot wound					
Year	2008	1774	162	1936	Fishers exact = 2.647	1	0.059
	2018	2130	159	2262			
	Total	3877	321	4198			
		Foreign body					
Year	2008	1927	9	1936	Fishers exact = 0.110	1	0.460
	2018	2253	9	2262			
	Total	4180	18	4198			

Comparison of the surgical procedures with counts above 5 (using Pearson's Chi-square for larger numbers and Fisher's exact test for lower numbers) showed that a statistically higher number of ORIF and closed reductions for fractured mandible, ORIF for zygoma, dentoalveolar fracture maxilla, ORIF for Le Fort fracture, plate removal and biopsies were performed in 2008 compared to 2018. Conversely, there was statistically more removal of wires and incision & drainage procedures in 2018 compared to 2008 (Table 6).

Table 6: Comparison of procedures for 2008 and 2018

Table 6: Comparison of procedures for 2008 and 2018							
Cross tabulation					**Significance**		
		No	**Yes**	**Total**	**Persons Chi^2 or Fishers Exact**	**df**	**P value**
		ORIF Fracture mandible			Persons Chi^2 = 16.552	1	**<0.001**
Year	2008	1640	296	1936			
	2018	2021	250	2262			
	Total	3652	546	4198			
		CRFM			Persons Chi^2 = 0.258	1	**<0.001**
Year	2008	1637	299	1936			
	2018	2117	145	2262			
	Total	3754	444	4198			
		Debridement septic mandible			Fishers exact = 0.151	1	0.395
Year	2008	19040	32	1936			
	2018	2228	34	2262			
	Total	4132	105	4198			
		ORIF fracture zygoma			Fishers exact = 12.709	1	**<0.001**
Year	2008	1910	26	1936			
	2018	2254	8	2262			
	Total	4164	34	4198			
		ORIF Le Fort fracture			Fishers exact = 10.397	1	**0.001**
Year	2008	1914	22	1936			
	2018	2255	7	2262			
	Total	4169	29	4198			
		Dental clearance			Fishers exact = 2.588	1	0.072
Year	2008	1921	15	1936			
	2018	2233	29	2262			
	Total	4154	44	4198			
		Incision and drainage			Fishers exact = 47.747	1	**<0.001**
Year	2008	1892	44	1936			
	2018	2108	154	2262			
	Total	4000	198	4198			

		Foreign body			Fishers exact = 0.110	1	0.460
Year	2008	1927	9	1936			
	2018	2253	9	2262			
	Total	4180	18	4198			
		Bone graft			Fishers exact = 2.990	1	0.062
Year	2008	1918	18	1936			
	2018	2251	11	2262			
	Total	4169	29	4198			
		Removal of plate			Fishers exact = 7.260	1	**0.005**
Year	2008	1898	38	1936			
	2018	2240	22	2262			
	Total	4138	60	4198			
		Archbars and wires - removal and fixation			Fishers exact = 77.509	1	**<0.001**
Year	2008	1888	48	1936			
	2018	2060	202	2262			
	Total	3948	250	4198			
		Surgical removal of teeth			Fishers exact = 22.930	1	**<0.001**
Year	2008	1235	701	1936			
	2018	1279	983	2262			
	Total	2514	1684	4198			
		Biopsy			Fishers exact = 16.598	1	**0.001**
Year	2008	1721	215	1936			
	2018	2080	182	2262			
	Total	3801	397	4198			

Gunshot wounds were compared by month and gender. Unfortunately, the counts were too low to test the cross-tabulation for significance by month or gender. Fractured mandible, fractured maxilla, dentoalveolar fractures, fractured zygoma complex, Le Fort fracture, orbital fractures, fractured nasal bones and pan-facial fracture were grouped as all fractures. Septic mandible, septic maxilla and abscesses were grouped as all sepsis. Males experienced a statistically highest number of fractures and December was the highest month of occurrence with 129 cases. Males also experienced a statistically highest rate of sepsis but sepsis was not associated with any month (Table 7).

Table 7: Gender and month

Table 7: Gender and month							
		Gunshot wounds			Chi^2	df	P value
		No	Yes	Total			
Month	January	314	5	319	N/A	N/A	N/A
	February	355	6	361			
	March	315	4	319			
	April	370	1	371			
	May	394	0	394			
	June	313	1	314			
	July	386	4	390			
	August	311	8	319			
	September	328	2	330			
	October	386	0	386			
	November	359	0	359			
	December	335	1	336			
	Total	**4166**	**32**	**4198**			
Gender	Female	1275	3	1278	N/A	N/A	N/A
	Male	2889	29	2918			
	Total	4164	32	4196			
		All fractures			**Chi^2**	**df**	**P value**
		No	**Yes**	**Total**			
Month	January	198	121	319	50.105	11	**<0.001**
	February	268	93	361			
	March	249	70	319			
	April	285	86	371			
	May	281	113	394			
	June	234	80	314			
	July	294	96	390			
	August	225	94	319			
	September	241	89	330			
	October	265	121	386			
	November	250	109	359			
	December	207	129	336			
	Total	**2997**	**1201**	**4198**			
Gender	Female	1114	164	1278	223.706	1	**<0.001**
	Male	1882	1036	2918			
	Total	**2996**	**1200**	**4196**			
		All sepsis			**Chi^2**	**df**	**P value**
		No	**Yes**	**Total**			
Month	January	282	37	319	16.746	11	0.116
	February	323	38	361			

	March	293	26	319			
	April	340	31	371			
	May	363	31	394			
	June	277	37	314			
	July	353	37	390			
	August	286	33	319			
	September	295	35	330			
	October	339	47	386			
	November	338	21	359			
	December	309	27	336			
	Total	**3798**	**400**	**4198**			
Gender	Female	1190	88	1278	14.932	1	**<0.001**
	Male	2606	312	2918			
	Total	**3796**	**400**	**4196**			

The total number of pathology and reconstruction cases performed under GA in 2008 and 2018 were 55 and 46 respectively. These numbers are significantly lower when compared to trauma, dentoalveolar and septic cases during the same period.

Chapter 6. DISCUSSION

6.1 Study size and demographics

The present study was a comprehensive retrospective audit of Maxillofacial and Oral Surgery patients treated at CHBAH over two 12-month periods, first in 2008 and a decade later in 2018. We measured the demographics, diagnoses, distribution of cases and treatment procedures. The study consisted of 4198 subjects treated under both general and local anaesthetics. As per the Department of Health Guidelines, a requirement for an internal clinical audit is to include a minimum of 80% of subjects. (A Practical Guide to Clinical Audit) This requirement has been both met and exceeded as our study consisted of 100% of the patients who underwent any procedure at CHBAH.

The outcome of this study indicates a statistically higher number of cases in 2018 compared to 2008 ($p=0.001$). In comparison the department treats a far greater number of patients than the MFOS unit at the University of Calabar Teaching Hospital in Nigeria, which treated only 1437 patients over five years (Anyanechi *et al*., 2015). An unpublished study by Damtew *et al.,* (2009) reported that 609 patients were treated at CHBAH over six months in 2007. The significant population increase in Johannesburg and the arrival of foreign nationals from neighboring African nations were ascribed to the increase in patient numbers during the year 2007 at CHBAH (Damtew *et al*., 2009). The increase in the number of cases in the current study appears to reflect the growth in catchment area density over the decade, ease of access and central location, as well as urbanization from other lower-income provinces to Gauteng.

There were more male patients than females in the present study ($p<0.001$). We also found a higher mean age ($p=0.001$) of patients in 2018, with most of the patients belonging to the third and fourth decade of life. These results were similar to those of Desai et al., (2010) study at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH). This study was similar to ours as it was a cross-sectional clinical audit, however, it was prospective and included patients with mandibular fractures only.

Their findings on 133 individuals revealed that mandibular fractures were more common (70 percent) in patients aged 20 to 39, which is similar to our findings. They also reported a female: male ratio of 1:6. The majority of the fractures (86%) were the result of blunt trauma due to interpersonal violence, and open reduction was the main treatment modality (75%) (Desai *et al.,* (2010)). The

gender and age distributions of patients with maxillofacial fractures were similar to those seen in earlier research (Desai *et al*., 2000). (2010). Although there are regional differences, interpersonal violence and motor vehicle accidents have a significant role in the aetiology of maxillofacial injuries, particularly in men (Lee *et al*., 2012). Even though this was not analyzed in our study, anecdotal evidence suggests that blunt trauma due to interpersonal violence remains the major cause of trauma in our setting.

Another notable trend we noticed from 2008 to 2018 was a major shift in the management of oral and maxillofacial cases from general to local anaesthesia. (p=<0.001). Staff shortages, lack of adequate theatre facilities and limited anaesthetic resources may be significant contributors to this trend.

6.2 Diagnoses, with focus on trauma cases and anaesthetic type used

In both periods (2008 and 2018) trauma was the most common preoperative diagnosis for maxillofacial treatment. It is noted that mandibular fractures comprised 587 (30%) of cases treated in 2008 but only 394 (17.4%) of all cases in 2018 (p<0.001). Despite trauma being the most common reason for treatment under general anaesthesia, our results showed a significant decline in the overall trauma cases from 2008 to 2018 (all p values <= 0.001).

Similar to our findings, Lee *et al*., (2012) discovered that the mandible was the most common facial bone fracture reported worldwide, with minor changes in the mode of injury and fracture angle. Due to limited resources in our unit before the year 2000, patients with mandibular fractures were usually treated by closed reduction. After 2000 there was however a notable move towards ORIF and treatment under GA, particularly for mandibular fractures (Lee *et al.,* (2012)). Whilst this reflects progress towards more advanced techniques, treatment under GA and by ORIF places a huge financial burden on the state, especially in an under-resourced country like ours with a high prevalence of blunt trauma due to interpersonal violence. It is rather concerning that the limited resources available in the country is by and large redirected towards the management of mostly preventable assault-related injuries. The other trauma cases which included fractures of the zygoma complex, Le Fort fractures orbit, nasal and pan-facial were collectively fewer than mandibular fractures.

In our study, male patients were more frequently associated with gunshot wounds than females. There was statistical significance with men and all cases of fractures compared to females ($p<0.001$). There was also a month-related change, with December associated with the highest number of fractures ($p<0.001$).

6.3 Procedures, with focus on non-trauma cases and anaesthetic type used

The non-trauma cases in our study included dentoalveolar surgery, orofacial sepsis, pathology and reconstruction cases. Dentoalveolar surgery and sepsis formed the greater part and were performed under both local and general anaesthesia, while pathology and bony reconstruction cases required general anaesthesia. The type of procedures performed for these cases was vast and often done in steps requiring repeated procedures. However, our study shows that dentoalveolar surgery and sepsis were aligned with a shift from general to local anaesthesia. Therefore, the cases that are responsible for the observed overall decrease in general anaesthetic and increase in local anaesthetic are the non-trauma cases, particularly the dentoalveolar surgery and septic cases.

Dentoalveolar procedures were the overall commonest procedure type in the audit from 2008 and 2018, with wisdom teeth extraction contributing the most. Out of the 1681 wisdom teeth extractions, only 4 (0.002%) were performed under general anaesthesia. This method not only saves resources but appears to reduce the rate of complications also. Lim *et al*., (2019) compared the complication rates of surgical removal of lower third molars under general anaesthesia with local anaesthesia in a study. A total of 313 patients were enrolled and 79 patients had wisdom teeth removed under general anaesthetic. All GA patients and 23 out of 296 LA patients received preoperative antibiotics, and sepsis was higher amongst the general anaesthetic patients ($p = 0.034$). Other complications (wound breakdown, severe pain, trismus, retained tooth structure, nerve injury and dry socket) were the same despite the increased resources spent to perform the general anaesthesia (Lim *et al.,* (2019)). For these reasons, in our unit, removal of wisdom teeth under GA is only undertaken when certain conditions preclude treatment under local anaesthetic (e.g. Cerebral palsy patients), it involves removal of all 4 wisdom teeth and there are associated increased risk of complications when treated under LA. Concerns for the patient's safety has been cited by Khan *et al.,* (2014) as another reason for the treatment of wisdom teeth under GA.

Surgical loads related to trauma, dentoalveolar surgery and sepsis seem to form the bulk of the work undertaken by the MFOS department at the expense of elective cases such as orthognathic surgery, pathology and reconstructive cases. There is undoubtedly inordinate exposure to trauma-related injuries in our unit. On the other hand, pathology, implantology, and reconstructive surgery exposure are restricted.

Chapter 7: CONCLUSION

This audit was a longitudinal examination of the CHBAH Maxillofacial and oral surgery Department over ten years. Audits like this one demonstrate how workload, disease patterns, treatment procedures, and patient demographics have changed over time. The most profound and apparent transformation has been the substantial increase in case numbers that are managed in the unit. Whilst the number of cases has increased, the resources have however remained the same. Across the two time periods, the demographics of the patients treated remained essentially the same, with more men than women being treated in the department and the majority of patients being young adults. (3rd and 4th decade).

We also compared the type and distribution of oral and maxillofacial cases over the two ends of a decade. Our findings over the years showed that trauma cases have remained the most common preoperative diagnosis group in 2008 through to 2018, with mandibular fracture being the commonest type throughout. Under general anaesthesia, the majority of maxillofacial fractures were treated with open reduction and internal fixation. The ever-increasing number of cases (especially trauma cases needing to be treated under general anaesthetic) because of the social and population dynamics in the catchment area, not only places an added constraint on the department's limited resources but also impacts and limits the unit's patient profile.

We also observed that the number of surgical procedures performed under local anaesthetic has significantly increased from 2008 to 2018. The cases that appear to be responsible for the observed overall decrease in general anaesthesia and increase in local anaesthesia were the non-trauma cases, particularly the dentoalveolar surgery and septic cases. This movement to local anaesthesia has several advantages on the resources including shorter hospital stay, fewer complications and less theatre time.

We recommend that more surgical audits be conducted to include data such as bed facilities, human resources, waiting periods in the clinic and theatre, and referral patterns from surrounding hospitals. The credence and scientific value of data from audits such as this will be significantly enhanced by the introduction of a computer-based data collection system. Academic units such as ours must ensure that trainees are adequately exposed to the eclectic scope of MFOS through either specialized

clinics, rotation of registrars in academic hospitals with a different patient profile or creating opportunities for public/private partnerships to allow for registrar exposure to scopes not regularly covered in the public sector.

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Chapter 9: ANNEXURES

Annexure A

<table>
<tr><td>Patient No</td><td colspan="5"></td></tr>
<tr><td>Age (years)</td><td colspan="5"></td></tr>
<tr><td>Gender:</td><td>M</td><td colspan="4">F</td></tr>
<tr><td rowspan="14">Procedure</td><td rowspan="2">ORIF Craniofacial Fracture</td><td>Mandible</td><td>LeFort</td><td>Zygoma Complex</td><td>Pan Facial</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Closed Reduction Facial Fractures</td><td colspan="4"></td></tr>
<tr><td>Debridement Gunshot wounds</td><td colspan="4"></td></tr>
<tr><td>Biopsy</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Sepsis</td><td colspan="2">Odontogenic</td><td colspan="2">Non-Odontogenic</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>Extractions</td><td colspan="4"></td></tr>
<tr><td>Resection</td><td colspan="4"></td></tr>
<tr><td>GAP Arthroplasty</td><td colspan="4"></td></tr>
<tr><td>Bone Graft</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Osteotomy</td><td colspan="2">BSSO</td><td colspan="2">PTO</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">Other</td><td>Removal of foreign body</td><td>Removal of Plate</td><td>OAC Closure</td><td>Nasal Bone Reduction</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Annexure B

Patient code ……

Patient Name ……

Medical record number / File number ……

Annexure C

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG	HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

TO: Dr P Ramlakhan
School of Oral Health Sciences
Department of Maxillofacial and Oral Surgery
Dental School
University

E-mail: dr.ramlakhan@gmail.com

CC: Supervisor: Professor RE Rikhotso <Risimati.Rikhotso@wits.ac.za>
and <HREC-Medical.ResearchOffice@wits.ac.za>

FROM: Iain Burns
Human Research Ethics Committee (Medical)
Tel: 011 717 1252

E-mail: Iain.Burns@wits.ac.za

DATE: 2020/09/07

REF: *R14/49*

PROTOCOL NO: **M200766** *(This is your ethics application study reference number. Please quote this reference number in all correspondence relating to this study)*

PROJECT TITLE: *Have things changed? An audit of Maxillofacial and Oral Surgery procedures for the years 2008 and 2018*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to the Government funding of the University.

MSWorks2000/Iain0007/Clearscan.wps

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Dr P Ramlakhan

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M200766

NAME: **(Principal Investigator)**	Dr P Ramlakhan
DEPARTMENT:	School of Oral Health Sciences Department of Maxillofacial and Oral Surgery Dental School University
PROJECT TITLE:	Have things changed? An audit of Maxillofacial and Oral Surgery procedures for the years 2008 and 2018
DATE CONSIDERED:	2020/07/31
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Professor RE Rikhotso
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2020/09/07

This clearance certificate is valid for 5 years from the date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the 3rd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **July** and will therefore reports and re-certification will be due early in the month of **July** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature _____ Date _____

Annexure D

7 York Road, Parktown, 2193 South Africa • Telegrams "Witsmed" • Telephone (011) 717-2000 • Fax (011) 484-2717

Department of Maxillofacial and Oral Surgery
Telephone 0117172130
Fax: 0867654436
E-Mail: liza.huygen@wits.ac.za

04 March 2020

Dear Dr. Ramlakhan

As per your request for your study entitled "***Have things changed: an audit of maxillofacial and oral surgery procedures for the years 2008 and 2018,***"approval is hereby granted for you to access records of patients who were at Chris Hani Baragwanath Academic Hospital (CHBAH).

Although these patients have given consent for treatment at Wits Oral Health Centre and CHBAH, their privacy and confidentiality however need to be respected at all times and at no stage should these patients be identified by their names in the ultimate collection and analysis of the data.

Yours sincerely

Prof. RE Rikhotso
Head of Department Maxillo-Facial and Oral Surgery
University of Witwatersrand

Annexure E

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE

CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 16th April 2020

TITLE OF PROJECT:

Have Things Changed: An Audit of Maxillofacial & Oral Surgery Procedures for the Years 2008 & 2018.

UNIVERSITY: Witwatersrand

Principal Investigator: Dr P Ramlakhan

Department: Maxillofacial

Supervisor : Prof RE Rikhotso

Permission Head Department (where research conducted): Yes

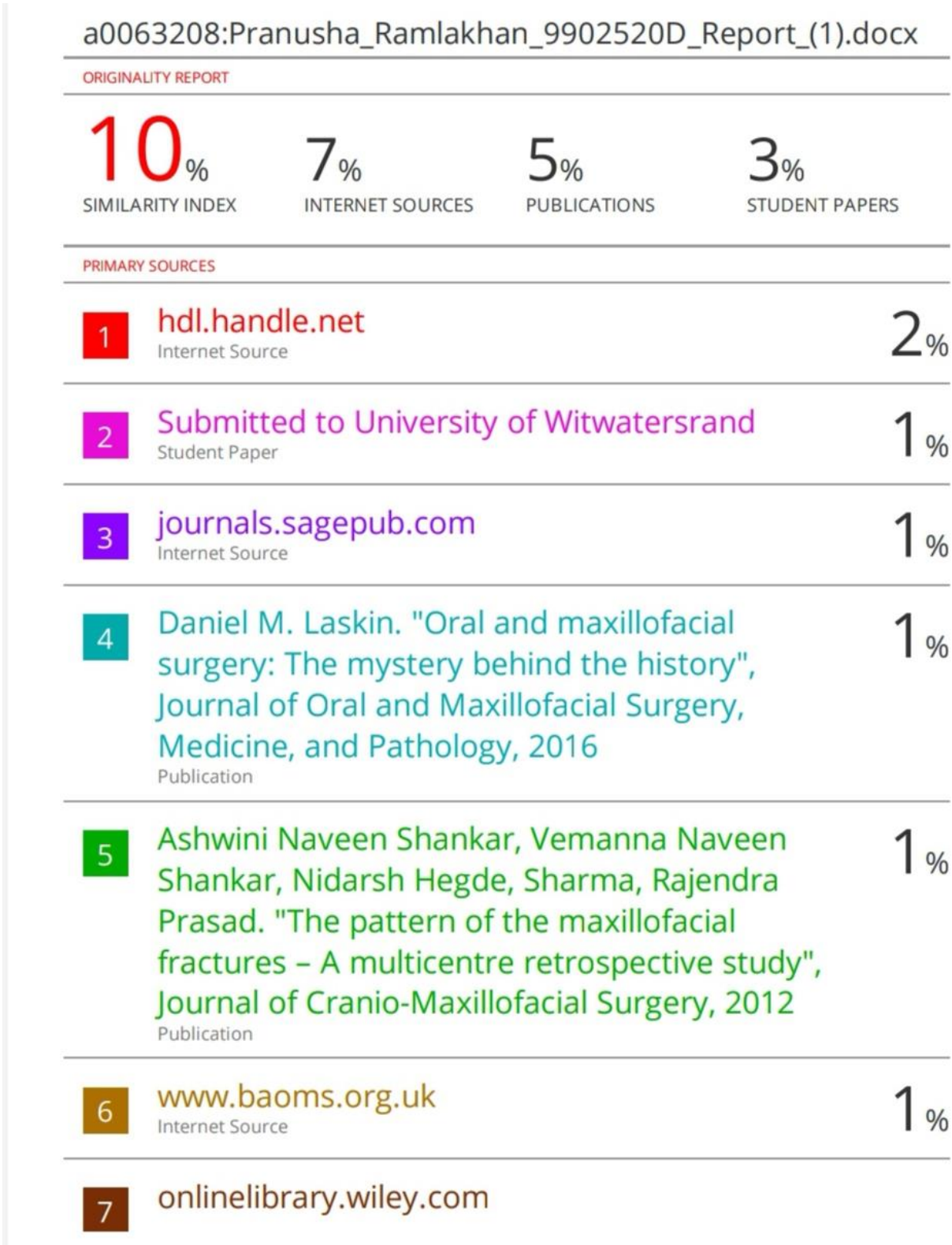
The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Academic Hospital. The CEO / management of Chris Hani Baragwanath Academic Hospital is accordingly informed and the study is subject to:-

- **Permission having been granted by the Committee for Research on Human Subjects of the University of the Witwatersrand.**
- The Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- The MAC will be informed of any serious adverse events as soon as they occur
- Permission is granted for the duration of the Ethics Committee Approval.

.....
Recommended
(On behalf of the MAC)
Date: 16/4/2020

.....
Approved/~~Not Approved~~
Hospital Management
Date: 17/04/2020

Annexure F



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5	Ashwini Naveen Shankar, Vemanna Naveen Shankar, Nidarsh Hegde, Sharma, Rajendra Prasad. "The pattern of the maxillofacial fractures – A multicentre retrospective study", Journal of Cranio-Maxillofacial Surgery, 2012 Publication	1%
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THE END