INFLUENCE OF THE DUAL QUALIFICATION ON THE SCOPE OF PRACTICE OF MAXILLOFACIAL AND ORAL SURGERY SPECIALITY IN SOUTH AFRICA.

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg. In partial fulfilment of the requirements for the degree of Master of Science in Dentistry (MSc Dent).

Johannesburg, 2020

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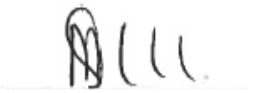
Declaration:

I, Tinyiko Charmaine Shalonga declare that this research report is my own, unaided work. It is being submitted for the Degree of Master of Science in Dentistry 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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ABSTRACT

Background: Entry requirements to MFOS speciality are either dentistry only or medicine only or both medicine and dentistry. The curriculum followed also varies in length, depth and quality, leading to significant differences in professional standards worldwide. Controversy exists over whether both dentistry and medicine are necessary in order to practice the full scope of MFOS.

Aim: The aim of the study was to determine whether the current scope of practice of maxillofacial speciality is enhanced by dual qualification.

Methods: A cross-sectional study, with convenience sampling was conducted. A questionnaire was sent via email and by hand to 103 dental professionals inclusive of 17 maxillofacial and surgeons and 11 registrars, Johannesburg-based dentists and University of the Witwatersrand dental students and specialists. Stata software, version 15, was used to analyse data, analysis was performed using Cohen's kappa coefficient and Fisher exact test

Results: Majority of surgeons had a dental degree only, their scope of practice was broad, even though some procedures were performed the least and by a few surgeons. Cohen's kappa coefficient revealed that there was agreement between procedures performed by surgeons and registrars, and perceptions by the dental community.

Conclusion: The results were not conclusive to determine whether the current scope of practice of maxillofacial speciality is enhanced by dual qualification due to a small sample size. However, the study suggests that a broad scope of practice is performed by the surgeons even though the numbers were low.

ACKNOWLEDGEMENTS

I would like to thank the following people

My supervisor Professor Mzubanzi Mabongo for his patience, advice, guidance, encouragement and input.

The CEO of School of Oral Health Sciences Professor Simon Nemutandani for granting me permission to conduct my research at the school.

Everyone who contributed to this study.

My colleagues for their support.

My family for their support and encouragement.

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LIST OF ABBREVIATIONS

MFOS: Maxillofacial Surgery and Oral Surgery

TMJ: Temporomandibular joint

WW I: First World War

WWII: Second World War

CHAPTER 1: INTRODUCTION

Maxillofacial and Oral surgery (MFOS) is a surgical specialty dealing with the diagnosis, surgical and adjunctive management of diseases, injuries and defects involving both the functional and aesthetic aspects of the hard and soft tissues of the mouth, jaw, face and neck region (Haider and Latif, 2018).

MFOS stems from dentistry, and during the formative stages, medical methods were in cooperated by plastic and general surgeons, therefore it comprises of dental and medicine practices hence it has often been seen as the bridge between dentistry and medicine (Herford et al., 2001). Controversy exists as to whether both medical and dental qualifications are necessary in order to practice the full scope of MFOS. Currently, requirements for training in MFOS differ in different parts of the world. Some countries require either dental or medical qualifications only, while others require a qualification in both. While in other countries such as Finland requirements differ from university to University. The curriculum followed by various countries in their training programmes also vary in length, depth and quality, leading to significant differences in professional standards worldwide (Kumar, 2017).

In the United Kingdom (UK), MFOS originated as the surgical specialty of dentistry, developing from the need for specialist services to treat jaw injuries sustained by servicemen during the two world wars. However, due to the demand for treatment of an increasingly large range of pathological conditions of the face, jaws and teeth this was seen as a need for extensive surgical training. This resulted in, dual qualification becoming mandatory in the late 1980's (Kumar, 2017). While prior to first World War (WW1), oral surgery professors in American dental schools were largely dually qualified. However, dual qualification was only formalised in 1971(Donoff and Troulis, 2018). A study by Herford et al. (2001) suggests that dual degree training programmes train registrars on a broader scope of procedures, and that dual degree surgeons overall possessed a higher percentage of a given privilege than the single degree in most cases. In contrast to this Bell (2016) believes that despite a medical degree, the scope of practice for the United States of America (USA) maxillofacial

and oral surgeons has generally been the same, regardless of degree. While some differences have been noted between dual-degree and single-degree surgeons, it appears that more substantive differences in scope of practice are related to geographic location, years in practice, fellowship training and academic involvement. He also believes that the result has been the development of a de-facto tiered system of training within MFOS that is based upon the trainee's desire and merit (Bell, 2016).

CHAPTER 2: LITERATURE REVIEW

2.1 History of MFOS

The earliest references to Odontology are to be found in Egyptian literature. Discovered in 1873, at Luxor, by Professor Georg Ebers. A large number of dental diseases such as alveolar abscess and pulpitis, and their medical treatment are mentioned in the " Ebers Papyri." For the cure of these conditions many prescriptions were given in the form of plasters and vegetable decoctions, honey and oil (Densham,1909). During this period amongst the Greeks, Aristotle mentions that the tooth doctors scope was restricted, it included only the extraction of loose teeth and the removal of deposits of salivary calculus (Densham,1909).

The formal practice of medicine, which at that time included dental treatment, began in Greece in the 4th century BC under the leadership of Hippocrates (Densham,1909). Hippocrates, born about 460 B.C., devoted several chapters to the description and treatment of dental and oral diseases. He recommended the extraction of very loose teeth with leaden forceps, but regarded the extraction of firmly fixed teeth as a dangerous operation(Densham,1909). Amongst the Romans, Cornelius Celsus, born 25-30 B.C., gave a very interesting description of the proper method of extracting a tooth and treatment of teeth with large cavities. He mentioned that the gum must first be scraped away and separated from the tooth until the latter is quite loose, as it is very dangerous to extract a firm tooth. When it is possible the tooth should be taken out with the fingers, or if this is not possible use forceps. If there is a large cavity in the tooth then it should be filled with lead or lint to prevent fracture (Densham,1909).

While the Roman Catholic Church expanded, and monkish orders were established, the monasteries became the centres of surgical and medical practice (Densham,1909). During this period a change of guard occurred when a series of papal edicts prohibited monks from performing any type of surgery, bloodletting, or tooth extraction. After the edicts, barbers assumed the monks' surgical duties. In

1210, a Guild of Barbers was established in France. Barbers eventually evolved into two groups: Surgeons who were educated and trained to perform complex surgical operations, and lay barbers or barber-surgeons, who performed more routine hygienic services including shaving, bleeding, and tooth extraction (Hussain and Khan, 2020). They were ultimately united by British parliament in 1540 and their scope of practice was defined. Barber surgeons were only allowed to extract teeth and lay surgeons were not allowed to operate barbershops or shave patrons (Laskin, 2016). Barbers, apprenticed to established surgeons, dental surgeons and medical doctors (Kaban and Perrott, 2019).

The earliest known mention of what is now included in the scope of MFOS occurred in Egypt in the so-called Edwin Smith Papyrus (Rowe, 1971). The Edwin Smith Papyrus, a trader unearthed in Egypt about 1600 B.C. Mentioned how a dislocated mandible was treated and that simple jaw fractures were treated by bandages, obtained from the embalmer, and soaked in honey and white of egg, while wounds were treated with fresh meat (Rowe, 1971). About the same period, in Ancient India, techniques were developed for the use of pedicle flaps from the forehead or cheek to repair defects of the nose or lips (Rowe, 1971). While, Hippocrates were the first to advise that, in the case of fractures of the mandible, a gold wire or linen thread must be used to fasten together mobile teeth in the area of the fracture site (Densham, 1909). Support for the fragments was provided by broad strips of Carthaginian leather. These were glued to the skin adjacent to the fracture site and the essentials of this method of bandaging persisted well into the present century (Rowe, 1971). Celsus recommended treatment of a fractured mandible by tying together the teeth on either side of the seat of fracture with silken ligatures; he also advocated the use of the splint described by Hippocrates (Densham,1909).

The Renaissance period (14th- to mid-17th century) saw a further extension of the scope of what is now considered MFOS. Among the practitioners of that time was Ambroise Pare (1510–1590), who progressed from being an apprenticed barber surgeon to that of a head surgeon who not only treated broken jaws, temporomandibular joint (TMJ) dislocation and various tumours, but when serving as a military surgeon improved the management of gunshot wounds and developed

methods for the localisation and removal of bullets (Haider and Latif, 2018). Pare also founded the use of ligatures rather than cautery to control bleeding (Laskin, 2016). He also was renowned for the introduction of artificial noses and eyes, and obturators for palatal defects (Rowe, 1971). Another contributor during this period was Johannes Scultetus from Padua (1595–1645) who was the first to describe marsupialisation of a cyst of the jaw (Laskin, 2016).

The modern era of surgery began in the 1800s, which is a major contributor to MFOS today (Kaban and Perrott, 2019). During this period in the USA, Simon P. Hullihen (1810–1857), a physician with dental training, practised oral surgery as a specific branch of surgery. He performed a number of surgical procedures which included cleft lip and palate, various cancers, maxillary sinus diseases and reconstructions of the lips, nose and mandible. He also performed the first documented case of orthognathic surgery (Laskin, 2016). Other contributors during this period were, Hamilton (1857) from London, one of the first to point out the tendency of the conventional four-tailed bandage to carry the anterior fragment of a fractured mandible posteriorly, thus increasing both the displacement and the danger of respiratory obstruction (Rowe, 1971). Guerin (1866) a French surgeon, described the midface fracture pattern, he observed in post-mortem examinations the involvement of orbital fractures not only the maxillary bones but also extends to involve the pyramidal part of the palatine bone and the pterygoid processes of the sphenoid bone (Rowe, 1971). In the 1900s, Rene le Fort reported upon his researches in Paris in 1901 subjecting cadaver heads to various degrees of trauma from different angles, and following maceration of the soft parts, studied the formation of the fracture lines which fell into three principal groups (Rowe,1971). While, Gilmer described in 1907 the arch-bar method of fixation whereby a German silver wire was bent round to conform to the outer aspect of the dental arch. The bar was wired to the individual teeth both in the upper and lower jaws, following which both bars were fastened together by tie wires to immobilize the mandible (Rowe, 1971).

More advancements occurred during the WWI. Before then no formal training programmes existed for the treatment of maxillofacial injuries. In the early stages of WWI, British and French soldiers with extensive facial injuries wore masks to cover

their deformities (Strother, 2003). During this period the role of the dentist was to treat oral infections, carious teeth by performing restorations or extractions, as well as making and repairing dentures. They also served as assistant medical officers at the front, caring for facial wounds, assisting with the debridement and closure of wounds, administering anaesthetics, and sorting casualties (Strother, 2003).

At this point during WWI, the role of the dental surgeon had still not been adequately appreciated and it was not until Major Gillies an otorhinolaryngologist, (later Sir Harold Gillies) persuaded the war office to establish a special centre for these problems. Full co-operation between the plastic surgeon, the anaesthetist and the dental surgeon was then established. It was here that Captain Kelsey Fry, later Sir William Kelsey Fry a dental surgeon, assisted by Captain Fraser, laid the foundations of the dental treatment of maxillo-facial injuries (Rowe, 1971). Varaztad Kazanjian, an oral surgeon who later became a plastic surgeon, also known as ‘‘miracle man of the Western Front,’’ made significant advances in the management of maxillofacial fractures and other traumatic defects (Kaban and Perrott, 2019). Plastic and maxillofacial surgery emerged in Britain from the collaboration between dental and surgical practitioners.

The pioneering work of dental surgeons during this period contributed to the foundation of the speciality, which was later to become MFOS (Hussey, 2014). During this period, in 1927 Gillies discovered the technique of bone grafting, skin grafting intra-orally and the discovery of the tube pedicle which further facilitated the techniques of facial reconstruction (Rowe, 1971). Period between WW I and second World War (WWII), there was further advances, such as the development of interdental eyelet and management of the depressed zygomatic bone (Rowe, 1971).

During the WWII maxillofacial units were instituted with specialities of plastic surgery, anaesthesia, and dental surgery working in close co-operation with the neurosurgeon and the ophthalmic surgeon. Fractures were treated through the advances in intra-oral and extra-oral fixation made, and aided by major advances in technology in the dental laboratory (Rowe,1971). There was also further development of improved

methods for the management of trauma, orthognathic surgery, oncology and teratology. In 1936, the Paris surgeon, GraÃce George Ginestet, developed a method to stabilise lower jaw fractures by means of a fixateur externe. This method was later used for internal fixation for fractures of the upper jaw (Hausamen, 2001). While in 1942, Adams introduced the concept of internal skeletal fixation using subcutaneous suspension wires passed from holes drilled in the zygomatic process of the frontal bone, the inferior orbital rim, or the zygomatic bone, to support either the maxilla or mandible (Rowe, 1971). In 1968, Hans Luhr introduced automatic compression plates for the practice of maxillofacial surgery. Eccentric holes in the plates and the use of screws was paramount as from this evolved the principles of compression plate osteosynthesis. This was later standardised to become a routine treatment for fractures as well as being used in orthognathic surgery, in the treatment of craniofacial malformations and for plastic and reconstructive bone surgery (Luhr, 2000).

During this period, oral surgery was still considered an integral part of medicine (Laskin, 2016). There were also recommendations to abolish the “doctor of dentistry” degree and to expand the dental curriculum to include medical training. In the USA dentists who limited their practice to extractions and the attendant dentoalveolar surgery gained recognition for their skill as oral surgeons. Pressure to increase the medical content of the dental curriculum continued well into the 20th century (Laskin, 2016). In 1946, MFOS discipline was formalised, to become the American Society of Oral Surgeons, and American Board of Oral Surgery. In 1971, a dual degree programme was established by Dr Walter C Guralnick. It was said with the expanded biomedical and clinical curriculum, it enhanced the overall education of MFOS (Donoff and Troulis, 2018). Whereas, in the European Union (EU), MFOS speciality developed from a professional point of view but was only recognized legally in 1989. At that particular time, MFOS was not recognized as an independent speciality in any of the European Union Member States (Peiffer,1996). MFOS managed to assert itself in Europe as a medical specialty due to the stomatology and maxillofacial surgery monospecialist section of the European Union of medical specialists(Peiffer,1996). In 1985 the stomatology and oro-maxillofacial section representatives of EU member states, signed an agreement stating that to practice MFOS in Europe, it was necessary to be both a doctor and a dentist (Peiffer,1996). However, in 1989 the

directive was amended, resulting in two new specialties; maxillofacial surgery for Spain, France and Italy, specialty based on the medical degree, while dental and medical degree were followed by countries such as Germany, Ireland and Belgium (Peiffer,1996).

2.2 Requirements for MFOS training

A review of the different training pathways and requirements revealed that currently there are four systems in place depending on the country or continent, namely those requiring a dental degree only, those requiring both a dental and medical degree, those requiring a medical degree with minimal or no dental training and those requiring a combination of dental and medical education but without any degree-based stomatology (Laskin, 2008).

MFOS has been a dental speciality throughout most countries in the world except in France and Spain where it has always been a medical speciality (Laskin, 2008). In these countries, MFOS is called “stomatology and maxillofacial surgery” and the entrance requirement for the speciality is a medical degree with minimal or no dental training (Kumar, 2017). Countries in which dentistry is currently the only entrance requirement for MFOS training are India, Sri Lanka, Hong Kong, Brazil, Turkey, Nigeria, Japan and Nordic countries; Denmark, Sweden, Norway, Finland and Iceland (Kumar, 2017). Countries that require both a dental and medical degree are the UK, Australia, New Zealand and Germany, while China requires a combination of dental and medical education but without any degree-based stomatology (Laskin, 2008). In Russia MFOS is open to either dental or medical graduates. While in South Africa (SA) training is open to graduates with both a medical and dental degree. However, the dental degree is the primary prerequisite and some institutions recommend a medical degree (Kumar, 2017).

2.3 Controversy with regard to entry requirements

There have been considerable debates and opinions regarding the advantages and disadvantages of a dual degree. The dual degree for the MFOS programme was postulated to be the future of MFOS registrar training in the USA. This was due to a significant increase in the number of dual-degree registrar positions and reduction in the number of single-degree registrar positions (Phan and Davis, 2011). Throughout the past 38 years, considerable debate has ensued within the MFOS community about the need for practitioners to obtain a medical degree (Phan and Davis, 2011).

Participants in a study conducted by Tahim (2015) proudly maintained that a dual degree imparted a trademark that no other member of the healthcare team possessed, although it held limited value as a standout feature within the speciality. There was also a sense that a dual degree created a perceived boundary that prevented other specialities from expanding into regions that might be best served by those with both dental and medical skills. There was also a perception that having both a medical and a dental degree would give trainees a sense of parity with both medical and dental practitioners (Tahim, 2015). Some researchers argue that it is important to recognise the adequacy of dental education as a prerequisite for MFOS specialisation and that subsequent medical training constitutes the essential factor rather than the possession of a medical degree (Laskin, 2008). While the skills of both groups were scrutinised, a study by Herford et al. (2001) deduced that dual-degree surgeons have better and broader surgical skills than single-degree surgeons. However, Kademani (2007) argued that surgical ability does not require dual degree as there are many superb practising surgeons with single degree.

The financial impact that dual training in the UK has on surgeons was found to be a disadvantage, where higher education is no longer free and therefore anyone considering a career in MFOS is likely to accrue considerable debt should they undertake both dental and medical undergraduate courses. While in the USA, Kaban and Perrott (2019) found that the cost of becoming a dual degree surgeon, due to the long training duration, was greater when compared to other dental specialities such

as orthodontist which have high starting salaries. Furthermore, the overall length of training in MFOS is such that they are unlikely ever to recover the loss of earnings that might have accrued were they to go directly into dental practice on graduation (Langdon, 2006).

With these controversies, Laskin (2008) believes that it is impossible for everyone to conform to a single standard and that each group should be recognised for the manner in which they meet the differing needs of their environments. And that, the single degree maxillofacial and oral surgeon rather than the dual degree counterpart will become the dominant specialist in nearest the future. This opinion is based on the fact that single degree maxillofacial and oral surgeons provide those services most needed by the public coupled with the fact that the education and training requires a shorter time period. Thus, they fulfil most of the public needs in a more educationally and economically efficient manner (Laskin, 2008). Moreover, dual-degree surgeons would not wish to undergo such an extensive period of education and training to end up doing the same procedures done by most single degree surgeons (Laskin, 2008). They would prefer to limit their scope to more major procedures such as oncologic surgery, craniofacial surgery, management of congenital anomalies and major reconstructive surgery (Laskin,2008). Fewer patients, however, require extensive operations as listed above rather than those in need of dentoalveolar surgery, dental implants, orthognathic surgery and TMJ problems (Laskin, 2008). Fewer dual degree maxillofacial and oral surgeons will therefore be needed in the long run (Laskin, 2008). While, in SA dually qualified Surgeons, like single qualified surgeons still have to do fellowship in order to perform procedure in the craniofacial surgery and oncologic surgery (University of Pretoria, 2019).

2.4 Length and Structure of the Programmes

Training in MFOS speciality has evolved globally, with different programmes and lengths of training (Kumar, 2017). Initial training in the USA was only for a year prior to the controversy of dual degree. In 1968 the minimum training time was extended

from one to two years. By 1972 this was further extended to three years and eventually to four years in 1983 (Goss and Gerke, 1990). However, in Australia and New Zealand prior to the mid-seventies the young dental graduate usually went to the UK for several years. After completion of a medical degree they received little or no credit for their dental and oral surgery experience, they usually completed the full medical course over at least a 6-year period. Thus the total training time was at least 12 years (Goss and Gerke, 1990). Currently, speciality training in MFOS alone takes four to six years, depending on the country and continent (Kumar, 2017). There are also factors that make other programmes longer, such as the pre-training followed by the UK, as well as rotations in medical/surgical departments, which vary in length (Kumar, 2017).

In the UK, training for MFOS takes approximately 18 years (Kumar, 2017). This is inclusive of a five-year dental degree, followed by two years of general dental training (Manchester University, 2019). Thereafter four to five years as a medical undergraduate and two years of medical foundation (GMC-UK, 2019). Thereafter a one to two-year core surgical training and a pass in the membership of the Royal College of Surgeons examination. An examination is required to progress to five years of specialty training as a specialist registrar. In addition, a pre-certificate of completion of training interface fellowship in aesthetics, cleft lip and palate or head and neck surgery are additional requirements (Garga et al., 2018).

While in France, after eight years of medical training, the registrar must complete training in general and trauma surgery for one year, three years for MFOS and related surgical specialties (such as otorhinolaryngology, plastic surgery, vascular surgery and neurosurgery) for two years. Of interest is that this MFOS training now allows registrars to switch their surgical speciality, for example from plastic surgery to MFOS (Pitak-Arnnop et al., 2010).

In contrast with the rest of Europe, in Nordic countries, such as Denmark, Sweden, Norway, Finland and Iceland, MFOS registrars are required to have a dental degree only (Fiehn,2002). Helsinki University in Finland is the only university that advocates

both dental and medical degrees for a specialist degree in MFOS. Educational activities for specialists are regulated by the national health authorities and the training programmes vary from four to six years (Kumar, 2017).

The training pathway in Hong Kong includes a minimum of six years supervised training in recognised training centres, comprising three years of basic training after the dental degree, followed by another three-year period of advanced training in MFOS (Lau, 2014).

Whereas, in China, the higher education system of stomatology is divided into three different levels, namely a five-, seven- and eight-year undergraduate education system. The five-year education system is based on general oral medicine lessons and a bachelor's degree in oral medicine is granted at the students' graduation. The seven-year education system is a long-term undergraduate education and students in this system are trained as specialists (in areas such as MFOS) and are awarded the degree of Master of Stomatological Medicine after graduation. However, a five-year undergraduates of stomatology can pursue the master's degree in MFOS (Kumar, 2017).

In South Africa, MFOS is a dental speciality, although some institutions recommend dual degree as a minimum requirement for entry into the speciality. The duration of the speciality ranges from four to eight years. For those with dual degrees the speciality takes four years, while those with dental degrees only, the specialty takes four to five years, depending on the institution (University of Pretoria, 2019). One university in SA offers an integrated specialty programme for people with either a medical or a dental degree. For medically trained trainees the integrated programme takes seven years, while for dentally trained trainees it takes eight years (University of Pretoria, 2019). Despite the various entry requirements and differences in the length of the programmes, their surgical content of training is the same (University of Pretoria, 2019).

2.5 Scope of MFOS practice

A three-part model was created by Laskin (2008) presenting what the scope of practice of MFOS should include. These were areas of expertise (oral pathology/oral medicine, dentoalveolar surgery, preprosthetic surgery, implantology, and maxillofacial trauma), areas of competency (TMJ surgery, orthognathic surgery, local reconstructive surgery) and areas of familiarity (cleft lip and palate surgery, regional reconstructive surgery, oncologic surgery, craniofacial surgery and cosmetic surgery). He believed to be considered an oral and maxillofacial surgeon, one needs to include at least the areas of expertise and competence in his or her scope of practice. These areas of practice clearly distinguish the oral and maxillofacial surgeon from the plastic surgeon or the otolaryngologist (Laskin, 2008).

A survey on scope of practice of MFOS revealed that dual degree practice has a broader scope than single degree and that dual degree MFOS overall possessed a higher percentage of a given privilege than the single degree MFOS in all cases (Herford et al., 2001). It is also said that dual degree training programmes are more likely to train registrars in expanded scope procedures, some of the reasons being that there is an educational deficit in MFOS training programmes consisting of insufficient general medical and surgical background, and that this deficiency would best be corrected by obtaining a medical degree and general surgery training (Herford et al., 2001). Goss et al. (1996) argued that countries where dual degree is mandatory have the broadest scope. However, there are a number of countries in which surgeons practice with only the dental degree, such as Japan, where the scope is equally broad (Goss et al.,1996). A comparison of surgical skills between single- and dual-degree surgeons was done by Messiha et al. (2010) who found no significant difference in the proportions of single- versus dual-degree surgeons who were comfortable in dentoalveolar work, pathology, orthognathic surgery and oncology. However, there was a significant difference in the proportions of single- and dual- degree surgeons who were comfortable in performing the implants and reconstructive surgery (Messiha et al.,2010).

Herford et al. (2001) also found that dual degree surgeons with less than six years in practice possessed a greater number of surgical privileges than single degree surgeons; however, both groups still possessed greater surgical privileges than did older surgeons. It was also revealed that MFOS continues to have a high percentage of privileges for traditional procedures (such as trauma, dentoalveolar, pathology) and there has been a significant increase in expanded scope procedures over the past 10 years. Also there has been an increase with respect to cosmetic procedures, such as rhinoplasty and liposuction (Herford et al., 2001).

This suggests that the specialty is expanding its scope while retaining its privileges for traditional procedures (Herford et al., 2001). Although dual degree surgeons are said to possess more privileges, both single- and dual-degree surgeons have experienced increases in surgical privileges. This has led to overall gains and an expanded scope for the specialty as a whole (Laskin, 2008). Of significance is the fact that these dentally-trained surgeons practice the full scope of the specialty, similar to that which occurs in the European nations that require a medical degree (Laskin, 2008).

2.6 Perceptions about the speciality

There is often confusion with regard to which procedures are within the scope of MFOS practice. This is particularly true when discerning between the specialties of otorhinolaryngology, plastic and reconstructive surgery and periodontics because of the overlap in the specialities (Hunter et al., 1996). The procedures exclusively recognised as those within MFOS scope of practice include maxillofacial trauma and the extraction of impacted third molars. Procedures more poorly recognised as being within the realm of the specialty include facial cosmetic procedures, repair of congenital deformities (cleft lip and palate), pathologic conditions of the oral cavity and remaining maxillofacial structures and sinus surgery (Jarosz et al., 2013). Ali et al. (2018) found that medical practitioners would refer a patient to a maxillofacial and oral surgeon for wisdom teeth removal, dental implants and TMJ disorders. However, for cosmetic surgery and cleft lip and palate they would refer to a plastic surgeon. Hunter et al. (1996) found that medical practitioners would expect a maxillofacial and

oral surgeon to treat facial fractures, cleft palate and deformed jaw, an otorhinolaryngologist to treat oral cancer and sinus surgery, a plastic surgeon to treat cleft lip and cosmetic surgery on the face and a periodontist for implants. This has been confirmed by a number of studies done in various countries.

In a study to understand perception of MFOS by healthcare professionals, facial trauma, dentofacial deformities, mandibular reconstruction and TMJ surgery were procedures that respondents indicated that they would consult the MFOS for treatment with a mean rate of 90 percent. In cases of oral biopsy and treatment of benign mandibular tumours, the mean referral rate to MFOS was low at 48 percent. With regard to cosmetic procedures, problems with facial appearance and rhinoplasty, 91 percent of respondents would refer to a plastic surgeon for treatment (Rocha et al., 2008).

In Bangladesh, there was high awareness of the scope of practice of MFOS, by dental professionals and students. The following procedures were correctly allocated by most to be performed by maxillofacial and oral surgeons: wisdom tooth removal (dentoalveolar); fracture of maxilla and mandible (maxillofacial trauma); facial deformity (orthognathic correction); oral cancer (oncology); dental implants; and TMJ disorders. The exceptions were facial laceration and closure of cleft lip and palate, where most participants maintained that they were part of plastic surgeons' scope of practice (Reddy et al., 2011).

While, a study done by Vadepally and Sinha (2018) reveals a similar finding when respondents were asked to indicate who they would expect to treat them should they have one of the specified conditions: wisdom tooth removal; facial cut injuries; facial bone fractures; facial deformities; cleft lip and palate; oral cancer; facial space infections; sinus problems; TMJ; and aesthetic disorders and facial surgery. The majority of the respondents in the group comprising dental specialists, general dentists and dental students agreed that most conditions listed in the questionnaire were within the domain of MFOS, but such response was not seen in the group comprising medical professionals, medical specialists and the general public. A

number of respondents in the latter group nominated other medical specialists for specified conditions. Certain of the respondents in the group comprising medical professionals and medical students chose MFOS for TMJ disorders, but members of the general public would consult family physicians for treatment or for their opinion about whom to refer to for such conditions (Vadepally and Sinha, 2018). This finding suggests that this group lacks awareness of what the scope MFOS entails.

Since there has been significant overlaps and turf conflicts between MFOS and several other surgical specialties (Paul, 2017). Surgical placement of implants, is often considered to be a periodontist speciality and not so much of a maxillofacial and oral surgeon (Jarosz et al., 2013). This was confirmed by dental students in the USA who would refer patients for implant placement 39 percent of the time to a maxillofacial and oral surgeon (Guerrero et al., 2014). Similarly, Jarosz et al. (2013) found that for dental implant placement, dental students elected to refer to a periodontist 59.3 percent of the time and 26.9 percent to a maxillofacial and oral surgeon.

Findings with regard to the perception of MFOS as a medical or dental specialty show that 81 percent believed that an MFOS is both a dentist and a physician. The study concludes that those who believed this did so because they believed medical education was required first or that the dentist needed to obtain a medical degree after dental education (Jarosz et al., 2013). In Hong Kong, 44 percent of medical professionals believe that MFOS is a dental speciality while 39 percent indicated both dentistry and medicine (Lau, 2014).

It is evident from the history of MFOS that most of the developments that contributed to what MFOS is today took place in the 1800s and involved surgeons from all over the world. This process was however not static, it continued well into the WWI, WWII and 20th century. While the controversy about dual degree continue to date, the studies have shown that differences in training existed well before time and were acceptable. And that it is the surgical training in MFOS which qualifies one to become a maxillofacial and oral surgeon in the country regardless of whether one has a

dental, medical or dual degree. Even though MFOS is still considered a new speciality, studies have indicated that there is awareness of the profession and what is entailed in the scope of practice, even though there are overlaps between MFOS and other surgical specialties like plastic surgery, surgical oncology and oral medicine and periodontology. South Africa seems to be following suit of international standards in terms of entry requirements into speciality, with more institutions advocating for a medical degree, however MFOS remains a dental speciality, with a dental degree as a primary prerequisite as requirement into the speciality.

CHAPTER 3: AIM AND OBJECTIVES

3.1 Aim

The aim of the study was to determine whether the current scope of practice of maxillofacial speciality is enhanced by dual qualification.

3.2 Objectives

- To determine the age and gender distribution among qualified maxillofacial surgeons
- To determine the ratio of dually qualified to dentally qualified maxillofacial surgeons
- To determine the common pathway of training of current registrars
- To determine to compare the scope of practice of maxillofacial surgeons who have the two different streams of training
- To determine whether there is association between procedures and type of undergraduate training
- To determine the perceptions of the dental community (dental students, dentists, registrars, maxillofacial surgeons and other dental specialists) towards the two streams of requirements

CHAPTER 4: METHODOLOGY

4.1 Study design and sampling

A cross-sectional study, with convenience sampling was conducted. Sample size of 100 was aimed at, a total number of 147 surgeons based in SA was used to achieve the sample size, this was calculated using software Epi Info 7, at a confidence interval of 95%, expected frequency of 50%, and confidence limit of 5%. In order to obtain a positive response and to achieve the sample size aimed at, 388 study questionnaires were distributed via email and by hand where practical to all 147 maxillofacial and oral surgeons practicing in SA, 26 to maxillofacial and oral surgery registrars in all four training institutions, 6 to registrars in other specialities, 184 to dentists, 5 to other dental specialists and 20 to final-year dental students. Additional data regarding race, gender and number of the maxillofacial and oral surgeons were obtained from the Health Professionals Council of South Africa (HPSCA).

4.2 Study population

Comprised maxillofacial and oral surgeons based in SA. Registrars in MFOS from all training institutions in SA, Johannesburg-based dentists, University of the Witwatersrand dental students, registrars and other dental specialists at the University of the Witwatersrand.

4.3 Data collection

Data was collected over five months, from November 2018 to March 2019. A questionnaire (Appendix A) was compiled consisting of three parts. Part A: participant's demographics (age, gender, race and dental profession), Part B: scope of practice for maxillofacial and oral surgeons and registrars and Part C: perceptions for all participants. The questionnaires were constructed using the attempt to define

the scope of practice by Laskin (2008), which divided the scope of practice of MFOS into three parts: areas of expertise, areas of competence and areas of familiarity. Areas of expertise included oral pathology/oral medicine, dentoalveolar surgery, preprosthetic surgery, implantology and maxillofacial trauma surgery. Areas of competence included TMJ surgery, orthognathic surgery and local reconstructive surgery. Area of familiarity included cleft lip and palate surgery, regional reconstructive surgery, oncologic surgery, craniofacial surgery and cosmetic surgery. The questionnaires were sent via email and by hand to the registered maxillofacial and oral surgeons and registrars to determine the scope of practice. Questionnaires (Appendix A) were distributed via email and by hand to dentists, dental students, dental specialists, registrars and maxillofacial and oral surgeons in order to understand their perceptions. Data which include number of registered surgeons, gender and race of maxillofacial and oral surgeons were obtained from the HPCSA.

4.4 Inclusion criteria

- Maxillofacial and oral surgeons based in SA. Registrars in MFOS from all training institutions in SA
- Johannesburg-based dentists
- University of the Witwatersrand dental students, registrars and specialists.

4.5 Exclusion criteria

- Maxillofacial and oral surgeons practicing outside South Africa
- Dentists outside Johannesburg.

4.6 Data Analysis

Data were captured using excel and exported to Stata software, version 15. Analysis of data was performed using Fisher exact test to assess association of procedures

performed by surgeons and registrars, and Cohen's kappa coefficient to assess agreement of the scope of practice of surgeons with that of registrars, and perceptions by the dental community.

4.7 Ethical considerations

Ethical clearance certificate M180702 (Appendix B) was obtained from the Human Research Ethics Committee of the University of the Witwatersrand, Johannesburg. Permission (Appendix C) was obtained from the CEO of the School of Oral Health Sciences to conduct research at the school. Participation was voluntary and confidentiality was preserved as participants were not requested to give their name, HPCSA and identity number, contact and practice location details.

4.8 Limitations of the study

There was, unfortunately, a poor response rate from the maxillofacial and oral surgeons who were requested to participate in the study.

CHAPTER 5: RESULTS

5.1 Ratio and demographics of MFOS

According to the HPCSA, there are 155 qualified registered maxillofacial and oral surgeons;147 are based in SA, while 8 practice outside SA. Of the 147 surgeons based in SA, 16 are dual qualified and 131 are single qualified. Ratio of single-qualified to dual-qualified surgeons is 8.2:1.

The majority of the maxillofacial and oral surgeons (133) are males (90.5%) and 14 are females (9.5%). Racial distribution for males is as follows: 77 Whites (57.9 %), 26 Indians (19.5%), 11 Africans (8.2%), 8 Coloureds (6%) and 11 unknowns (8.2%). Of the 14 females (9%) were made up of 7 Whites (4.5%), 3 Africans (2%), 2 Indians (2%),1 Coloured (0,6%) and 1 unknown (0.6%).

In this study of the 17 maxillofacial and oral surgeon responded, 15 were male (88.2%) and 2 females (11.8%). The racial distribution for males is as follows: 6 African (40%), 6 Whites (40%), 1Coloured (6.6%), 1 Indian (6.6%) and 1 unknown (6.6%). Of the 2 females (11.8%) both were African (100%).

5.2 Study population

Questionnaires were sent via email to 144 maxillofacial and oral surgeons practicing in SA and three copies were hand-delivered. Of the 144 sent via email, 85 were undelivered and 59 were delivered, with only 14 completed and returned via email. Resulting in only 17 questionnaires being completed and returned, 14 via email, and three by hand with a response rate of 28.8 percent. Sixteen of these respondents had a dental degree only while one respondent had both dentistry and medicine as an undergraduate qualification. The number of years in practice ranged from 6 months to 30 years, the mean being 11.3. The respondents practice setting was as

follows: one in public sector, 6 in private sector and 10 in both public and private sectors**.**

A total of 11 MFOS registrars responded. All 11 had a dental degree as their undergraduate qualification from two training institutions. Their year of study ranged from first to fourth year.

Therefore, a total of 103 dental professionals and students completed and returned the questionnaire. These respondents consisted of 19 dental specialists including maxillofacial and oral surgeons (18%), 55 dentists (53%), 16 registrars including MFOS registrars (16%) and 13 final year dental students (13%).

5.3 Scope of practice of MFOS

Maxillofacial and oral surgeons were asked about the procedures they perform. Sixteen of the seventeen respondents completed this section. One respondent failed to indicate the type of procedures performed while some participants left certain fields blank. However, all sixteen respondents indicated that they perform maxillofacial trauma, while very few perform oncologic surgery (Table 5.1).

Table 5.1 Procedures performed by maxillofacial and oral surgeons

	Dual		Single	
	Yes	No	Yes	No
Maxillofacial trauma	1		15	
Preprosthetic surgery		1	12	1
Oral pathology/ oral medicine		1	13	
Dentoalveolar surgery	1		14	
Dental implants	1		13	1
Local reconstructive surgery	1		12	
Temporomandibular joint surgery	1		12	1
Orthognathic surgery	1		11	
Regional reconstructive surgery	1		7	4
Cleft lip and palate surgery		1	4	8
Oncologic surgery	1		2	9
Craniofacial surgery		1	5	5
Cosmetic surgery	1		5	8
Others - Cone beam imaging - Orthognathic surgery with Le Fort III, Pyramidal Le Fort II and quadrangular midfacial reconstruction			1 1	

Fisher exact test revealed that procedures strongly associated with single degree surgeons were maxillofacial trauma, preprosthetic surgery, oral pathology/ oral

medicine, dentoalveolar surgery, dental implants, local reconstructive surgery, temporomandibular joint surgery and orthognathic surgery with p = 0,034.

Maxillofacial and oral surgeons were asked to specify other procedures that they performed. These were cone-beam imaging, orthognathic surgery with Le Fort III, Pyramidal Le Fort II and quadrangular midface reconstruction. Some cited no personal interest and on the questionnaire against procedures, they indicated “no”.

5.4 Exposure of registrars to scope of practice

MFOS registrars were requested to specify the procedures to which they had exposure. All participants from both institutions agreed that maxillofacial trauma, oral pathology/oral medicine and dentoalveolar surgery were procedures to which they were exposed the most. Procedures with the lowest number were cosmetic surgery (three), oncologic surgery (six) and craniofacial surgery (six) (Figure 5.1).

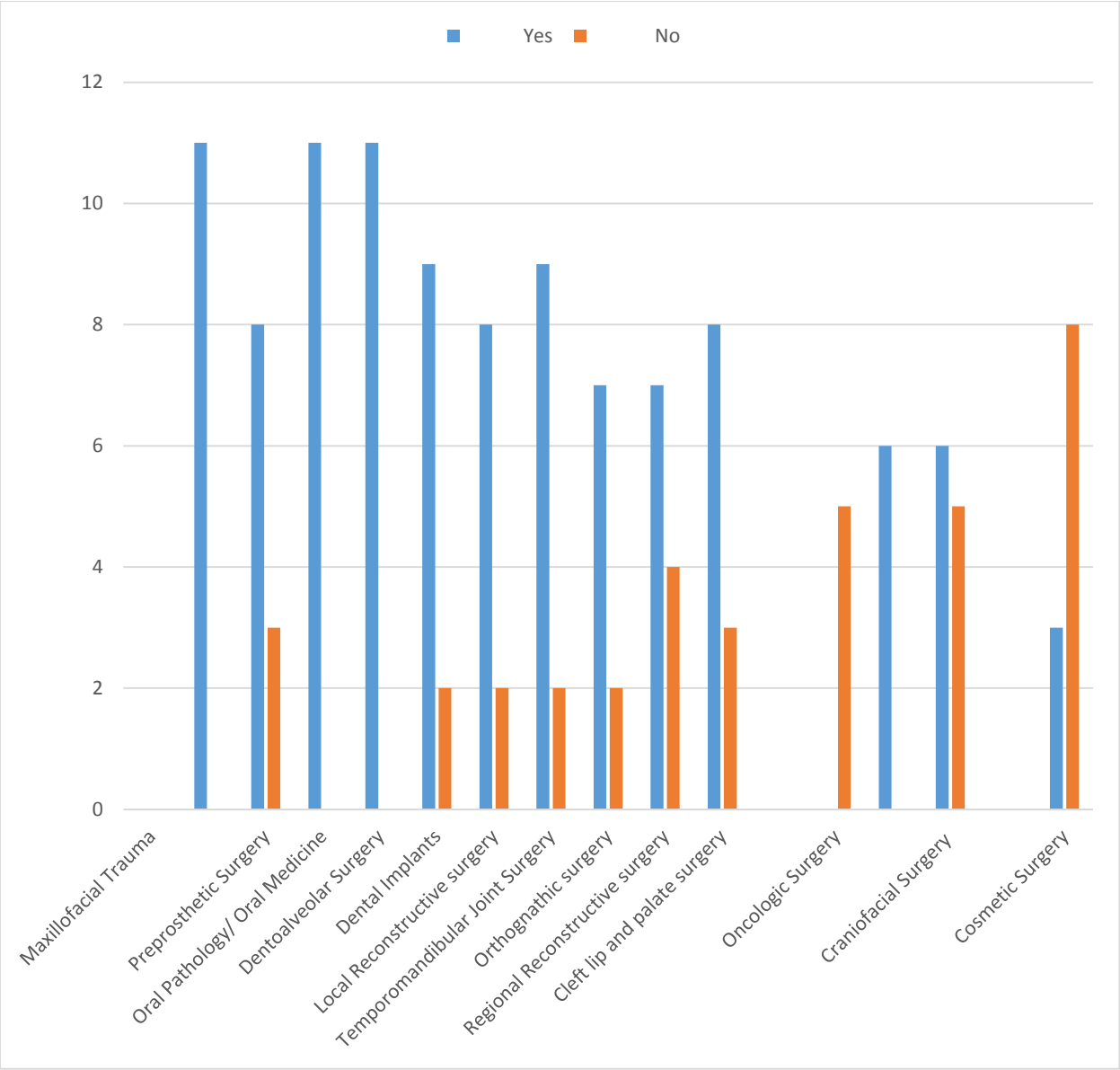

Figure 5.1 Procedures done by MFOS registrars

Fisher exact test revealed that there was association of statistical significance with p=0.037 between the following procedures performed by registrars, namely dentoalveolar surgery, maxillofacial trauma and oral pathology/medicine.

5.5 Perceptions of the dental community

The dental professionals were further asked if they thought SA needed MFOS as a speciality of the 103 participants, 94 completed this part. All 94 (100%) respondents agreed.

The participants were asked to indicate for which procedures maxillofacial surgeons were needed the most/least. Of the 103 who participated in this study, 101 completed this section. There were variations in the number of respondents to certain questions as some left the fields blank. A high number of respondents agreed that maxillofacial and oral surgeons were most needed for maxillofacial trauma 101 (100%), cleft lip/palate surgery 87 (91%) and TMJ surgery 85 (88%), the lowest being cosmetic surgery 35 (36%) and dental implants 50 (52%) (Figure 5.2).

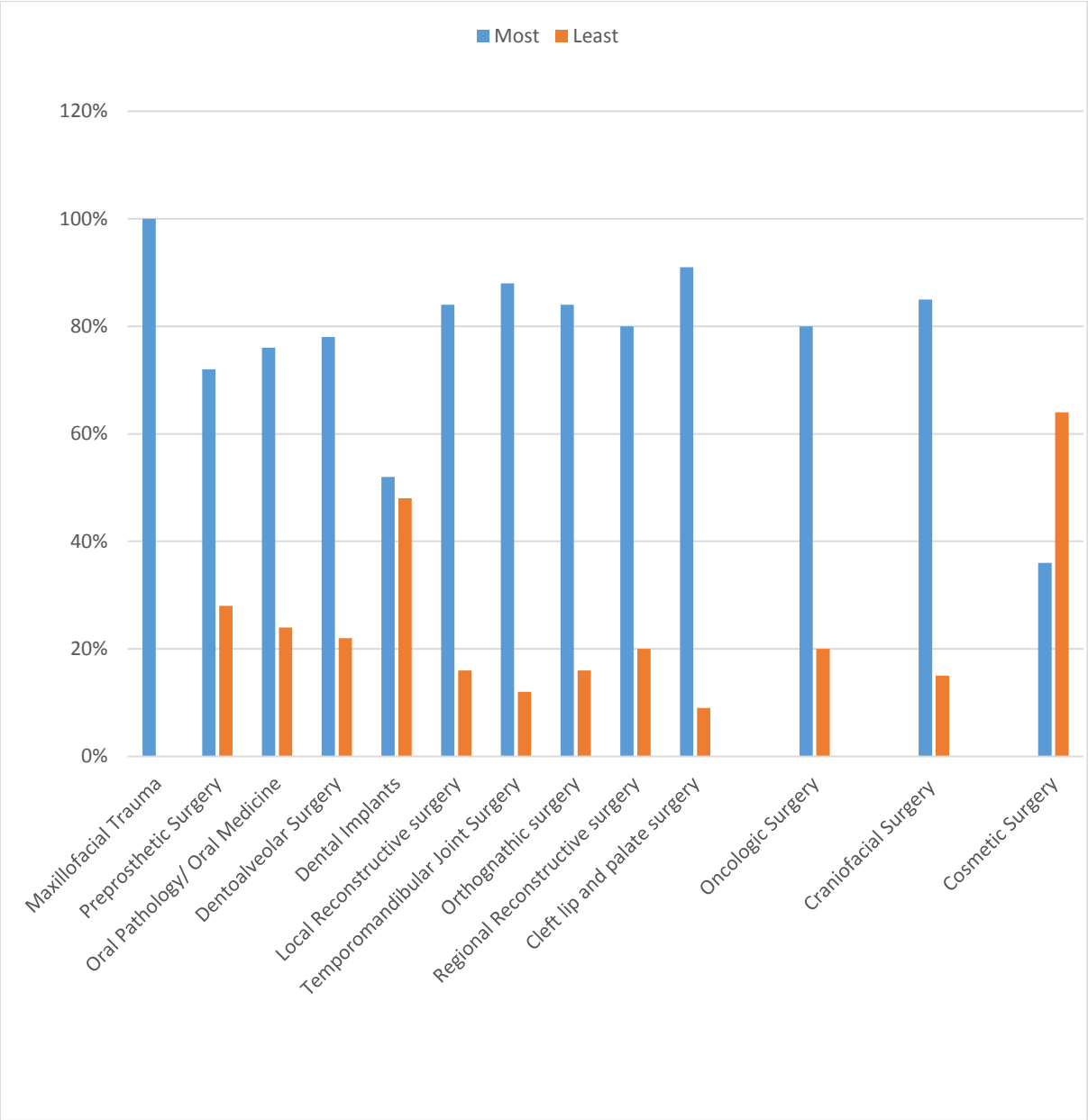

Figure 5.2 Perceptions of whether certain procedures are performed most/least by MFOS

According to Fisher exact test there was statistically significant association between procedures performed by maxillofacial surgeons and that perceived by the dental community; for the following procedures namely preprosthetic surgery, dental implants and craniofacial surgery with p= 0.02, 0.004 and 0.011 respectively.

Participants were asked what they thought entrance into MFOS should be. According to 60 (59.41%) of dental professionals, dentistry only should be the entry requirement into the speciality while 41 (40.59%) said that both medicine and dentistry should be the entry requirement (Figure 5.3).

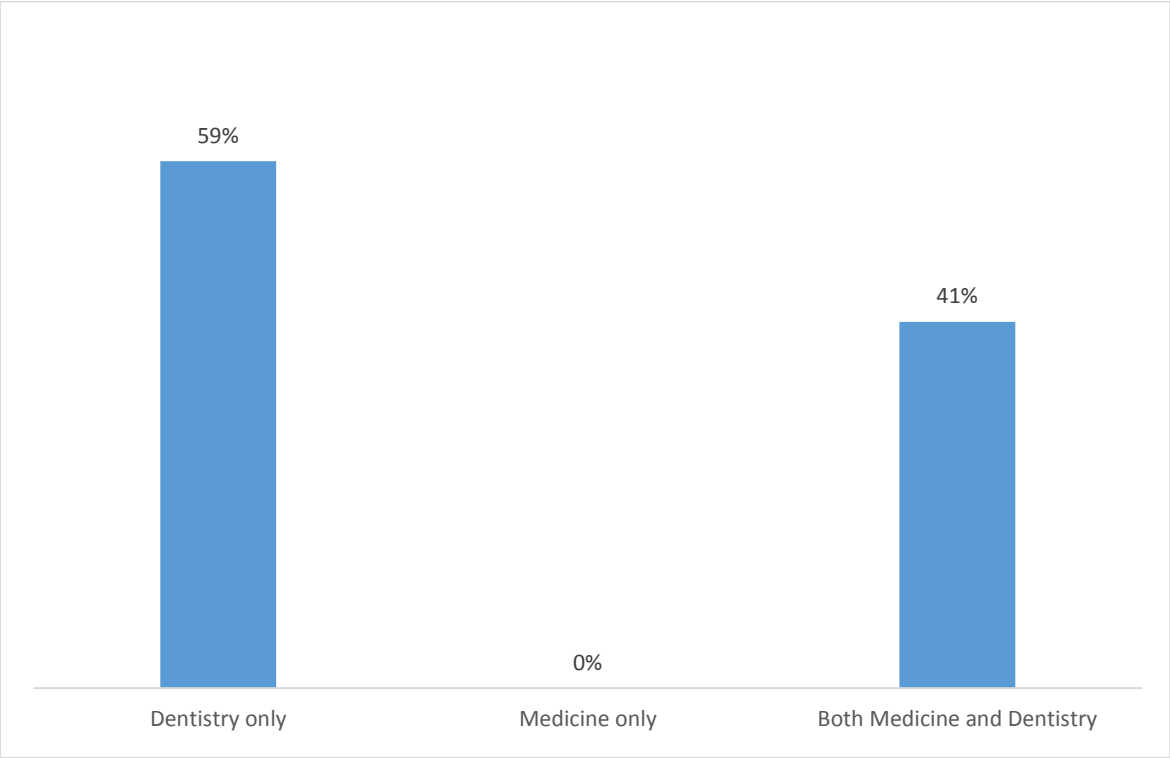

Figure 5.3 Perceptions on entry requirement into MFOS speciality

5.6 Perception of the dental community on the scope of practice of surgeons.

Cohen's kappa coefficient was used to measure whether the scope of practice of surgeons was in agreement with perceptions of the dental community. (Table 5.2).

Table 5.2 Scope of practice of surgeons' vs perceptions of the dental community

Procedures	Kappa rating
Maxillofacial trauma	1.0000
Preprosthetic surgery	0.7409
Oral pathology/oral medicine	0.9453
Dentoalveolar surgery	0.9005
Dental implants	0.6773
Local reconstructive surgery	0.7864
Temporomandibular joint surgery	0.7340
Orthognathic surgery	0.6571
Regional reconstructive surgery	0.5730
Cleft lip and palate surgery	0.5366
Oncologic surgery	0.4211
Craniofacial surgery	0.4423
Cosmetic surgery	0.3951

5.7 Assessing the exposure of registrars and scope of practice of the surgeons

There was almost perfect agreement with the following procedures: maxillofacial trauma, dentoalveolar surgery, dental Implants, local reconstructive surgery and temporomandibular joint surgery. There was moderate agreement with regional reconstructive surgery, cleft lip and palate surgery, oncologic surgery, craniofacial surgery and cosmetic surgery. There was almost perfect agreement with the following areas of expertise: maxillofacial trauma, oral pathology/ medicine and dentoalveolar surgery, while there was fair to moderate agreement with areas of competency, oncologic, craniofacial and cosmetic surgery (Table 5.3).

Table 5.3 Scope of practice of surgeons' vs exposure scope of practice to registrars

Procedures	Kappa rating
Maxillofacial trauma	1.0000
Preprosthetic surgery	0.6629
Oral pathology/oral medicine	1.0000
Dentoalveolar surgery	1.0000
Dental implants	0.8415
Local reconstructive surgery	0.9074
Temporomandibular joint surgery	0.8415
Orthognathic surgery	0.7037
Regional reconstructive surgery	0.5797
Cleft lip and palate surgery	0.5575
Oncologic surgery	0.5043
Craniofacial surgery	0.6052
Cosmetic surgery	0.4118

CHAPTER 6: DISCUSSION AND CONCLUSION

6.1 Discussion

According to the HPCSA, there are 155 registered maxillofacial and oral surgeons, 147 of whom practice in SA with 8 practicing outside SA (HPCSA, 2019). These service a population of 55.7 million (Statistics South Africa, 2016) giving a ratio of surgeons to population of 1:378 911. This compares favourably with a study from Nepal where there are 75 maxillofacial and oral surgeons (Shrestha et al., 2017). The population being 29.9 million according to Worldmeters (2019), gives ratio of surgeons to population of 1:398 666. When compared to countries such as the UK where there are 1400 surgeons for a population of 66.04 million, this gives a ratio of 1:47 717 (British association of Oral and Maxillofacial Surgeons, 2019). Australia with 185 surgeons and a population of 22.7 million, a ratio of 1:122 702 (Goss and Linn, 2018). Both SA and Nepal are developing countries, with similar ratios, while the UK and Australia are developed countries. The reason for the huge ratio margins could be attributed to the fact that developed countries generally have a stronger economy which automatically provides these countries with better resources, more training institutions and quality education.

SA has 131 single-qualified surgeons and 16 dual-qualified surgeons giving a ratio of 8.2:1. While in the USA, the number of single-qualified surgeons is 6500 against 3080 dual-qualified ones giving a ratio of 2.1:1 (AAOMS, 2019). The major difference in the ratios is due to the fact that the USA has a high intake of registrars who have dual degrees. Also there are far more training institutions than in SA. These surgeons comprise both genders although most medical specialities are male dominated. This though is no different from the MFOS speciality; in SA of the 147 surgeons 14 are females according to the HPSCA. A similar trend in the USA, indicated by the American Association of Oral and Maxillofacial Surgery membership directory in 2015, shows only 422 females of the 6 374 active members (Rosemont, 2015).

All registrars who participated in this study have a dental degree only. Similarly, in the USA, the majority of registrars have a dental degree only. The trends differ in the UK, where both a dental and a medical degree are a requirement, whereas in France to obtain a degree in MFOS and stomatology, a candidate should have completed a medical degree (Kumar, 2017). This controversy around the entrance requirements into MFOS has been ongoing for years. According to Laskin (2008), entrance into MFOS requires one of the following, a dental degree only, both a dental and a medical degree, a medical degree and no or minimal dental training and a combination of dental and medical education without degree-based stomatology. However, many are of the notion that both dental and medical degrees should be the ultimate, with the belief that this will offer surgeons more surgical privileges and a broader scope of practice than a dental degree only (Herford et al., 2001). Other researchers believe that surgical training offers better surgical privileges rather than a particular type of undergraduate training (Kamedani, 2007).

Since different entry requirements exist, there are also variations in length and structure of programmes. In SA, training takes four to eight years, depending on the institution and undergraduate qualification. This is followed by one-year rotation in departments like surgery and its subdivisions, neurosurgery, ophthalmology, otorhinolaryngology, oral pathology and family medicine (University of Pretoria, 2019). Similarly, training in France requires completion of eight years of a medical degree followed by five years of specialty training in MFOS. Unlike SA, the rotation in related surgical specialties (such as ENT, plastic surgery, vascular surgery, neurosurgery) is of two years' duration (Pitak-Arnnop et al., 2010). This suggests that the major difference between MFOS programme in SA and France are years of rotation in other surgical disciplines which is one and two years. The second difference between SA and France are entry requirements which is dentistry and medicine respectively. In the UK, training takes approximately 18 years, including undergraduate degrees and MFOS training, with a three-year rotation in other surgical departments (Kumar, 2017). Of interest, is that even the South African Universities that offer different MFOS programmes based entry criteria, have the same curriculum for training MFOS specialist.

Regarding the scope of practice in this study, a high number of MFOS registrars were exposed to maxillofacial trauma, oral pathology/oral medicine, dental implants and dentoalveolar surgery (Figure 5.1). This trend was also noted in the USA, where single degree registrars were exposed mainly to maxillofacial trauma, oral pathology/oral medicine, dentoalveolar surgery and dental implants (Lew, 2013). In the case of surgeons, maxillofacial trauma, oral pathology/oral medicine, dentoalveolar surgery and dental implants are procedures that a high number of surgeons were shown to practice. This finding concurs with a study in Nepal where the scope of practice also revealed that traumatology, dentoalveolar surgery and pathology were procedures most practiced by surgeons (Yadav, 2019). While a study looking at the workforce and scope of practice of Australasia surgeons who have dual degrees showed that procedures practiced the most were also trauma, dental implants and dentoalveolar surgery (Ricciardo, 2011).

This result was also consistent with some of the findings where single- and dual-degree members of the oral surgery register in London were surveyed and a self-assessment of their surgical competencies was requested (Messiha et al., 2010). There was no significant difference in the proportions of single versus dual degree surgeons who were comfortable in performing trauma and dentoalveolar work (Messiha et al.,2010). This was confirmed by Rogers and Lowe (2011), where in the UK majority of maxillofacial and oral surgeons perform dentoalveolar surgery, trauma and oral medicine procedures. The finding of maxillofacial trauma being practiced the most in this study concurs with a study in Nigeria, while in contrast to this study dental implants were least practiced (Akinmoladun et al., 2019). High cost of implants was cited as the reason why dental implants were least performed. Contrary to this study, maxillofacial trauma and pathology were least performed in Brazil, where orthognathic surgery was most performed (Bezerra et al., 2011). Islam et al., (2016) observed that in Bangladesh oncology was mainly performed. These differences in procedures commonly performed is likely to be influenced by treatment demands that informs the exposure.

Kappa coefficient test (Table 5.3) further confirmed that there was agreement between the specific procedures performed by maxillofacial and oral surgeons and

registrars. This finding suggests similar training pathway and that the same areas of expertise are mainly practised.

The findings in this study with respect to perceptions in the dental community (Figure 5.2) about the areas of expertise, resonate somewhat with the findings of registrars and surgeons. A high number of participants agreed that MFOS was most needed for maxillofacial trauma and dentoalveolar surgery. The same was found in awareness levels of these specified conditions, which were high for wisdom tooth removal (dentoalveolar) and facial bone fractures (maxillofacial trauma) by healthcare professionals and students (Vadepally and Sinha, 2018). The above studies suggest that most procedures in the areas of expertise as described by Laskin (2008) are practised by MFOS in most countries irrespective of undergraduate training.

Kappa coefficient confirmed that the dental community understands what the scope of MFOS entails (Table 5.2). This was revealed through agreement between these specific procedures of maxillofacial trauma, oral pathology/ medicine and dentoalveolar surgery. However, with regard to dental implants the agreement was low. This could be attributed to the fact that dental implants fall within the scope of practice of periodontists as well. Therefore, as alluded to in the literature, most referrals would be to a periodontist for implant placement rather than to a maxillofacial and oral surgeon.

MFOS was shown to be most needed by 52 percent of the dental community for dental implants in this study. A study by Rastogi et al. (2008) on awareness level of MFOS by health professionals, found that 100 percent of the participants agreed that dental implants were within the scope of MFOS, contradictory to the findings of this study. Perceptions about dental implants were quite low in comparison to other procedures in the area of expertise. This could be attributed to the fact that the MFOS speciality shares this scope of practice with periodontists. Secondly, dentists in SA also have the opportunity to practice implant placement through implantology courses that are offered by some universities, dental companies and other institutions.

Registrars also indicated that they practise or have moderate exposure to TMJ and orthognathic surgery (Figure 5.1). These were high in comparison to other countries such as the USA according to Lew (2013) where, in contrast to this study, TMJ and orthognathic surgery were amongst the least performed by registrars. This was accredited to the fact that cases available to train registrars in these key areas are found to be declining (Bell, 2016). This suggests that moving forward there will be a reduction of the number of surgeons able to perform these procedures due to lack of training. While many surgeons practice TMJ and orthognathic surgery, these procedures were least performed according to this study. This finding was in agreement with practice activity trends of MFOS in Australia. It was revealed that the main areas of practice were orthognathic; an increase in this service was also noted from 1990 to 2000 with an increase in the number of dual degree surgeons (Brennan et al., 2004). The same was echoed by Messiha et al. (2010), where they attributed the type of qualification to be a factor in those procedures practised. Dual-degree surgeons were found to be more comfortable specifically in the areas of orthognathic surgery than single-degree surgeons. However, Bezerra et al. (2011) found that orthognathic surgery was the most practised procedure in Brazil in contrast to this study, TMJ surgery being least performed. In Nepal, five of the 34 surgeons who participated in a study practiced TMJ and orthognathic surgery (Yadav, 2019). This finding suggests that there might be less demand for these procedures or a lack of training in Nepal, since these are subspecialties in MFOS which require further training.

Perceptions with regard to these procedures were shown in this study to be in agreement with the findings of registrars and surgeons. TMJ surgery and orthognathic surgery were procedures that most needed a maxillofacial and oral surgeons according to the dental community (Figure 5.2). This finding concurs with Vadepally & Sinha (2018) where perceptions of maxillofacial and oral surgery by healthcare professionals, students and general public were investigated. Awareness levels of the MFOS specified conditions were assessed and were high for TMJ surgery. A similar finding was also observed in Bangladesh where 94 percent of dental students and dentists opted for MFOS for TMJ surgery and 96 percent for orthognathic surgery. It was found that MFOS was replacing plastic surgery (Reddy et al., 2011). In contrast to this study, Almutairi et al. (2019) found that 30% of dental

personnel maintained that orthognathic surgery was the procedure least performed by MFOS.

While the findings of this study suggest that oncology, cosmetic, craniofacial and cleft lip and palate surgery were the least practiced procedures by registrars and surgeons, Bell (2016) found that there has been a decline in cases available for craniofacial and cleft lip and palate surgery over the years, resulting in registrars having limited training and exposure. However, there has been an increase in oncologic cases. This result also concurs with a study in Nepal where of the 34 participants, cleft lip and palate surgery were practised by five and oncology by seven surgeons (Yadav, 2019). The same finding was also observed by Ricciardo (2011) where a study on workforce of Australasia found that surgeons were least involved in craniofacial and cleft lip and palate surgery, but were mostly involved in oncology in contrast to this study (Ricciardo, 2011). In Bangladesh, oncology was the most performed procedure in contrast to this study (Islam et al., 2016). Kappa coefficient (Table 5.4) was in agreement with these findings as there was moderate agreement and substantial agreement with regards to these procedures. The reason for this finding could be that registrars may not have been exposed to these procedures despite the fact that they are performed by a number of surgeons.

In accordance with this study, perceptions with regard to the procedures that most needed a maxillofacial and oral surgeon according to the dental community was oncologic surgery, the lowest being cosmetic surgery. This finding is consistent with the study of Vadepally and Sinha (2018), where healthcare professionals and students decided that (oncologic) oral cancer surgery (88%) should be a procedure most performed by maxillofacial and oral surgeons. Whereas, a study by Rastogi et al. (2008), showed that 52% of healthcare workers seemed to prefer a maxillofacial and oral surgeon for oncologic surgery. Also contrary to this study, (cosmetic) aesthetic facial surgery was said by healthcare professionals to be mainly performed by maxillofacial and oral surgeons (71%) (Vadepally and Sinha, 2018). Kappa coefficient echoed the finding of this study where there was fair agreement with cosmetic surgery and moderate agreement with oncologic surgery. Literature

suggests that these procedures are associated with other specialities such as plastic surgeons, this could be the reason for this finding.

Areas of familiarity and competence that constitute sub-specialties of MFOS require further training in order to practice them successfully regardless of undergraduate qualification. From this study, reasons as to why there is less involvement are unknown, although a few participants cited lack of interest next to procedures they did not perform. In relation to other countries, lack of training/ facilities has been cited. Of interest is the finding by Bell (2016) that a decline in these cases is directly related to less training and practice of these procedures. Worth noting is the fact that although these procedures are said to performed best by dual degree surgeons, countries such as Bangladesh and Brazil, which have predominately single degree surgeons have been shown largely to practise procedures in these areas.

Participants in this study were asked what they thought the entry requirement for MFOS should be, most were in favour of dentistry only, followed by dentistry and medicine. This is an alarming finding, since MFOS has always been a dental speciality in SA. However, a study by Jarosz et al. (2013) found that 81 percent believed that MFOS should be a speciality involving both medicine and dentistry.

6.2 Conclusion

Due to a small sample size and poor response rate from the maxillofacial and oral surgeons who were requested to participate in the study, one of the objectives was not met, namely a comparison between the scope of practice of dual- and single-qualified surgeons. Therefore, the results were not conclusive to determine whether the current scope of practice of maxillofacial speciality is enhanced by dual qualification. While the finding of this study suggest that the speciality is dominated by males, this was also confirmed by the data obtained from the HPCSA. Although the entry requirements and length of training for an MFOS speciality differ globally, it is evident from this study that MFOS is still predominantly a dental speciality, with a majority of surgeons and registrars holding dental degrees only. The study also suggests that a broad scope of practice is performed by the surgeons even though the numbers were low, in the areas of familiarity. This can be due to a number reasons, such as needs of communities and personal interests of surgeons rather than the type of undergraduate qualification.

The scope of practice of registrars suggested that an expanded scope is being taught during the MFOS training programme. This was indicated by means of the statistical agreement between procedures performed by surgeons and registrars. It was also indicative of the types of procedures that are predominantly performed in the country. The results of this survey also demonstrated high awareness and understanding by the dental community of what the scope of practice of MFOS entails. This will ensure correct and swift referrals.

6.3 Recommendations

It is recommended that a further study be conducted to understand the procedures performed by oral and maxillofacial surgeons utilising a considerably larger sample size.

REFERENCES

Akinmoladun, V.I., Gbolahan, O.O., Akadiri, O.A., et al. (2019). Evaluation of the scope and practice of oral and maxillofacial surgery in Nigeria. *J Clin Prac*.18 (2), p. 282-286.

Ali, F.M., Al-Iryani, G.M., Namis, S.M., et al. (2018). Knowledge and awareness of medical practitioners of Jazan city towards oral and maxillofacial surgery as a specialty. *J Med Sci*. 6(3), p. 588-591.

Almutairi, I. A., AlQarni, A. A., Alharbi, M., et al. (2019). Dental students' perceptions of oral and maxillofacial surgery as a specialty*. IJMDC*. 3(3), p. 266-271.

American Association of Oral and Maxillofacial Surgeons, 2017. <http://www.aaoms.org.>. Accessed 12 May 2019

Bell, R.B. (2016). Infinite cornucopia: The future of education and training in oral and maxillofacial surgery. *J Maxillofac Oral Surg*. 121(5), p. 447-9.

Bezerra, F.M., Avelar, R.L., de Oliveira, R.B., et al. (2001). Assessment of the oral and maxillofacial surgery service in a teaching hospital in Brazil*. J Craniofac Surg*. 22(1), p 50-53.

Brennan, D.S., Spencer, A.J., Singh, D.N., et al. (2004). Service provision by patient and visit characteristics in Australian oral and maxillofacial surgery:1990 to 2000. *Int J Oral Maxillofac Surg* .4(37), p.1-7.

British association of Oral and Maxillofacial Surgeons/workforce. < http ://www.baoms.org.uk>. Accessed 12 May 2019.06.16

Densham, A. (1909). A review of the progress of dental science and literature from the earliest ages. *Proc R Soc Med* .2, p.71-98.

Fiehn, N.E. (2002). Perspectives on dental education in the Nordic countries*. J Dent Educ*. 66(12), p. 1374-1380.

Garga, M., Collyera, J. and Dhariwal, D. (2018). Run-through training at specialist training year 1 and uncoupled core surgical training for oral and maxillofacial surgery in the United Kingdom: a snapshot survey. *Br J Oral Maxillofac Surg* .56, p. 327–331.

GMC (2017) < http://www.gmc-uk.org> Accessed 29 June 2019

Goss, A.N and Gerke, D.C.(1990). Effect of training on the scope of oral and maxillofacial surgery*. Int J Oral Maxillofac Surg* .19(3), p. 184-9.

Goss, A.N., Helfrick, J.F., Szuster, F.S., et al. (1996). The training and surgical scope of oral and maxillofacial surgeons: The International Survey 1. *Int J Oral Maxillofac Surg* .25(1), p. 74-80.

Kaban, L.B and Perrott, D.H.(2019). Dual-degree Oral and Maxillofacial Surgery Training in the United States: ‘‘Back to the Future”. *J Oral Maxillofac Surg.* 78, p.18-28

Goss, A.N. and Linn, R. (2018). Extractions to reconstruction: The development of Oral & Maxillofacial Surgery in Australia and New Zealand. *Aust Dent J*. 63:(1), p. 4–10.

Guerrero, A.V., Altamirano, A., Brown, E., et al., (2014). what is in a name? oral and maxillofacial surgeon versus oral surgeon. *J Oral Maxillofac Surg* .72(1), p. 8-18.

Haider, S.M. and Latif, W. (2018). Oral & Maxillofacial Surgery; A historical review of the development of the surgical discipline. *Int J Surg*.55, p. 224-226.

Hausamen, J.E. (2001). The scientific development of maxillofacial surgery in the 20th century and an outlook into the future. *J Craniomaxillofac Surg* .29(1), p 2-21.

Health Professional Council of South Africa, iRegister <http://www.hpcsa.co.za> Accessed 3 March 2019

Herford, A.S., Pulsipher, A. and Sinn, D.P. (2001). Integration of the medical degree in Oral and Maxillofacial Surgery: A 10-year follow-up. *J Oral Maxillofac Surg.* 59, p. 1471-147.

Hunter, M.J., Tanios, B., and Lynda, R. (1996). Recognition of the scope of oral and maxillofacial surgery by the public and health care professionals. *J Oral Maxillofac Surg* .54(10), p. 1227–32.

Hussey, K.D. (2014). British dental surgery and the first World War: the treatment of facial and jaw injuries from the battlefield to home front. *Br Dent J.* 217, p. 597-600.

Islam, A., Haider, I.R., Uzzaman, H., et al. (2016). One-year audit of in-patient department of oral and maxillofacial surgery, Dhaka Dental College Hospital. *J Maxillofac Oral Surg*. 15(2), 229–235.

Jarosz, K.F., Ziccardi, V.B., Aziz, S.R., et al. (2013). dental student perceptions of oral and maxillofacial Surgery as a Specialty. *J Oral Maxillofac Surg* 71, p. 965-973.

Kademani, D. (2007). The medical degree: Impact on the clinical scope of practice. *J Oral Maxillofac Surg* 65, 153-155.

Kumar, S. (2017). Training pathways in oral and maxillofacial surgery across the globe—A Mini Review. *J Maxillofac Oral Surg* .16(3), p. 269- 276.

Langdon, J.D. (2006). Training for oral and maxillofacial surgery, academic oral surgery, and surgical dentistry in the United Kingdom. *J Oral Maxillofac Surg*. 64, p.1803-1806.

Laskin, D.M. (2008). The past, present, and future of oral and maxillofacial surgery. *J Oral Maxillofac Surg* 66, 1037-1040.

Laskin, D.M. (2016). Oral and maxillofacial surgery: The mystery behind the history. *J Oral Maxillofac Surg Med Pathol* 460, p1-4.

Lau, L.S. (2014). Do you think they know About Us? Oral and Maxillofacial Surgery in Hong Kong. *J. Dent Health Oral Disord. Ther.* (1)2, p 44-47.

Lew, D. (2013). Historical review of American Association of Oral and Maxillofacial Surgeons < http ://www.aaoms.org.> Accessed 12 May 2019

Luhr, H.G. (2000) The development of modern osteosynthesis. *Mund-Kiefer-Gesichtschir* .4, p. 84-90.

Manchester University <http://www.manchester.ac.uk> Accessed 29 June 2019

Messiha, A., Chadha, A., AI-Hadad., et al. (2010). A survey of self-assessed surgical competencies with respect to qualifications, training and working patterns of members on the oral surgery register. *Br Dent J* .208 (2), p. 65–69.

Nayak, K. (2011). Oral and maxillofacial surgery: It's future as a specialty. *J Maxillofac. Oral Surg*. 10(4), p. 281–282

Paul, G. (2017). The future of maxillofacial surgery as a specialty of dentistry. *J Maxillofac. Oral Surg* .16(1), P. 1–2

Phan, T and Davis, J.M. (2011). Demand for single- and dual-degree in oral and maxillofacial surgery residency positions. *J Oral Maxillofac Surg* .69, p. 242-247.

Peiffer, R.J. (1996). The development of the specialty of Oral and Maxillofacial Surgery in the European Union. J Craniomaxillofac Surg .24, p.193 -194

Pitak-Arnnop, P., Bauer, U., Chaine, A., et al. (2010). The past, present, and future of oral and maxillofacial surgery—some details in Europe. *J Oral Maxillofac Surg*. 68, p. 491–494.

Rocha, N.S., Laureano, F.JR., Silva, E.D., et al. (2008). Perception of oral maxillofacial surgery by health-care professionals. *Int J Oral Maxillofac Surg*. 37(1), p. 41-6.

Rastogi, S., Dhawan., V and Modi, M. (2008). Awareness of oral and maxillofacial surgery among –health care professionals – A cross sectional study. *J. Clin. Diagn. Res*. 2(6), p.1191-1195.

Reddy, K., Adalarasan, S., Mohan S., et al. (2011). Are people aware of oral and maxillofacial surgery in India? *J Maxillofac Oral Surg*.10(3), p.85–189.

Ricciardo, P., Bobinskas, P.A., Vujcich, A., et al. (2015). Survey of Australasian oral and maxillofacial surgeons 2011—scope and workforce issues. *Int. J. Oral Maxillofac. Surg*. 44, p 1569–1573.

Rittersma, J. (1988). The dentist as a plastic surgeon (Hugo Ganzer 1879-1960*). J Cranio-Max Fac* Surg.16, p. 51-54.

Rogers, S.N and Lowe, D. (2011). British Association of Oral and Maxillofacial Surgeons first national audit in support of revalidation. *Br J Oral Maxillofac Surg*. 49(6), p 478-479.

Rosemont, I.L. (2015). Membership directory: American Association of Oral and Maxillofacial Surgery, Accessed on 12 May 2019, < http ://www.aaoms.org.>

Rowe NL. The history of the treatment of maxillo-facial trauma. Ann Roy CollSurg Eng 1971; 49:329–49.

Shrestha, R.M., Shrestha, S., and Kunwar, N. (2017). Dentists in Nepal: A Situation Analysis. *J Nepal Health Res Counc*. 15(36), p 187-92.

Statistics South Africa 2016, <http://www.statssa.gov.za> Accessed 10 May 2019

Strother, E.A. (2003). Maxillofacial Surgery in World War I: The role of the dentist and surgeons. *J Oral Maxillofac Surg*. 61, p. 943-950.

Tahim, A. (2015). Who are we? A qualitative evaluation of trainees' perspectives on professional identity in oral and maxillofacial surgery. *Perspe ct Med Educ*.4, p.33-38.

Tiwari, R., Pendyala, C., Gurukarthik, G., et al. (2017). History of oral and maxillofacial surgery- A review. *J Dent Med Scie.* 16(3), p. 99-102.

University of Pretoria. Department of oral and maxillo-facial surgery. <http://www.up.ac.za> Accessed 22 June 2019

Vadepally, A.K. and Sinha, R. (2018). What surgical education the speciality offers? Perception of role of oral and maxillofacial surgery by 1200 Healthcare Professionals, Students and the General Public in Hyderabad, India *J Maxillofac Oral Surg*.17(2), p. 182–187.

World meter population <http://www.wiorldmeters.info> Accessed 20 June 2019

Yadav, A.K., Dongol, A., Acharya, P., et al. (2019). Practice of oral and maxillofacial surgery in Nepal: Its scope and influencing factor. *Int J Dent* p.1-5

APPENDIX A

Data Collection Sheet

Ref number: ☐☐☐☐

A. All Members of the dental community

Age:

Gender:

Race:

Dental Professional: Dentist / Specialist/ Registrar

Specialty:

Dental student (Level):

B. Maxillofacial and Oral Surgeons/ Registrars only

Number of years in ☐ **practice:**

Practice: ☐ Private ☐ ☐ Public Both

Type of undergraduate Qualification:

Dentistry ☐ Dentistry & Medicine ☐

1. Which of the following procedures do you perform?

Type of Procedures	Yes	No	If yes, how many in the last year?
Maxillofacial Trauma			
Preprosthetic Surgery			
Oral Pathology/ Oral Medicine			

Dentoalveolar Surgery			
Dental Implants			
Local Reconstructive surgery			
Temporomandibular Joint Surgery			
Orthognathic surgery			
Regional Reconstructive surgery			
Cleft lip and palate surgery			
Oncologic Surgery			
Craniofacial Surgery			
Cosmetic Surgery			
Other, Please specify			

C. All Members of the dental community

1. **Do you think SA needs maxillofacial and oral surgery specialty**?

Yes ☐ No ☐

2. **For which procedures/conditions are MFOS needed most/least? Choose from the list**

Type of Procedures	Most	Least
Maxillofacial Trauma		
Preprosthetic Surgery		
Oral Pathology/ Oral Medicine		
Dentoalveolar Surgery		
Dental Implants		
Local Reconstructive surgery		

Temporomandibular Joint Surgery		
Orthognathic surgery		
Regional Reconstructive surgery		
Cleft lip and palate surgery		
Oncologic Surgery		
Craniofacial Surgery		
Cosmetic Surgery		

3. **What do you think should be the requirement(s) for entry into the specialty?**

Dentistry only ☐ Medicine only ☐ Both Medicine and Dentistry ☐

APPENDIX B

Ethical Clearance Certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Dr TC Shalonga

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M180702

NAME: (Principal Investigator)	Dr TC Shalonga
DEPARTMENT:	School of Oral Health Sciences Department of Maxillofacial and Oral Surgery Medical School University
PROJECT TITLE:	Influence of the dual qualification on the scope of practice of maxillofacial and oral surgery in South Africa
DATE CONSIDERED:	27/07/2018
DECISION:	Approved unconditionally
CONDITIONS:	Title changed 26/09/2018
SUPERVISOR:	Dr M Mabongo
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	25/09/2018

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 on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/We fully understand the conditions under which I am/we are authorised 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 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 of the meeting 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

04/10/2018
Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX C

Approval from the School of Oral Health Science

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

FACULTY OF HEALTH SCIENCES

School of Oral Health Science

Department of Oral Biological Sciences, 7 York Road, Parktown, 2193. Tel: 011 717 2045 Fax: 086 553 3890 Email: Julitha.Molepo@wits.ac.za

15 January 2019

Dr T. Shalonga
Maxillofacial and Oral Surgery
Faculty of Health Sciences
University of the Witwatersrand
Johannesburg

RE: PERMISSION TO CONDUCT RESEARCH

REFERENCE: HRRC/JAN/01/2019

It is my pleasure to grant final approval to conduct your research titled "Influence of the dual qualification on the scope of practice of Maxillofacial and Oral Surgery in South Africa" at Wits Oral Health Centre.

The Hospital Research and Risk Committee allocated a unique reference number to this application – Kindly quote this reference number in all future correspondence regarding this research.

Please note that the Hospital Research and Risk Committee should be informed of the estimated date the research will commence, as well as regular status reports until the research has been concluded. Within a month after conclusion of the research project, a written report must be submitted to the Head of School/CEO, summarizing the final result/outcome as well as the recommendations made based on the research concluded.

Regards,

Prof M. S Nemutandani
CEO/Head of School
Date: 16/01/2019