AUDIT OF THE WORKLOAD IN A MAXILLO-FACIAL AND ORAL SURGICAL UNIT IN JOHANNESBURG

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A research report submitted in partial fulfillment of the requirements for the degree of Master of Science in Dentistry to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg

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DECLARATION

I, Kamalkumar Sukha declare that this research report is my own work. It is being submitted for the degree of Master of Science in Dentistry to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University

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Signed

..... day of 2017

ABSTRACT

INTRODUCTION

Maxillo-facial and oral surgical (MFOS) audits provide data to both current and prospective patients regarding the quality of care an institution is capable of providing. The more frequently performed MFOS procedures can be determined and the allocation of funding and resources can therefore be more appropriately allocated. The scope of MFOS practice that can be determined from an audit may be used for comparison with international trends of practice and for future planning in the training of registrars.

AIMS AND OBJECTIVES

The aim of the study was to conduct an audit to evaluate the workload and scope of practice of the MFOS unit in the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) for the year 2015 (1st January 2015 to 31st December 2015) by quantifying MFOS conditions and respective treatment modalities for this period. The objectives of the study were to determine the number of patients treated in the unit, their mean age and gender, the spectrum of MFOS activities and scope of practice and to relate this to areas of practice described by Laskin in 2008.

METHODS AND MATERIALS

The study was a retrospective, cross-sectional study of patients managed in the MFOS unit of the CMJAH. The sample included all patients (in-patients and out-patients) treated in the unit over a one-year period (1st January 2015 to 31st December 2015). Data was retrieved from the statistics of the unit which included a theatre logbook for cases treated under general anaesthesia, as well as a patient register for cases treated under local anaesthesia at the Wits Dental Hospital (located in the CMJAH). The data colleced included patient age, gender,

month of procedure, diagnosis of condition, anatomical site of condition (for trauma and pathology) and the nature of the procedure performed.

RESULTS

A total of 1,750 patients were treated in the CMJAH MFOS unit during the year 2015. Five hundred and two patients (502) were treated under general anaesthesia while 1,248 patients were treated under local anaesthesia. The male to female ratio was 1.3:1 and the majority of these patients were in their 3rd and 4th decade. Most patients required a tooth extraction mainly for an impacted 3rd molar. Conditions such as trauma, pathology, post-operative complications and sepsis were most commonly encountered. Isolated conditions such as facial deformities, edentulism, partial edentulism and temporo-mandibular joint dysfunction (TMD) were seen on a much lower scale. Dentoalveolar surgery was the most commonly performed procedure followed by the treatment of facial fractures, biopsy of pathological lesions and the incision and drainage of sepsis. Procedures such as jaw reconstructions, jaw resections, soft tissue surgery, orthognathic surgery, implant placements and temporo-mandibular joint (TMJ) surgery were not regularly encountered and only performed under general anaesthesia. The treatment of post-operative complications was also not routinely performed.

DISCUSSION

The CMJAH MFOS unit treats a high volume of patients in comparisons with global studies. The scope of practice according to areas described by Laskin (2008) is relatively broad, with most procedures being performed in the unit. Certain more advanced MFOS procedures in Laskin's area of familiarity are not commonly done by registrars due to a low demand and a lack of funding. CMJAH policy also prevents the treatment of certain conditions by the unit, which leads to a slight narrowing of the scope of practice.

CONCLUSIONS

In accordance with global workloads and trends, the CMJAH MFOS unit treats a significantly high number of patients as compared with numbers seen on the Asian continent. The scope of MFOS practice is relatively broad with regard to Laskin's areas of expertise and competence but very narrow in the area of familiarity. We recommend that the workload of the unit might be reduced by training more dental practitioners in primary healthcare procedures. In order to increase their scope of MFOS practice, registrars should devote a fixed amount of time to confering with specialists in private practices who are exposed to advanced MFOS procedures.

DEDICATION

To my parents Harish and Raksha

To my brother Ritesh, and his family Aarti, Yashveer and Diyan

Most of all, to my wife Pranisha and our daughter Mishti

ACKNOWLEDGEMENTS

- I wish to express my sincerest gratitude to Dr Mzubanzi Mabongo for his supervision, expertise and skills during the conduction of this research. More importantly, for his patience, understanding and motivation without which this would not have been possible**.**
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CHAPTER 1

INTRODUCTION

Johannesburg is the capital city of Gauteng Province and the economic hub of the Republic of South Africa. According to the 2011 census results, Johannesburg with it's 12,3 million inhabitants accounted for 23,7% of the South African population.(1) The Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) based in Parktown is one of the teaching hospitals of the Faculty of Health Sciences of the University of the Witwatersrand, Johannesburg.

The hospital's Maxillo-Facial and Oral Surgical (MFOS) department/unit treats a wide spectrum of diseases, injuries and defects affecting the head, neck, face and jaw bones, including the hard and soft tissues of the oral cavity.(2) These procedures are performed under both local and general anaesthesia. The unit manages patients referred from healthcare facilities in Gauteng as well as surrounding provinces and also treats citizens of the Southern African Development Community (SADC) countries that lack the necessary skilled professionals, facilities and resources.

Clinical/surgical audits provide data for both current and prospective patients regarding the service quality that the institution is able to provide.(3) According to the National Institute for Health and Care Excellence (NICE) (2000), "an audit seeks to improve patient care and treatment outcomes through a systematic review of care against explicit criteria and the review of change". Through the elements of measurement, comparison and evaluation, one is able to use an audit as a tool for improving health care.(4) The Chinese University of Hong Kong (CUHK) states that audits are beneficial in supporting research and developing clinical policies, assessing clinical skills of surgeons and measuring the use of resources. A systematic

review of surgical audits of various procedures showed that a well-conducted audit could be used to reduce the cost of resources.(5) Accountability of clinicians may also be determined based on clinical outcomes.(6)

CHAPTER 2

2. LITERATURE REVIEW

2.1 WORKLOAD

A number of audits conducted in various parts of the world have been reported in the literature. A five-year audit of the MFOS department of Calabar Teaching Hospital in Nigeria, a multidisciplinary tertiary institution, revealed that a total number of 1,437 patients were treated from 2005 to 2009.(7) The hospital serves as a referral hub for patients from three of the six Nigerian zones. The potential patient population of these zones represents 40.2% of the total Nigerian population. Adebayo et al. also reported results of an audit that was conducted in a Military hospital in Port Harcourt, which is part of the Niger Delta region of Nigeria.(8) The audit showed that of 430 patients who were managed in the hospital, only 86 received specialised maxillofacial treatment. Both hospitals received referrals from a broad surrounding geographic area but the hospital in Port Harcourt supposedly only treated Nigerian military personal. This would explain the low patient volume. Adebayo et al. also found that the majority of patients treated at the Port Harcourt hospital could not afford specialised care, hence the low percentage of procedures that were actually performed.(8) An audit in the Muhimbili National Hospital in Dar es Salaam revealed that 456 patients visited the MFOS unit for treatment over a period of six years.(9) The authors considered this volume significantly high even though the population of Tanzania is currently estimated at 51.04 million and the hospital was the only centre providing specialist MFOS services in the country.

Asian studies on the other hand reveal a much higher number of individuals who required MFOS treatments. A study at the Dhaka Dental College showed a total number of 768 patients who were treated in the year 2012.(10) The college is considered the largest institution

providing MFOS services in Bangladesh. Researchers of the Kyber College of Dentistry in Peshawar, Pakistan similarly found that a high number of patients were seen in the hospital's MFOS unit. A total number of 2,764 patients were treated over a two-year period (January 2006 to December 2007) at an average of 1,382 patients per annum.(11) The studies cited above show that smaller volumes of patients are managed in African nations as compared with certain Asian countries.(7-11) The research conducted in both Nigerian hospitals was done over a lengthy period (five years), yet the patient numbers are not comparable with those described in Bangladesh and Pakistan. One may attribute the high volumes of patients in Asian nations as being due to their extremely high populations. The Nigerian authors Adebayo et al. suggest that their low patient volume was attributed to a lack of centres that are able to provide MFOS treatments.(7,8) They also deduced that more patients actually had MFOS treatable conditions during those five years but due to the lack of skilled professionals and appropriate screening, referral was not possible.(8) A limitation of the studies done in Bangladesh and Tanzania was that the sample size was exclusive to patients treated under general anaesthesia (in-patients).(9,10) Islam et al. 2013 acknowledged that a vast number of outpatients were treated at the day clinic in the hospital and therefore make no mention of the surgical removal of wisdom teeth in their audit.(9) A two-year audit performed at the Dhaka Dental College for the years 2004 and 2005 showed that only 341 patients were admitted in the unit (139 in 2004 and 203 in 2005).(12) It was reported that the improved capacity of the facility from a 20-bed to a 100-bed unit was the main contributing factor to the dramatic increase in patient numbers (768 patients) observed.

A study of significance was a six-month comparison of the statistics of the MFOS department at the Chris Hani Baragwanath Hospital (CHBH) for the years 1987 and 2007.(13) From this study Damtew et al. noted how MFOS practice had changed in South Africa over a period of 20 years in terms of both patient numbers and spectrum of conditions treated. The study had

considerable impact as it included patients treated under both local and general anaesthesia. A total number of 609 patients were treated in the MFOS unit during the first six months of 2007. This number had increased from 445 in the year 1987. The authors suggested that the increase was due to the rapid urbanisation of Johannesburg with both South African and foreign national citizens. Discontinuation of MFOS services at other tertiary hospitals such as Helen Joseph, Thembisa, Natalspruit and Leratong Hospitals in the Johannesburg region was also cited as the possible cause of the steep increase in patient numbers. There was a significant shift from treatment under general to local anaesthesia. The author identified this being due to increased patient numbers and a lack of/decreased funding within the state healthcare system. Staff shortages and poor organisation within the hospital's Department of Anaesthesiology were also identified as plausible explanations for this shift.

The majority of African authors found that trauma was the most treated condition in their respective units, with rates as high as 67% in Calabar, Nigeria.(7,8,13,19,20) An exception was the Muhimbili National Hospital in Tanzania that treated more patients with benign conditions.(9) Interestingly, the rate of trauma-related incidents had actually decreased from 69,9% in 1987 to 45,5% in 2007 at the CHBH.(13) However, their statistics illustrate that patient numbers had increased and more of these patients were treated for the surgical removal of their wisdom teeth. The percentage increase for this treatment modality was 21.6% between the two eras. This observation may be explained by a recent study conducted among public sector dentists in Gauteng. This revealed that dentists employed in the public sector have limited experience in MFOS surgical skills and hence referred a substantial number patients requiring dentoalveolar surgery to MFOS units in tertiary institutions.(14)

2.2 SCOPE OF MFOS PRACTICE GLOBALLY

The scope of MFOS education and practice globally appears to be quite diverse according to our review.(7-12). In an attempt to standardise the scope of maxillofacial practice, Laskin categorised this into three areas: “areas of expertise”, which include oral pathology, dentoalveolar surgery, trauma and implantology; “areas of competence”, which involve orthognathic, TMJ and local reconstructive surgery; and “area of familiarity”, which focuses on cleft lip and palate, regional reconstructive, oncologic, craniofacial and cosmetic surgery.(15) The publication does not indicate the proportion of exposure to these procedures. Global consistency, however, cannot be a reality owing to the enormous diversity in socioeconomic factors, treatment demands and differences in hospital policies.

Islam et al. of the Dhaka Dental College reported that maxillo-facial injury was the most common presenting condition (35% of total patients), while pathological lesions included squamous cell carcinomas (22%), odontogenic tumours and harmatomas (11%), odontogenic cysts (5%) and infective conditions (6%). The remaining presentations included temporo-mandibular joint dysfunction (TMD), sarcomas and miscellaneous conditions.(10) Uddin et al., who performed an audit at the same institution found that the incidence of cleft lip and palate was considerably high.(12) Even though both Nigerian studies described trauma-related conditions as the highest incidence in their facilities, there were also a considerable number of pathologic cases ranging from fibro-osseous lesions, salivary gland tumours, cysts, both odontogenic and non-odontogenic tumours as well as septic conditions such as osteomyelitis. (10-12)

Damtew et al. reported 12.5% of all cases as pathological for both 1987 and 2007. There was also a high incidence of impacted teeth and a moderate incidence of infectious conditions as well as TMD.(13) It should be noted that the 12,5% of pathological cases include only benign

conditions, which may be compared with the 17% of benign conditions (11% odontogenic tumours and 5% odontogenic cysts) reported by Islam et al.(10,13)

The British Association of Maxillo-Facial and Oral Surgeons' First National Audit report in September 2010 presented a very broad scope of practice for specialists in the United Kingdom.(16) The majority of participants were involved in dentoalveolar surgery which included the removal of impacted wisdom teeth, trauma-related procedures e.g. open reduction with internal fixation (ORIF) of the mandible, and minor oral medicine procedures such as the treatment of lichen planus. More than 80% of British surgeons were also involved in managing benign salivary gland tumours and cutaneous basal cell carcinomas. Over half of these surgeons also managed head and neck oncology, implantology, orthognathic, cleft lip and palate as well as TMJ surgery. Neurological and otorhinolaryngological conditions such as anterior cranial fossa resections and thyroidectomies were treated by as many as 10% of these maxillo-facial and oral surgeons. Surveys into changing trends in the scope of MFOS practice in Australia during 1990 and 2000 revealed that dentoalveolar surgery was the most commonly performed procedure in both eras.(17,18) Brennan et al. observed that there was an increase in the rate of provision of services per specialist visit in the year 2000 as compared to 1990.(17) There was a significant increase in the treatment of maxillo-facial pathology, reconstructive surgery, implantology, bone grafting and orthognathic procedures by surgeons who held both medical and dental degrees.(17,18)

Data for these surveys was collected and analysed through online questionnaires from practicing clinicians. A total of 127 out of 275 British specialists participated in the survey yielding a 46% response rate, which could be identified as a weakness of the study.(16) The response rate for the Australian survey was 73,8% and provided a more reliable representation of the scope of practice.(18) Other weaknesses of these surveys include the method in which

data was acquired. The data was not gathered from actual hospital statistics, which is normally recorded by an objective auxiliary staff member. These audits did, however, provide a broad perspective of the scope of MFOS procedures performed in so-called "developed nations", which seems to be more in accordance with the scope described by Laskin. Even though weaknesses were detected in these audits, British and Australian maxillo-facial and oral surgeons seem to perform more advanced procedures. The scope of practice in other parts of the world was much broader as compared to Africa, as the treatment of congenital deformities and oral malignancies were more commonly performed.(8,12,16).

Orthognathic surgery and TMD treatments were not well documented in all of the African and Asian audits.(7-13) These audits further do not report any incidence of rehabilitation of patients with dental implants after the resection of tumours. A plausible explanation is that orthognathic surgery is usually followed by expensive orthodontic treatment resulting in its low incidence. The majority of studies were done for "developing nations" and in state healthcare facilities, as is the case in South Africa. South African teaching institutions such as the CHBH and CMJAH are however funded by the state healthcare department, which allows provision for rehabilitation following dental implants. Advanced maxillo-facial surgical procedures are also more frequently performed at the CMAJH due to an integrated approach and the inclusion of all dental specialities available at the Wits Dental School situated within the hospital.

The diversity perceived in the general scope of MFOS practice is also noticeable in the treatment of maxillo-facial trauma due to the pattern of facial injuries. Oginni et al. and other authors found considerable differences in the global pattern of maxillofacial trauma according to studies investigating the aetiology of facial injuries.(19-23) According to a study in a Nigerian hospital, 215 patients sustained mandibular fractures in 313 sites while 141 patients

suffered midface fractures in 225 sites.(19) These authors reported in an independent study that mandibular fractures were more common, but also found that the soft tissues of the middle facial third displayed the highest injury sites.(20) The research was conducted at a university in the state of Oyo based in southwestern Nigeria. Maxillo-Facial trauma in Nigeria is commonly due to motor vehicle accidents as opposed to inter-personal violence.(10,11)

Lee at the University of Christchurch, New Zealand, aimed to review facial fractures at the hospital's unit between the years 1996 and 2006.(21) The mandible was the most commonly fractured facial bone followed by the zygoma and the lateral orbital wall. Le Fort fractures of the maxilla were less common. The pattern of mandibular fractures tends to vary as well. Lee also explains that the mandibular angle is the most commonly fractured site during cases of interpersonal violence due to the manner in which the jaw is struck. The left angle is more commonly fractured as most assailants are right handed.

It was noted that interpersonal violence was the most common cause of facial trauma followed by falls from a height in New Zealand. This was supported by Bucchanan et al. whose study conducted at New Zealand's Waikato Hospital found that maxillo-facial injuries occurred more frequently as a result of interpersonal violence.(21,22) The aetiological pattern of maxillo-facial trauma in Asia, particularly in India is due mostly to motor vehicle and motorcycle accidents followed by interpersonal violence.(23)

Alcohol abuse has been noted as a key factor in the cause of interpersonal violence. Two studies conducted at the Christchurch Hospital found that the rate of motor vehicle accident-related facial trauma was declining, whilst the incidence of alcohol-related maxillo-facial fractures were on the increase.(24,25) Young males were more commonly involved than females at relatively high ratios. A prospective audit of mandibular fractures at the Charlotte

Maxeke Academic Hospital in South Africa also noted that alcohol abuse was very common among the patients who were included in the study sample. A staggering rate of 86% of these patients suffered mandibular fractures due to interpersonal violence. The remaining 14% was due to accidental causes. Unemployment among these patients was also noted as a key factor, with the rate as high as 35%.(26)

2.3 THE VALUE OF CLINICAL AUDITS

Clinical/surgical audits are widely used as a strategy for improving professional practice. Healthcare providers upon feedback given that their clinical practice is below standard are forced to modify that practice. A paper that reviewed a total of 140 studies concluded that audits lead to small but potentially important improvements in professional practice.(27)
A systematic review of surgical audits identified an important relationship between such audits and a reduction of the cost of healthcare.(5) Surgical audits facilitate the provision of information and transparency in the performance of hospitals. This knowledge can facilitate improvement in the quality of care, which then leads to fewer complications and ultimately lower cost.

An investigation into the actual costs to a hospital for patients presenting with post-operative complications was graded according to the severity of the complication.(28) Patients with serious complications cost the hospital 28,356 US dollars. The hospital incurred costs of 14,094 dollars for patients who presented with minor post-surgical complications. When compared with the costs incurred by the hospital for patients with no complications (4,487 dollars), the importance of audits in improving the quality of care provided and in ultimately reducing the rate of postoperative complications may be appreciated. Auditing also provides information regarding the more frequently performed procedures within a surgical unit.

Stricter control can thus be kept on the purchasing of instruments and consumable items as more funding can be allocated to the more commonly used products.

CHAPTER 3

AIMS AND OBJECTIVES OF THE STUDY

The aim of the study was to conduct an audit to evaluate the workload and scope of practice of the Maxillo-Facial and Oral Surgical (MFOS) unit of the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) for the year 2015 (1st January 2015 to 31st December 2015) by quantifying MFOS conditions and respective treatment modalities during this period.

The objectives of the study were to determine:

1. the number of patients treated in the unit,
2. the mean age and gender of those patients,
3. the spectrum of MFOS conditions (diagnosis) and
4. the scope of practice of MFOS performed and to relate this to areas of practice described by Laskin in 2008. The scope of practice is defined as the "range of procedures performed" for the purpose of this study.

CHAPTER 4

MATERIALS AND METHODS

4.1 STUDY DESIGN

The research report is classified as a descriptive and retrospective, cross-sectional study of patients managed in the Maxillo-Facial and Oral Surgical (MFOS) unit of the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH). The sample size included all patients (in-patients and out-patients) treated in the unit over a one-year period (1st January 2015 to 31st December 2015).

4.2 DATA COLLECTION

Data was retrieved from the statistics of the CMAJH MFOS department. This included a theatre logbook for cases treated under general anaesthesia and a patient register for cases treated under local anaesthesia at the Wits Dental Hospital (located in the CMJAH). The data collected included patient age, gender, month of procedure, diagnosis of condition, anatomical site of condition (for trauma and pathology) and the procedure performed. The data was entered onto a data collection sheet and then imported into a Microsoft Excel Spreadsheet. It was then analysed and presented in the form of pie charts, bar graphs and tables. Statistics of MFOS procedures performed in the hospital's emergency theatre were included due to a misplaced patient register by the hospital's records department.

The diagnosis of MFOS conditions was categorised into the following:

1. Trauma: includes fractures of the facial skeleton and lacerations of facial and oral soft tissues as a direct result of trauma.

2. Pathology: includes all tumour and tumour-like conditions including cystic lesions of the jaw bones and oral soft tissues.
3. Teeth requiring extraction: includes all impacted, carious and mobile teeth. Also includes teeth extracted prior to radiation therapy. NB: The patient number rather than the number of teeth was recorded and certain patients were recorded more than once as they were treated on different days.
4. Sepsis: includes all abscesses, cellulitis and necrotic conditions.
5. Post-operative complications: includes all dry/septic sockets, oro-antral communications, displacement of teeth into ectopic areas and septic hardware after ORIFS (infected fractures).
6. Temporo-mandibular joint disorders (TMD) including ankylosis and bruxism resulting in trismus and myofascial symptoms.
7. Facial deformities and malocclusions.
8. Edentulous/partially edentulous patients requiring implants.

Treatment/procedures performed were categorised as follows:

1. Treatment of fractures of the facial skeleton either by open reduction with internal fixation (ORIF) or by closed reduction with inter-maxillary fixation (CRIMF).
2. Dentoalveolar surgery including the simple extraction of carious and mobile teeth as well as the surgical removal of impacted and unerupted teeth and full/partial dental clearances prior to or during radiation therapy.
3. Oral soft tissue surgery including procedures such as frenectomy, marsupialization, vestibuloplasty and suturing of lacerations.
4. Incisional and excisional biopsies of all tumour/tumour-like conditions.
5. Incision, drainage and debridement of sepsis including the management of space infections and osteoradionecrosis.

6. Jaw reconstruction/bone grafts with bone harvested from the anterior and posterior iliac crests as well as costochondral grafts.
7. Orthognathic and orthodontic surgery including bilateral sagittal splits, Lefort I osteotomies and genioplasty procedures.
8. Mandibular resections.
9. Temporo-mandibular joint (TMJ) surgery including the relief of ankylosis, arthroplasty, joint apositioning and arthrocentesis.
10. Implant placements in the maxilla, mandible and zygoma.
11. Treatment of post-operative complications including the treatment of dry sockets, closure of oro-antral communications, removal of teeth displaced into the antra and removal of septic hardware and wires.

4.3 ETHICS

An application was made to the University of the Witwatersrand Committee for Research on Human Subjects (Medical) who approved the research protocol unconditionally (Clearance Certificate Number M160744). Permission for using the hospital and Wits Dental School's statistics was sought from the School of Oral Health Science Hospital Research Committee.

CHAPTER 5

RESULTS

5.1 WORKLOAD

A total number of 1,750 patients were treated as elective cases in the CMJAH MFOS unit for the year 2015 (1st January to 31st December). Five hundred and two patients (502) were treated under general anaesthesia and 1,248 were treated as day cases under local anaesthesia (Figure 5.1). The distribution of patients with regard to treatment under general and local anaesthesia is illustrated below.

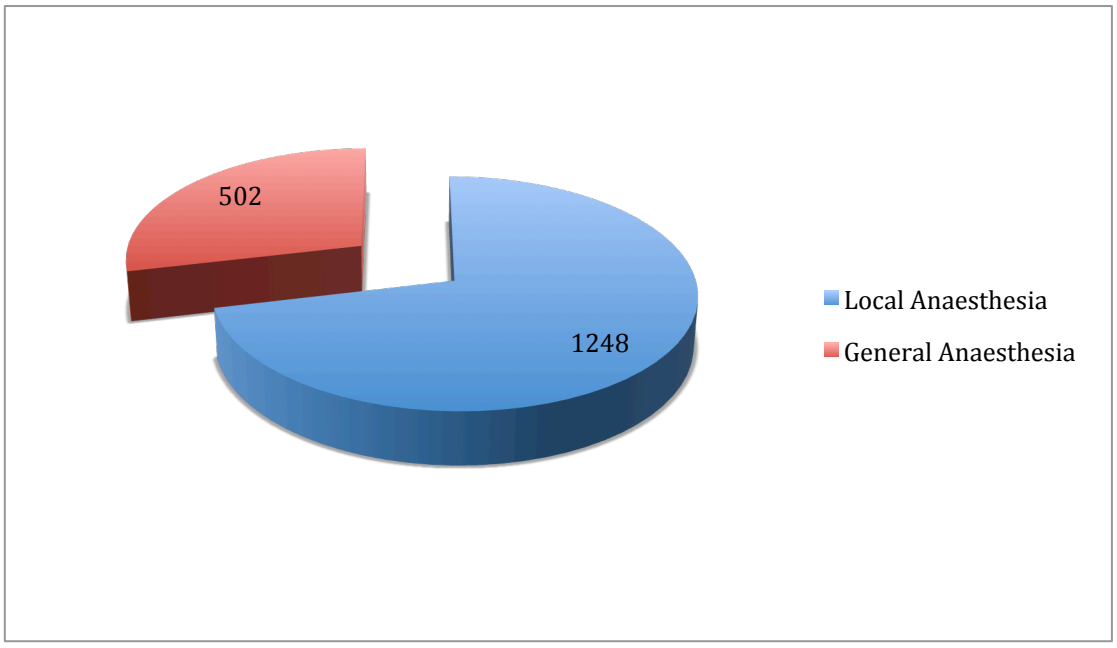

FIGURE 5.1: Volume distribution of patients treated in the unit based on the type of anaesthesia administered.

5.2 GENDER

A total number of 995 (56,8%) males and 755 (43,2%) females were treated in the unit during the year 2015. For the 502 patients treated under general anaesthesia, 345 were males and 157 were females (ratio of 2.2:1). The 1,248 patients treated under local anaesthesia, on the other hand had a relatively equal gender distribution (ratio of 1.1:1). The ratio of the 650 males was relatively similar to that of the total of 598 females treated as day cases. Table 5.1 below illustrates this observation.

TABLE 5.1: Distribution of patients according to gender and type of anaesthesia administered.

	GENERAL ANAESTHESIA	LOCAL ANAESTHESIA	TOTAL
MALES	**345 (68,7%)**	**650 (52,1%)**	**995 (56.8%)**
FEMALES	**157 (31,3%)**	**598 (47,9%)**	**755 (43,2%)**
TOTAL	**502**	**1248**	**1750**
MALE TO FEMALE RATIO	**2.2:1**	**1.1:1**	**1.3:1**

5.3 AGE

The age range of patients treated in the unit extended from the 1st to the 9th decade with a mean age of 31,5 years (31,2 years for general anaesthesia and 31,8 years for local anaesthesia). Patients in their 3rd and 4th decades were more commonly treated under both general and local anaesthesia. The frequency of the two extremes of age (very young and elderly) was very low. There were 18 patients from both categories whose age was unrecorded and could not be traced due to unrecorded file numbers in the patient register. Figure 5.2 demonstrates graphically the distribution of patients according to their age group and numbers.

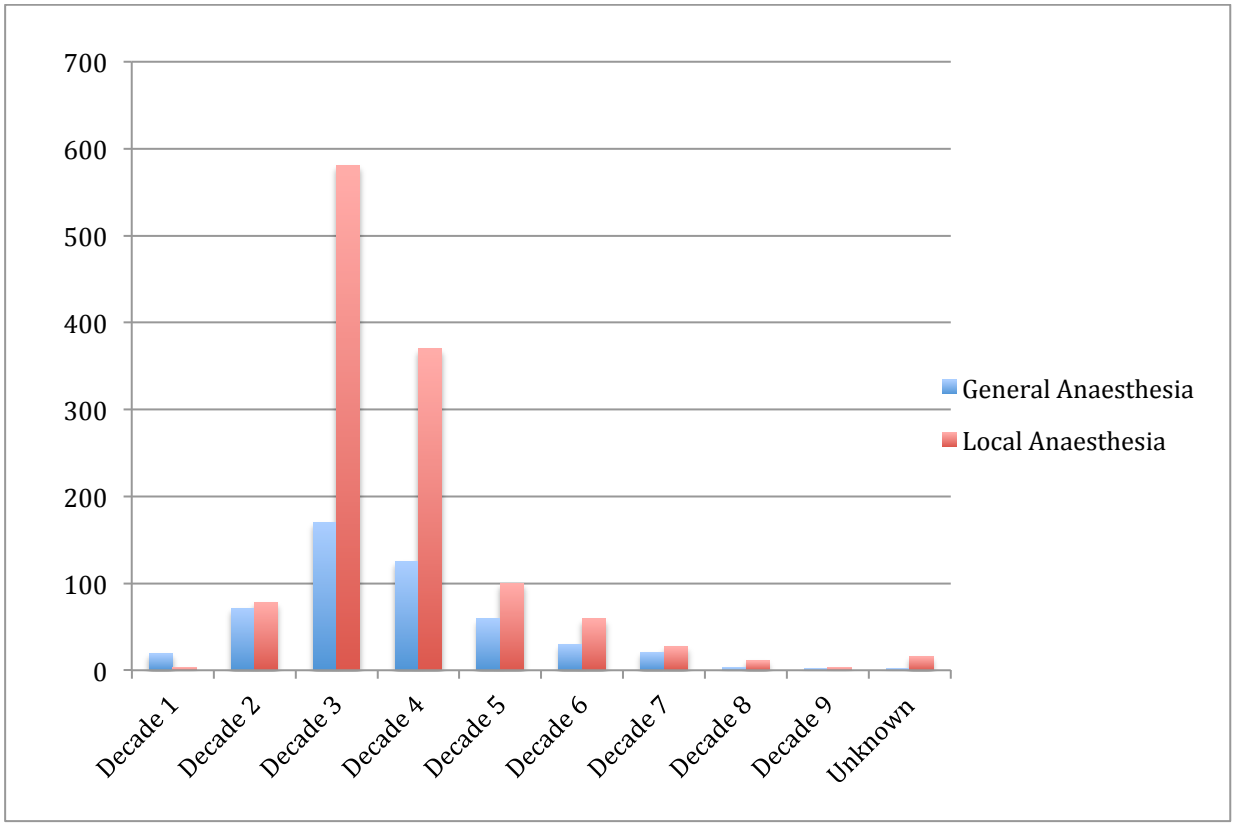

Figure 5.2: Patient age distribution in decades.

5.4 CONDITIONS

When considering all the patients (both under general and local anaesthesia) who were treated in the MFOS unit (Figure 5.3), the majority presented with a requirement for a tooth extraction, mainly an impacted 3rd molar (53%). Conditions such as trauma (23,9%), pathology (9%) post-operative complications (4,7%) and sepsis (2,9%) also presented. Isolated conditions, for example facial deformities (1,3%), Edentulism/partial edentulism (0,6%) and TMD (0,5%) were seen on a much lower scale.

These results were further subdivided into conditions seen under general and local anaesthesia. Half of the patients (50%) treated under general anaesthesia (Figure 5.4) presented with trauma. This was followed by pathology (17,9%), impacted teeth (8,1%), post-operative complications (7,9%) and sepsis (7,2%). Again, isolated conditions such as TMD (1,6%), facial deformities (4,8%) and edentulism/partial edentulism (2,2%) were not very commonly seen. The patients treated under local anaesthesia (Figure 5.5) presented mainly with impacted teeth (71,2%). Maxillary and mandibular fractures (13,4%) pathology (5,4%), post-operative complications (3,3%) and sepsis (1,2%) were less commonly treated. A percentage of patient conditions was not recorded in the patient register. This category is labelled as “unknown” and formed 3,7% of the entire sample and 5,5% of the local anaesthesia sample. One patient developed general anaesthetic complications after the induction phase and could not be operated on. This constitutes the category labelled as “cancellations” in Figure 5.3 and Figure 5.4 and comprised 0,4% of the entire sample and 0,3% of the general anaesthesia sample.

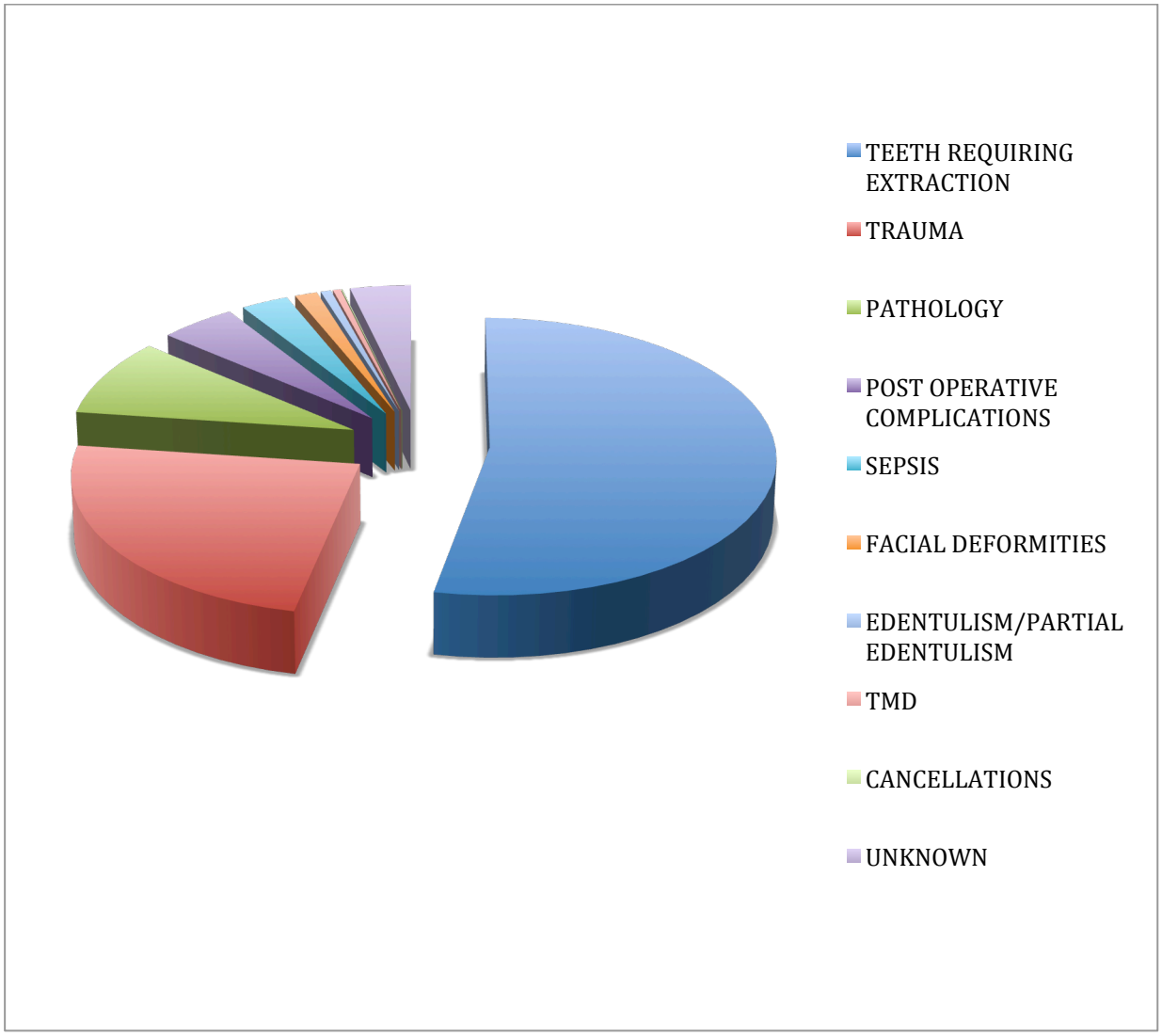

Figure 5.3: Distribution of conditions of all patients seen in the unit.

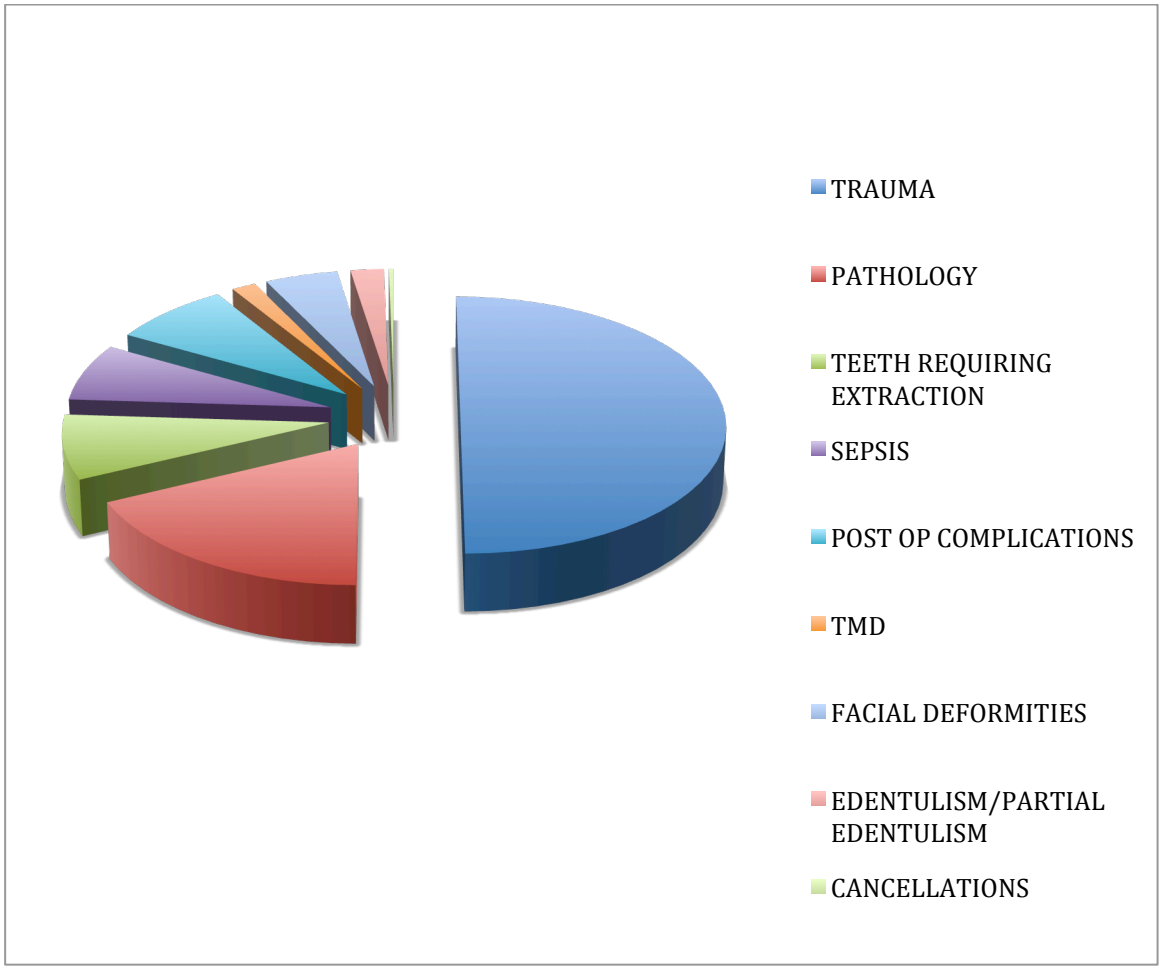

Figure 5.4: Distribution of conditions for patients treated under general anaesthesia.

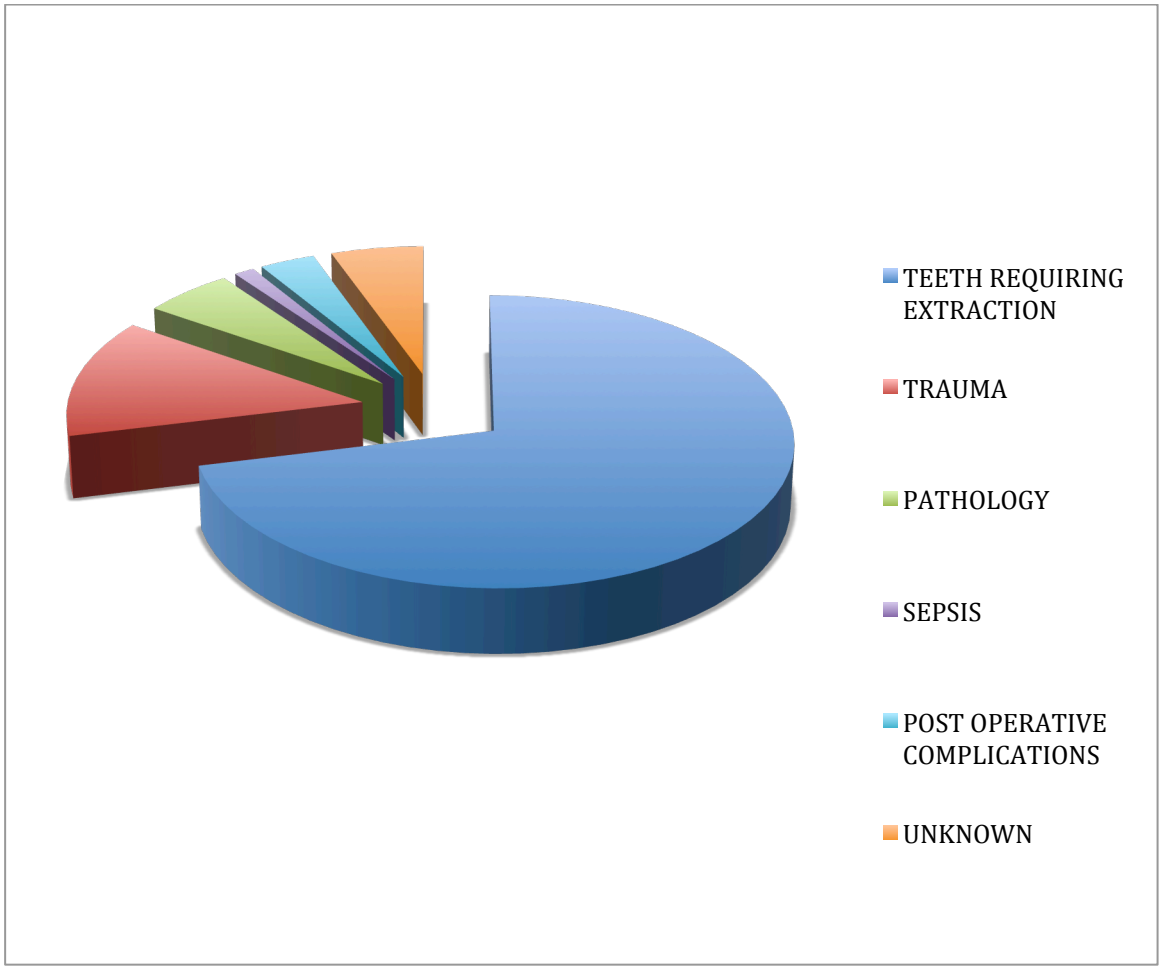

Figure 5.5: Distribution of conditions for patients treated under local anaesthesia.

5.5 PATTERN OF TRAUMA AND TUMOUR/TUMOUR-LIKE CONDITIONS

The distribution of specific anatomical sites affected is graphically demonstrated in figures 5.6, 5.7 and 5.8 below. The most commonly affected site with regard to trauma was the mandible (78,4%). Maxillary fractures (7,5%) and zygomatic arch/complex fractures (10,8%) were seen less frequently. Isolated fractures of the pan facial area (0,6%), frontal bone (0,3%), supraorbital area (0,3%), infraorbital area (0,3%) and orbital floor (0,6%) were minimal. Soft tissue injuries of the tongue and facial tissue were also uncommon (1,2%). Trauma sites for patients treated under local anaesthesia included the mandible (97,6%) and the maxilla (2,4%), as shown in figure 5.7 below.

Tumour/tumour-like conditions presented predominantly in the mandible (53.3%) and maxilla (30,5%). Sites such as the buccal mucosa (6,4%), floor of mouth (3,8%) cheek (1,2%), tonsil/base of tongue (1,2%) and zygomatic complex (1,2%) were less commonly affected. Certain patient records (2,4%) had unrecorded anatomical sites labelled as “unknown” on figure 5.8. Sites for pathological conditions that were biopsied and treated under local anaesthesia are not included as they were not recorded in the patient register.

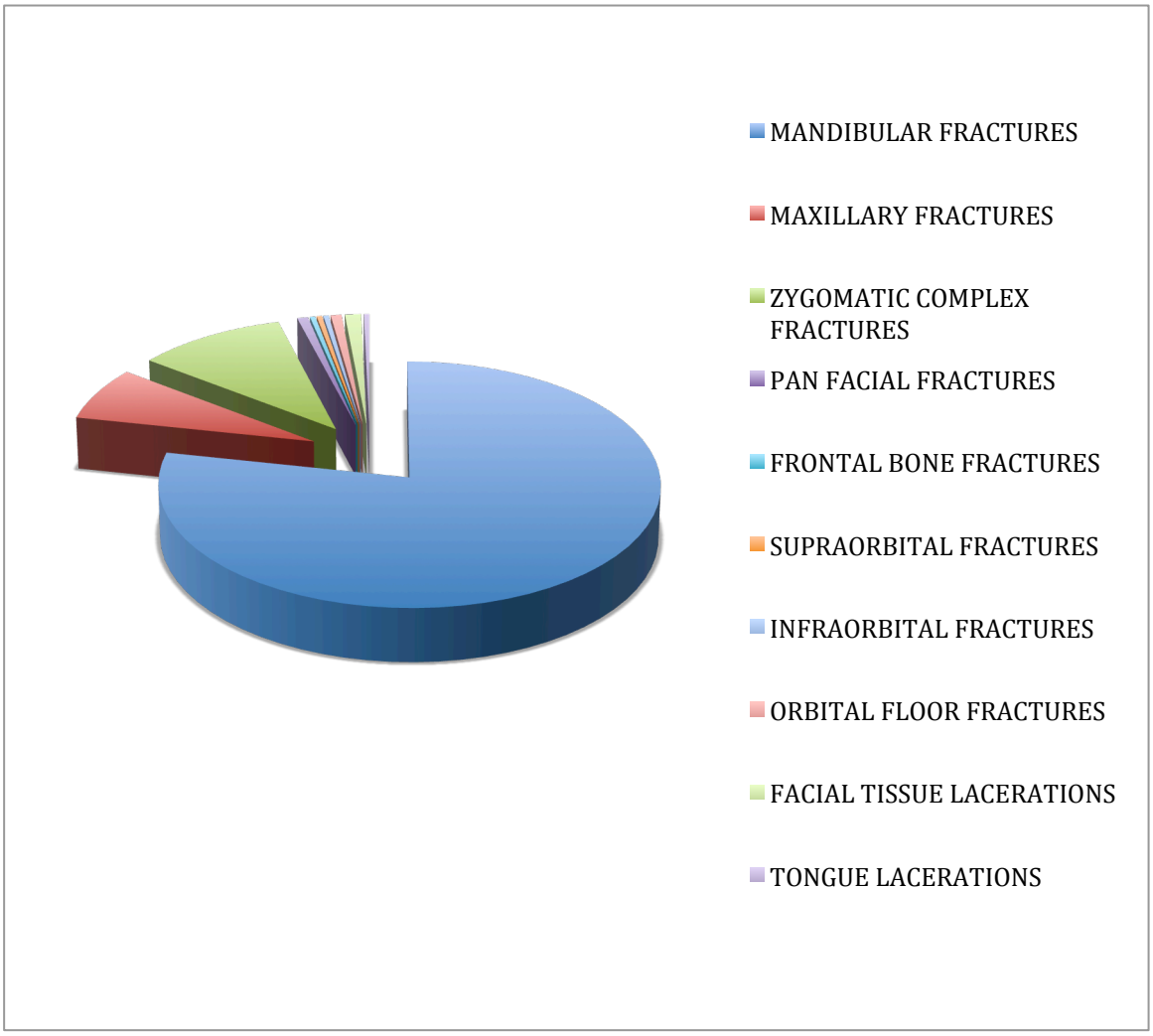

Figure 5.6: Anatomical site distribution/pattern of trauma for cases treated under general anaesthesia.

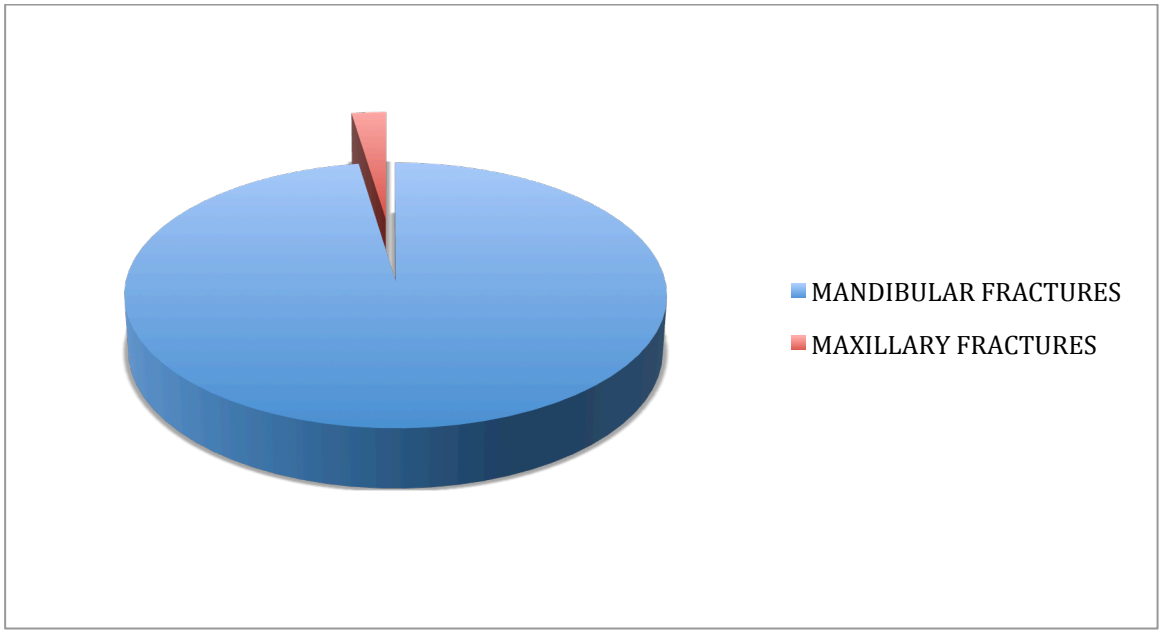

Figure 5.7: **Anatomical site distribution/pattern of trauma for cases treated under local anaesthesia.**

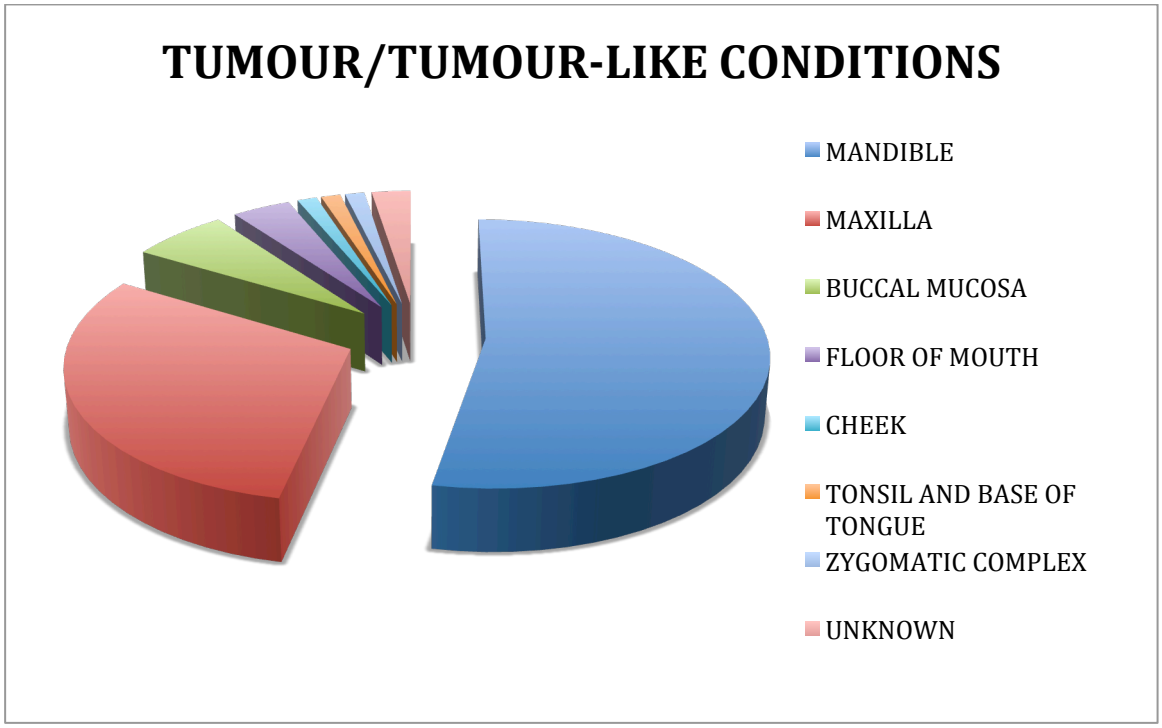

Figure 5.8: **Anatomical site distribution for tumour/tumour-like conditions.**

5.6 PROCEDURES/TREATMENTS

The distribution of all procedures performed (both under general and local anaesthesia) is demonstrated graphically in Figure 5.9 below. Dentoalveolar surgery was the most commonly performed procedure (60,9%) followed by the treatment of facial fractures (20%), biopsy of pathological lesions (5,1%) and the incision and drainage of sepsis (3,7%). Procedures such as jaw reconstructions (1,1%), jaw resections (0,9%), soft tissue surgery (0,8%), orthognathic surgery (0,7%), implant placements (0,4%) and TMJ surgery (0,4%) were not regularly encountered and only performed under general anaesthesia. The treatment of post-operative complications (5,2%) was also not routinely performed. Some procedures were not documented and represented 0,8% of the total sample. It may be noted that the number of procedures/treatments exceeds the total number of patients as multiple procedures were performed on certain patients. The specific distribution of procedures performed under general anaesthesia (Figure 5.10) and local anaesthesia (Figure 5.11) is indicated below. The treatment of facial fractures was the most common procedure for cases treated under general anaesthesia. These included ORIFS (33,5%) and CRIMF (1,7%). Dentoalveolar surgery (29,3%), post-operative complication procedures (10%), incision and drainage of sepsis (6,8%) and biopsies (5,6%) were less frequently performed. Procedures such as jaw reconstructions with bone grafts (3,3%), jaw resections (2,7%) soft tissue surgery (2,5%), orthognathic surgery (2,2%), implant placement (1,2%) and TMJ surgery (1,2%) were performed on a very minimal basis. Cases treated under local anaesthesia most commonly included dentoalveolar surgery (76,6%). This was followed by the treatment of mandibular fractures by CRIMF (12,5%), biopsies (4,9%), incision and drainage of sepsis (2,3%) and post-operative complication procedures (3%). Certain procedures (0,7%) were not recorded in the patient register and are labelled as “unknown”.

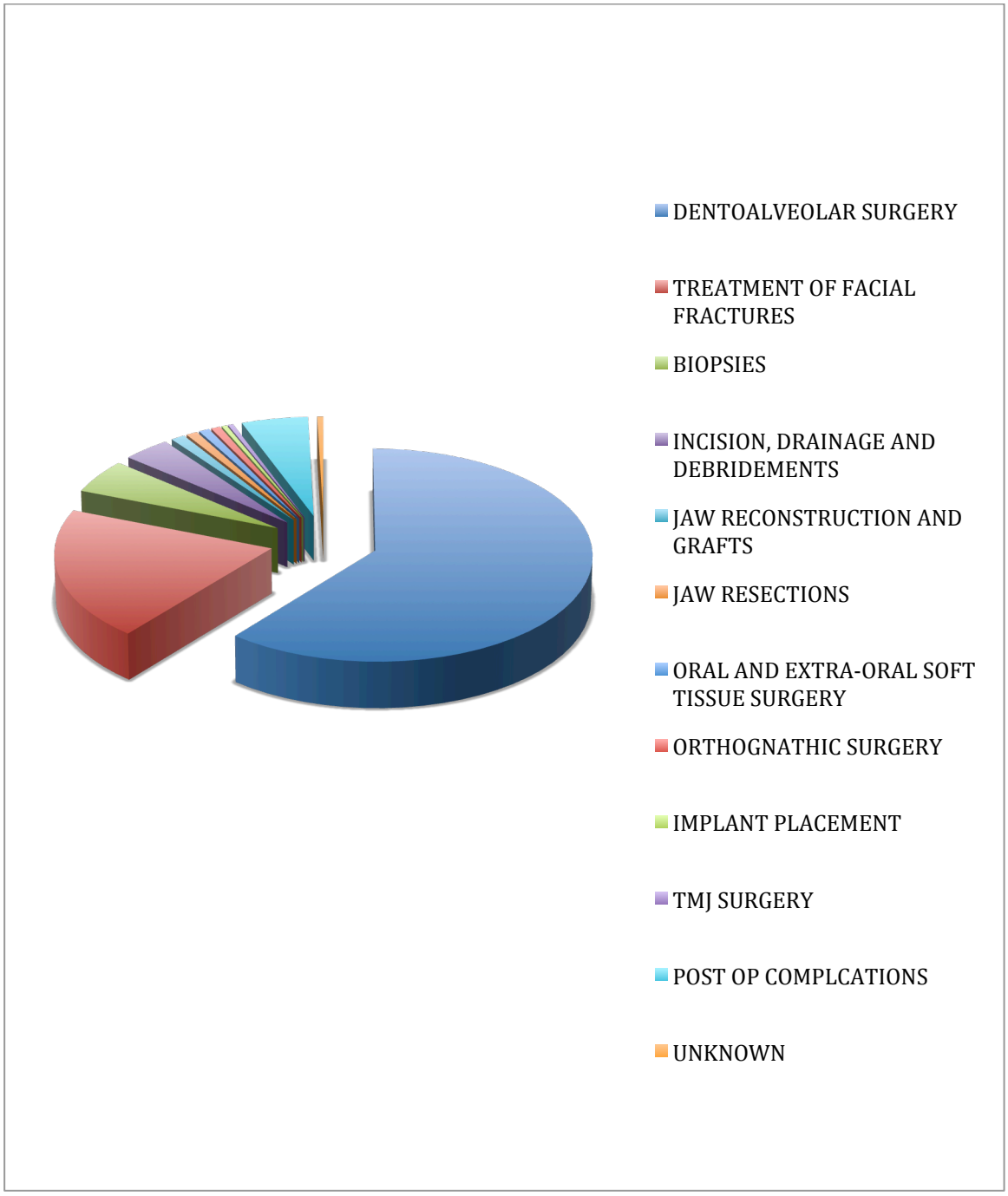

Figure 5.9: Distribution of procedures performed on all patients seen in the unit.

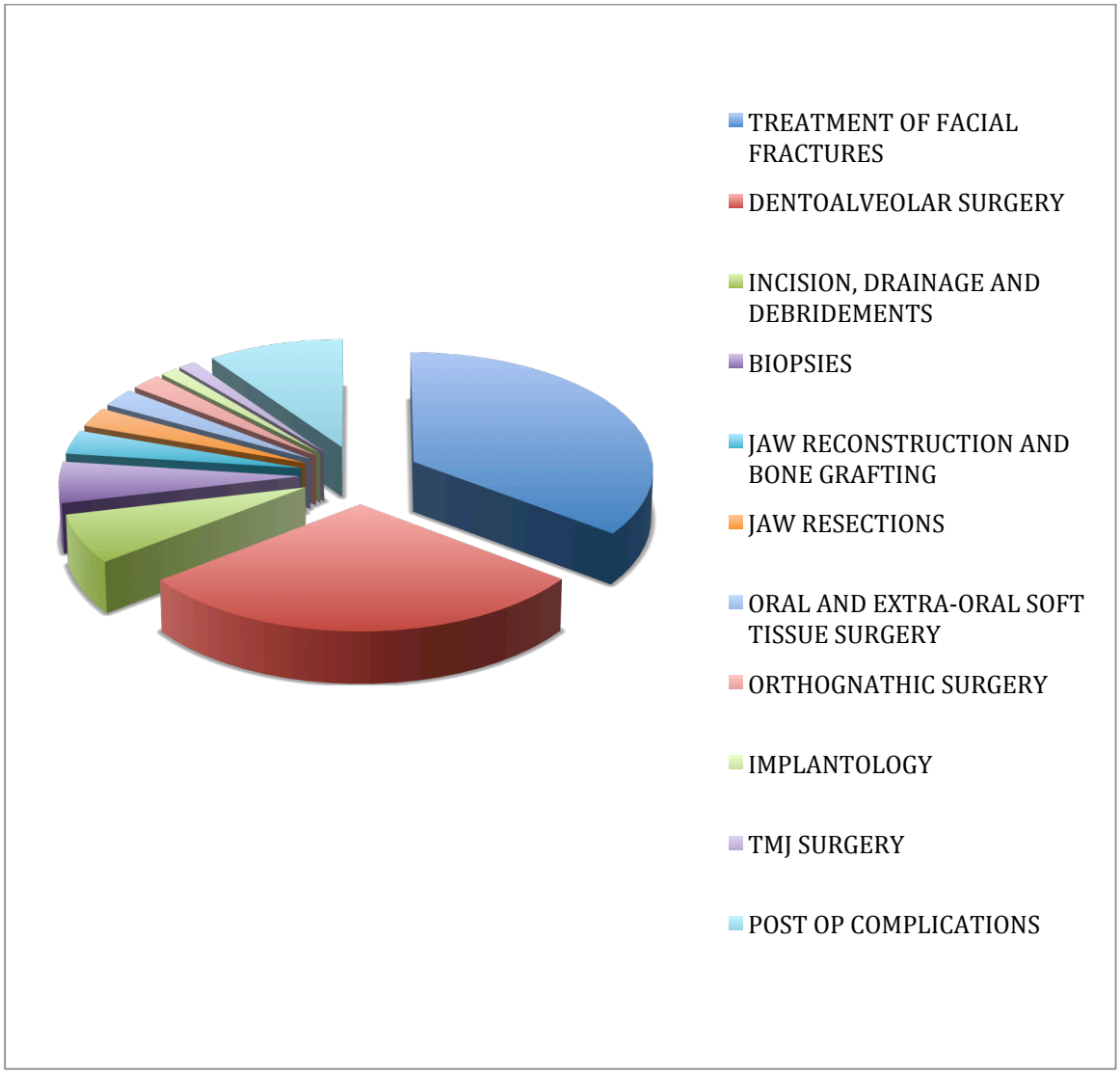

Figure 5.10: Distribution of procedures performed under general anaesthesia.

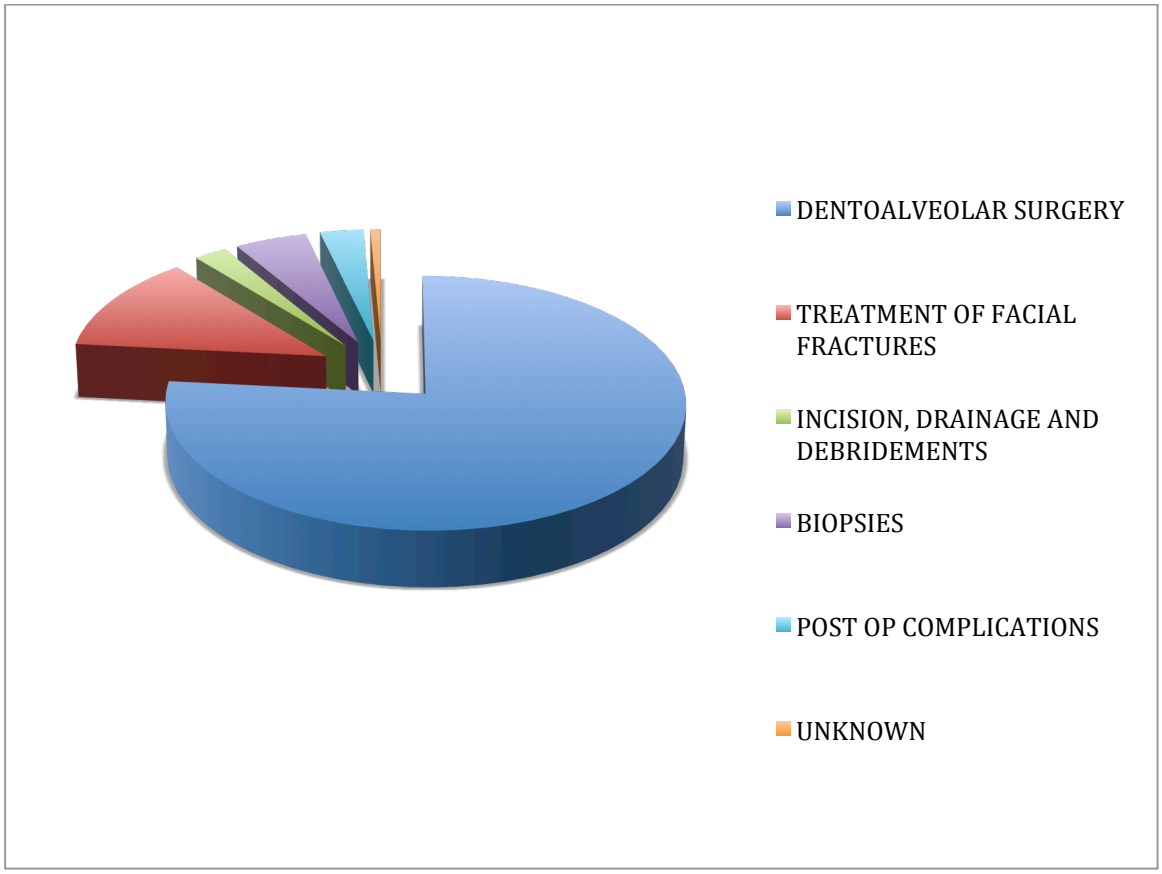

Figure 5.11: Distribution of procedures performed under local anaesthesia.

CHAPTER 6

DISCUSSION

The high volume of patients treated in the CMJAH MFOS unit during 2015 is particularly noteworthy (1,750 patients). Although no direct comparison can be made, as an audit of this nature has never previously been undertaken in the unit, anecdotal evidence suggests that the patient numbers have always been high. Globally, Asian units present figures that are definitely comparable with our audit.(10-12) Pakistan and Bangladesh have high populations and major cities such as Dhaka are densely populated. This would explain the high workload of their hospital MFOS units.(10-12) When the results of this audit are compared with audits from other African countries, a substantially higher number of patients are being managed in this unit.(7-9) For example, the MFOS unit of the University of Calabar Teaching Hospital in Nigeria treated only a total number of 1,437 patients over five years.(7) A comparison with another local audit at CHBH revealed that 609 patients were treated over a six-month period.(13) This difference could possibly be accredited to convenient accessibility for patients to the CMJAH due to its central location and ease of public transportation. The Wits Dental Hospital is also located in the CMJAH, which allows for easy referral of patients from the school to the MFOS unit. Damtew et al. also reported an increase in patient numbers for the year 2007 at the CHBH due to the significant growth of the population within Johannesburg and the influx of foreign nationals from surrounding African countries.(13) These factors could apply to the CMJAH as both hospitals are about 20km apart. It must be noted that Damtew et al. conducted their study approximately eight years ago and the population demography has most likely changed since then. The timeframe of the audit (January 1st to June 30th 2007) was also arbitrarily chosen. Anecdotal evidence indicates that patient numbers tend to fluctuate according to seasonal climate changes, the colder months having a smaller

patient flow. It is therefore inaccurate to draw specific parallels with Damtew's study. An average delay of 20 days at the CMJAH between an injury (facial fracture) and its treatment is further evidence of the high patient volume.(29) Limitations of the study include that the staff compliment of the unit was not considered. The global studies that were discussed also don't make any mention of the workforce that was employed to handle the workload. Another limitation is that our study makes no mention of the length of procedures which is significant as certain complex treatments consume a greater amount of time than more basic treatment types.

6.1 AGE

The majority of patients treated in the unit were in their 3rd and 4th decade with a mean age of 31,5 years. This result concurs with a study showing that most individuals require 3rd molar surgery after the age of 20.(30) Maxillo-facial trauma was shown also to occur in individuals of the same age group in western societies, while the author also attributed alcohol abuse predominantly in this age group as a pivotal factor in the increased number of road accidents and incidents of interpersonal violence globally.(21) In South Africa, mandibular fractures occurred mainly in patients between the age of 20 and 40 at the CMJAH according to Desai et al.(26) The authors also found that 86% of these patients who were treated in this unit during a six-month period in 2004 were victims of interpersonal violence.

6.2 GENDER

The male to female ratio for the entire sample was 1.3:1. For patients treated under general anaesthesia, this ratio was 2.2:1, while the ratio was almost equal for patients treated under local anaesthesia (Table 5.1). The majority of global trends suggest that males are more commonly affected by maxillo-facial conditions.(7-13,) Lee et al. 2012 described trends where males more commonly sustained facial fractures due to higher involvement in interpersonal

violence and motor vehicle accidents.(21) The majority of procedures performed under local anaesthesia included dentoalveolar surgery primarily of the 3rd molar. There is however no conclusive evidence that identifies whether males or females more commonly undergo 3rd molar surgery. According to a study conducted in Pakistan by Khan et al., males more commonly underwent the surgical removal of impacted wisdom teeth. These authors do however state that studies conducted in Malaysia and Saudi Arabia showed that 3rd molar surgery was commonly performed on females.(29) These conflicting results can be attributed to various factors such as the difference in geographic areas and the diverse ethnicity of the area's citizens.

6.3 CONDITIONS

According to our audit, 53% of the entire patient sample required tooth extraction/s, which predominantly included 3rd molar surgery. Traumatic facial injuries were also very prevalent at 23,9%. Audits conducted in Africa demonstrate how MFOS surgeons frequently treat facial fractures.(7-9,13,19,20) This is contrary to Asian studies where specialists are more involved in treating pathological conditions.(10-12) The high volumes of trauma seen in the CMJAH unit can be attributed to South Africa's high incidence of violent crime including interpersonal violence and road accidents. According to the draft South African Oral Health Strategic document reviewed by Mabongo et al., dentists in level 1 district hospitals are meant to be able to manage conditions such as class 1 3rd molar impactions, mandibular fractures requiring IMF and biopsies. These authors also comment on the fact that these dentists have limited experience in managing these conditions and were likely to refer patients to tertiary institutions.(14) This would explain the high patient numbers detected in our audit.

Pathological conditions were seen in 9% of the patients in this study. Specific tumour types were not included as part of the study. Anecdotal evidence suggests that a high prevalence of

ameloblastomas affecting the mandible occur frequently in the unit. This supports our finding that the majority of pathological lesions occur in the mandible (53,3%). Tumour/tumour-like conditions affecting the maxilla were atypically high (30,5%). We speculate that this increase was possibly due to the inclusion of intraosseous lesions such as nasopalantine duct cysts that occur exclusively in the maxilla, as well as soft tissue lesions. The management of malignant conditions such as squamous cell carcinomas was frequently performed in Bangladesh.(10) British studies also reported that head and neck oncologic conditions were treated by maxillo-facial and oral surgeons.(16) According to the CMJAH policy however, malignancies are not directly treated in the unit. A full dental clearance if indicated is requested by either the oncology or ENT surgery departments, which subsequently provide direct management in terms of surgery, radiation or chemotherapeutic treatments.

Post-operative complications and sepsis were found to be relatively low at 4,7% and 2,9% respectively. Damtew et al. also reported a slight decrease in sepsis from 8% in 1997 to 6% in 2007 at the CHBH.(13) A possible explanation for this observation is that most patients are now self-aware and educated with regard to their oral health and seek treatment before conditions progress to severe sepsis. It is possible that the incidence of HIV-related deaths has also decreased in South Africa from 2005 due to the rollout of anti-retroviral medication.(1) This view is supported by an American study which found that the epidemiology of sepsis in patients with HIV has changed significantly with advancements in HAART (highly active antiretroviral therapy). These authors found a decrease in ICU admissions of HIV patients with septic conditions and an increase in survival rates.(34)

Isolated conditions such as facial deformities, edentulism and TMD were not commonly encountered by the unit and only treated under general anaesthesia. We suspect that these conditions were seldomly encountered due to exorbitant costs associated with their treatment, particularly for implant placements. Patients presenting with facial deformities requiring

orthognathic surgery (due to the costly orthodontic treatments that accompany the surgery) are also not commonly treated, possibly due to public hospitals having very limited funding, basic surgical procedures generally taking priority. There seems to also have been a low demand for this treatment modality with very few patients actually requiring surgery. We attribute this to a possible lack of understanding among these patients firstly to recognize that they have the condition and, secondly, to know that there is available treatment.

Anecdotal evidence suggests that the prevalence of TMD and myofascial pain dysfunction due to bruxism is more common in affluent patients due to an increase in personal stress, while TMD related to post-trauma ankylosis is seen more commonly in lower socioeconomic groups who present more commonly at the hospital. This concurs with our observation that TMJ surgery performed in the unit was mainly to relieve ankylosis and to treat dislocations.

6.4 PROCEDURES

Dentoalveolar surgery, which included 1,162 procedures, was the most commonly performed treatment type (60,9%) on the entire patient sample. This elevated procedure type can be attributed to the increased number of patients who required 3rd molar surgery and other complicated tooth extractions. Developed nations like Australia also confirm a high prevalence of dentoalveolar surgery in their institutions. Brennan et al. reported dentoalveolar surgery rates as high as 60-70% of all procedures performed by MFOS surgeons in Australia, followed by trauma surgery which ranked a very distant second.(17) This trend has not changed as these increased rates occurred over two time periods (1990 and 2000). A study at the Royal Adelaide Hospital in Australia from the year 1989 to 1992 also revealed that the majority of MFOS procedures performed at the institution included dentoalveolar surgery.(31) We speculate that these high rates are due to Australia being a developed nation, hence resources are readily available and more patients are able to afford medical insurance. The

substantial gap between dentoalveolar surgery and trauma surgery can possibly be due to the low incidence of interpersonal violence and road accidents in the country.

ORIFS and CRIMFS: ORIFS performed under general anaesthesia constituted 55% of all facial fractures treated. ORIFS are normally indicated in patients with severe injuries and severe displacement to restore previous anatomic relationships. Edentulous and partially edentulous patients also benefit from ORIFS as they have a lack of stable occlusal contacts for closed reductions.(30) This procedure ensures an earlier return to function with decreased complications. Due to the high occurrence of trauma in the unit (50%) during 2015, an abundance of mid-face and mandibular fractures had to be treated under general anaesthesia. One hundred and seventy (170) closed reductions of mandibular fractures were performed. The indications for CRIMF include moderate displacement of the fractured fragments and a presence of stable occlusal contacts. The pattern of trauma in the unit revealed that the mandible (78,4%) was the most commonly fractured bone. Lee of the University of Christchurch found that the mandible was commonly fractured after traumatic incidents especially in cases of interpersonal violence, which could explain our finding.(21) The zygomatic bone was fractured in 10,8% of patients followed by the maxilla at 7,5%. This pattern explains why a significant number of CRFMS for mandibular fractures and certain maxillary fractures could be carried out. Isolated fractures of the orbital floor and orbital rim were treated by ORIF.

Biopsy of tumour/tumour-like conditions was performed on 5,1% of individuals. There is an atypical pattern where 9% of the total sample of patients presented with a pathological lesion, only 5,1% of these lesions being biopsied. We again speculate that a certain number of patients were referred to specialists in other medical disciplines for definitive management of their conditions and biopsies were not performed.

Orthognathic surgery and implant placements: the frequency of these treatment modalities was low (0,4% for implant placements and 0,7% orthognathic surgery). It should also be noted that even though implant placement is considered as dentoalveolar surgery, it has been classified under 'implant placement' in our study. Global studies from developing nations suggest that implant placements were not commonly performed due to the high costs involved.(7-12) Bezerra et al. in a Brazilian hospital also reported a low incidence of dental implant placements between the years 2000 and 2006. It was also noted that patients within the private healthcare system more commonly received dental implants due to the exorbitant costs associated with the procedure. Atypically though, the most commonly performed procedure was orthognathic surgery during 2005, which was funded by the state healthcare system. State funding was limited to patients requiring trauma surgery.(33) Similarly, implant placements at the CMJAH were not frequently done due to financial implications associated with components purchased from the manufacturer. The restoration of these implants during the prosthetic phase is also associated with costly laboratory procedures, being unaffordable for the majority of patients treated in the unit.

Jaw resection (0,9%) and reconstructive surgery (1,1%) were infrequently performed. Jaw resection surgery is normally performed to remove tumours such as ameloblastomas, fibro-osseous and cystic lesions. We speculate that these low percentages may be due to certain patients seeking help from traditional healers. Due to the invasive nature of this type of surgery, general anaesthesia was always administered. An uncharacteristic observation is the frequency of reconstructions being slightly higher than that of resections. A possible reason for this is that patients may have had tumours resected in previous years and presented for the reconstruction surgery in 2015.

Patient numbers managed under general anaesthesia vs local anaesthesia: As mentioned, procedures performed under general anaesthesia consisted predominantly of ORIFS(33,5%). This treatment modality is normally reserved for patients with severely displaced facial fractures.(30) Closed reduction of mandibular fractures was more frequently performed under local anaesthesia. A total of 12,5% of these patients received a CRIMF under local anaesthesia compared to 1,7% of patients on whom it was performed under general anaesthesia. The majority of patients (76,6%) had a dentoalveolar procedure that was performed under local anaesthesia. This treatment of high numbers of patients under local anaesthesia can be ascribed to many reasons, the outstanding factor being the intense patient numbers. It is simply not possible for all these cases to be treated under general anaesthesia. Patient comfort and satisfaction for dentoalveolar surgery, sepsis drainage as well as incisional and excisional biopsies can be attained through effective local anaesthesia. The treatment under local anaesthesia reduces the pressure placed on the elective theatre slate and allows for substantially more patients to be treated. It also allows for the more severe cases to be treated under general anaesthesia. Damtew et al. speculated that a lack of funding, resources, time and staff in the Department of Anaesthesiology at CHBH could possibly account for fewer cases being treated in theatre.(13) We consider these reasons also to be valid for our study. Only one theatre is assigned to elective MFOS cases at the CMJAH. The fact that more patients are being treated under local anaesthesia seems to be more the result of circumstance rather than choice. Although high numbers of patients are managed under local anaesthesia, the average waiting period for a patient with a facial fracture to be treated at the CMJAH was 20 days.(32) One can, however, gain encouragement from a study by Chye et al. who reported a high degree of patient satisfaction and a low incidence of post-operative complications for dentoalveolar surgery performed under local anaesthesia at the Royal Adelaide Hospital.(31).

According to Laskin's classification of the scope of MFOS practice, clinicians in the unit are exposed to virtually all MFOS procedures, but certain procedures are rarely encountered. Implant placements, which is also meant to be an area of expertise, is not commonly practiced in the unit due to financial reasons for both patients and the health department alike. Areas of competence according to Laskin include orthognathic, TMJ and local reconstructive surgery.(15) These procedures were rarely seen during this particular period (1,2%–3,3% under general anaesthesia). The areas of familiarity described by Laskin, which includes cleft lip and palate craniofacial, oncologic, regional reconstructive and cosmetic surgery were also very rarely performed procedures. As mentioned previously, malignancies are not managed by the unit due to the CMJAH policy, hence patients are subsequently referred to the ENT and oncology departments. Alveolar bone grafting in cleft lip and palate and some craniofacial procedures were grouped under reconstructive surgery according to our classification, which constituted 3,3% of the total number of procedures performed. The difficulty with associating the scope of practice of the CMJAH unit with the scope described by Laskin is the lack of absolute values or percentages. Laskin does not state exactly what percentage of each area should be practiced by a maxillo-facial and oral surgeon for their scope to be considered diverse. Laskin conducted his research in Europe, Asia and the Americas where he found a great diversity, with certain nations requiring maxillo-facial and oral surgeons to have both a medical and a dental degree, while others only required a single dental or medical degree.(15) The global trend, however, is that dual qualified clinicians are more settled and confident in performing more advanced cases such as oncologic, craniofacial, major reconstructive and cosmetic surgery. Funding and resources are also more abundant in western nations, thereby allowing for this broader scope of practice. Although Laskin does not comment on the scope of practice on the African continent, it would be beneficial for surgeons in South Africa to follow these guidelines as these areas of practice clearly demarcate MFOS as separate from plastic and ENT surgery.

CHAPTER 7

CONCLUSIONS

1. According to global workloads and trends, the MFOS unit within the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) treats a significantly high number of patients that is comparable with numbers seen on the Asian continent.

2. The scope of MFOS practice(range of procedures) in the unit is relatively broad with regard to Laskin's areas of expertise and competence but very narrow in the area of familiarity. Certain procedures in the area of competence are rarely performed in the unit. Future studies should consider data that includes the private sector in order to establish a broader national trend.

RECOMMENDATIONS

1. The Department of Health needs to consider activation and budgeting for the previous MFOS units in other government hospitals (Thembisa, Leratong, Natalspruit and Helen Joseph) to reduce the workload of the current operating units.

2. The Department of Health also needs to consider revising its current budget for the hospital. An increase in funds would improve resources and would allow for more advanced MFOS to be practiced.

3. The workload of the unit could be reduced by training more dental practitioners in primary healthcare procedures such as the treatment of mandibular fractures and dentoalveolar surgery. This would free up time for registrars to broaden their scope of MFOS practice and also decrease the waiting time for patients.

4. For the adequate training of registrars, a certain amount of time should be dedicated to consultants in private practices who are more exposed to advanced MFOS procedures.

5. A trauma fellowship should be included in the current teaching curriculum due to the high prevalence of trauma-related injuries and procedures.

6. Record-keeping within the unit needs to be improved possibly by computerisation to decrease the incidence of incomplete records and allow simplicity for future surgical audits.

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ANNEXURE A: ETHICAL CLEARANCE

R14/49 Dr Kamalkumar Sukha

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M160744

NAME: (Principal Investigator)	Dr Kamalkumar Sukha
DEPARTMENT:	Maxillo-Facial and Oral Surgery Charlotte Maxeke Johannesburg Academic Hospital
PROJECT TITLE:	Audit of a Maxillo-Facial and Oral Surgical Unit in Johannesburg
DATE CONSIDERED:	29/07/2016
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Mzubanzi Mabongo
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	01/08/2016

This clearance certificate is valid for 5 years from 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 in Room 10004, 10th floor, Senate House/2nd Floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. 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 resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in July and will therefore be due in the month of July each year.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

ANNEXURE B: TURNITIN REPORT

Dr

by Kamalkumar Sukha

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