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Changing trends in maxillofacial and oral surgery at Chris Hani Baragwanath Hospital: comparison between two time periods in 1987 and 2007

Mekonnen Damtew, Mesfin

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CHANGING TRENDS IN MAXILLOFACIAL AND ORAL SURGERY AT CHRIS HANI BARAGWANATH HOSPITAL: A COMPARISON BETWEEN TWO TIME PERIODS IN 1987 AND 2007

Dr Mesfin Mekonnen Damtew

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

June, 2009

DECLARATION

I, Mesfin Mekonnen Damtew 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 Witswatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University

_____

Signed

…… day of …… 2009

ABSTRACT

INTRODUCTION

Clinical audits of maxillofacial and oral surgery units in the United Kingdom have shown significant changes in the workloads of staff, in the social and demographic profiles of the patients, in the types of procedures performed and in the use of local or general anaesthesia. This data allows the planning of a better service, of monitoring the increasing workload and the suitability of the procedures being performed for the training of registrars.

AIMS AND OBJECTIVE

The objective of this investigation were to carry out a clinical audit in the maxillofacial and oral surgery unit at CH Baragwanath Hospital for a six month period in 1987 and in 2007 and to compare this data in order to determine changing trends.

MATERIALS AND METHODS

A clinical audit for the periods 1 January to 30 June 1987 and 2007 was undertaken. The audit was based on a review of the surgical procedures register which records all surgical procedures carried out in the unit. The following information was extracted from the procedures register for the two time periods and statistically compared; numbers of patients, age, gender, race of patient, local or general anaesthesia, diagnosis, duration of operation and procedure performed.

RESULTS

The results show an increase of 36.8% in the workload of the staff. There were no significant changes in the demographic profiles of the patients treated except that in the second time period the sample contained 15 whites and 5 Indians. A decrease in trauma related diagnoses

and an increase in presentation for wisdom teeth removal was found. There was also a significant shift from the use of general to local anaesthesia. There were no significant differences in the types of procedures performed although clearly there was a shift from trauma related surgery to surgery for removal of wisdom teeth. The range of operative procedures was inadequate for the training of registrars as virtually no exposure to implant related surgery nor to orthognathic surgery occurred in the unit.

DISCUSSION

This is the first audit of its kind to be performed in South Africa and very few similar audits have been performed internationally. While the data shows a distinct trend away from trauma related surgery, this was still the major activity in both the first and the second time periods. The change from predominantly general to local anaesthesia is partly the result of a critical shortage of anaesthesiologists in the public service in South Africa.

CONCLUSION

We recommend that:

- The scope of the data collected be expanded to include information on numbers of staff, waiting lists, work done in the Out-Patients Department (OPD) or on patients admitted by other specialties, referrals, length of hospital stay and cancellations and no-shows.
- A computerized audit system be introduced based on models in the UK.
- Clinical staff will have to take responsibility for capturing the data.
- Units should determine benchmark standards against which they can monitor their own performance.

DEDICATION

To my son, Leo De Angelo Mekonnen

In loving memory of my parents

Mekonnen Damtew and Almaz Yimam

ACKNOWLEDGEMENTS

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CHAPTER 1

1. INTRODUCTION

Clinical audits of maxillofacial and oral surgery (MFOS) units in developed countries show a significant change in the workload of the staff, changes in the socio-demographic profiles of patients attending for treatment, changes in the types of procedures performed and in the use of general or local anaesthesia. Such data allows the planning of more efficient services, better utilization of limited resources and the monitoring of increasing workload with its negative effects on the training of staff. In addition the establishment of reasonable benchmark standards and the monitoring thereof becomes feasible. Similar audits are not available from developing countries.

Chris Hani Baragwanath Hospital (Bara) is a 2888 bed tertiary academic hospital, which is the largest in the southern hemisphere with a staff complement of 5,759 and performing 33,241 operations and seeing 225,273 out-patients per year with a budget in excess of R 987 million.[1] It is a teaching hospital for the University of the Witwatersrand Medical School. It is located in the south-west of greater Johannesburg where it serves mainly the population of Soweto. The exact population of Soweto is unknown. Officially this figure is put at 1.3 million[2] but many believe it is much higher. Bara is also a referral hospital receiving patients from other parts of Gauteng, Mpumalanga, Limpopo and North West provinces as well as from neighboring countries such as Lesotho, Botswana, Swaziland, Angola, Zimbabwe, Malawi, Zambia and even from Central and North Africa.

The Division of Maxillofacial and Oral Surgery at the University of the Witwatersrand is responsible for rendering patient services at Bara. This includes providing an emergency service in cases of trauma and sepsis, an advanced maxillofacial and oral surgery

service, pre-and post-operative patient care and an out-patient clinic. Routine extractions are not performed in the unit but remain the responsibility of the dentists in a separate clinic. At the present time the staff consists of four registrars, a medical officer, a full time consultant and a part-time consultant. Accurate data on the numbers of staff in 1987 are not available.

CHAPTER 2

2. OBJECTIVE AND AIMS OF STUDY

The objective of the study were to perform an audit of the MFOS unit at Bara in order to determine the demographics of the patients being treated in the unit and the workload of the staff for a six month time period in 1987 and in 2007 and to compare this data in order to determine changing trends in the provision of maxillofacial and oral surgery services

The aims of this study were to determine the:

1. numbers of patients treated
2. the demographics of the patients
3. diagnosis
4. type of procedure performed
5. type of anaesthesia
6. duration of the operation

To compare this data for two time periods selected.

CHAPTER 3

3. LITERATURE REVIEW

3.1 SEARCH STRATEGY

Electronic databases (Pubmed, Science Direct, Google Scholar, Scopus) were searched for articles relating to the topic. Keywords used were; audit, patient demographic, workload, trends, maxillofacial and oral surgery, cancellation, day-cases, wisdom teeth removal.

It is pertinent to note that the literature contains relatively few papers in this field and that by far the majority of these papers emanate from the United Kingdom with virtually none from Europe or the USA.

3.2 WORKLOAD: NUMBERS OF PATIENTS AND CHANGING PATTERNS

In an eleven year period (1975 to 1985) admissions to hospitals for the specialty of maxillofacial and oral surgery, in the National Health Service (NHS), in the Oxford region, nearly doubled. In contrast the average for the acute sector was 2% per annum. The highest increase in admissions rates was for young females (aged 10-39 years) due to an increased demand for orthodontic treatment and hence removal of posterior teeth. Changes in admission rates for four groups of diagnoses ranged from an increase of 7.1% per annum for fractures of skull and face, an increase of 6.3% for disorders of tooth eruption and development, an increase of 4.2% for diseases of hard tissue of teeth, no change in admission rates for dento-facial anomalies and a decrease of 6% for the code covering other diseases and conditions of teeth.[3] The data did not record care

provided by maxillofacial surgeons for patients whose admission and discharge was under the care of other specialties

An audit of a day-case oral surgery unit at the Dublin Dental Hospital showed that over a 25 year period there was a decline in total numbers of procedures and in some operation categories. The most significant decrease was in the first 5 years. The most striking reductions were in extractions of carious permanent teeth which decreased from 53.9% of the annual total to 18%, in pre-prosthetic surgery, in frenectomies and in apicoectomies. The most marked increase was in surgery for impacted wisdom teeth which increased from 10.5% of the annual total to 57%. The authors speculated that the increase in patients with impacted teeth was due in part to a reduction in the numbers of routine extractions due to a decrease in the caries rates and in part to the widespread use of panoral radiography which led to detection of greater numbers of impacted teeth. With the decreased numbers of extractions of permanent teeth (from 66% to 23.5% of the annual total) one would have expected a concomitant decrease in the numbers of extractions of deciduous teeth, but this had not occurred. This could probably be ascribed to increased extractions in children for orthodontic reasons.[4,5]

The reduction in the demand for pre-prosthetic surgery (from 4.6% to 0.3% of the annual total) might be due to the decreased demand for full dentures, while more practitioners were doing procedures such as apicoectomies themselves resulting in decreased numbers of referrals. The authors concluded that the changing trends in oral surgery practice seemed to reflect the changes in dentistry over the past 25 years, namely a reduction in dental caries and an increasing awareness of the importance of oral health.[4,5]

Data from the Department of Health and the Dental Practice Board demonstrated substantial increases in the volume of oral surgery performed in England and Wales both in the hospital service and in the general dental service. Three complimentary papers investigated changing workload patterns in maxillofacial and oral surgery treatments in England and Wales from 1974 to 2000.[6-8] The first of these papers[6] reported on changing trends for the period 1974 to 1987. The main findings were a 32% increase in in-patient throughput between 1979 and 1986 and a 66% increase in oral surgery in-patient waiting lists. In the general dental service there was a 52% increase in minor oral surgery procedures. The second paper[7] reported on the period 1984-1991 and showed that in the general dental service although the numbers of routine extractions decreased by 10%, the numbers of surgical procedures increased by 20% with a substantial increase in the numbers of third molar removals. In the hospital service there was a 55% increase in the number of day-cases, a 10% increase in throughput of in-patients and a 13% decrease in number of patients waiting for in-patient surgery. The third covered the period 1991 to 2000 and showed that the numbers of apicoectomies decreased by 60% which may reflect the decreased caries rate, a decrease in ordinary extractions up to 1984 after which a plateau was reached, a dramatic increase (113%) in extractions of special difficulty which may be the result of teeth surviving longer and a substantial decrease in the numbers of third molar removals.[8]

In a survey of patients who underwent in-patient operations from 1989 to 1994 in the area covered by the West-Midlands Regional Health Authority, 1.24% were in the ambit of dentistry. Surgical removal of teeth was the third most common activity of all surgical

procedures. Removal of impacted wisdom teeth accounted for 41% of all oral surgery activities.[9]

From Africa there have been only two audits of maxillofacial and oral surgery activities, both from Nigeria. These are the only reports on the overall pattern of presentation to oral and maxillofacial treatment centers. In the first, which reports on MFOS activity in the North Western States of Nigeria, the most common presentations were as a result of trauma (55%), while less than 25% were the result of tumours and tumour like lesions.[10] In the second report from Port Hartcourt in the South of Nigeria, 46.4% of presentations were reported as being the result of trauma, while 39% were the result of tumours and tumour like lesions.[11] The authors appealed for the training of additional personnel as their MFOS unit was the only one in the region, serving a population in excess of 10 million.[10]

3.3 SOCIO-DEMOGRAPHICS

An exploratory study combining hospital episode statistics with socio-demographic variables to examine the access and utilization of hospital oral surgery services showed that the most deprived communities utilized this service 50% less than all other groups. This added to the debate on the appropriateness of the service and indicated that an examination of the pattern of referrals amongst primary dental care services was clearly needed.[9] In a second paper a study on the socio-demographic status of patients who underwent in-patient oral surgery operations from 1989 to 1994 in the area covered by the West Midlands Regional Health Authority only 1.24% of finished consultant episodes were dental. This ranked 14th on the list of specialties. The results showed a highly significant correlation between the use of in-patient services and social deprivation which

was consistent across all specialties except oral surgery, in which the correlation was reversed indicating that patients who availed themselves of in-patient oral surgery services were from a higher socio-economic group.[12] The most frequent procedure for both males and females was surgical removal of wisdom teeth.

The socio-demographics of the patients being treated might be affected by changes in either the aetiology or in the accuracy of diagnosis. A study from New Zealand[13] has shown changes in the demographics of the patients and in the pattern of jaw fractures. Both inter-personal violence and motor-vehicle accidents commonly involved alcohol and young male adults. Both categories frequently required hospitalization and surgical intervention, while the nature and severity of these injuries had not changed there had been a clear decrease in incidence which seemed to be due to a profound decrease in the rate of road traffic accidents associated with alcohol intoxication. Similarly from Helsinki changing trends in the causes and patterns of facial fractures have been reported in children with assaults as a causative factor increasing by 5.5%. The proportion with mandibular fractures decreased by 13.6% whereas the proportion with mid-facial fractures increased by 18.9%. The authors pointed out that recognition of a changing pattern might simply be due to improved diagnostic methods such as increased use of computerized tomographic scanning.[14]

3.4 CANCELLATION OF OPERATIONS

One of the factors that influence the provision of an effective service with detrimental effects on performance indicator indices is cancellation of operations. Thomson[15] showed that in the previous 12 months, 31% of planned operations were cancelled while nearly 20% of operating lists were lost completely. The commonest reasons for

cancellations included financial cut-backs, nursing staff shortages and failure of patients to attend. In a study from the UK a total of 13% of procedures were cancelled for non-clinical or logistical reasons of which 4% were cancelled on the day of the operations. The main reason for the cancellation of elective oral and maxillofacial operations were not enough beds or operating times, partly a result of the admission of medical patients and partly because of the need to operate on maxillofacial emergencies. The performance indicator index of 0.3% was below the target threshold of 0.5 %.[16]

Elective surgery cancellation in oral surgery units in Ireland while multifactorial in aetiology were most frequently due to increasing medical admissions. "No bed" was the reason for theatre cancellation in 31% of cases for the period 1997-1998. This increased to 62.5% between 2001-2002. Cancellation of operations has consequences for doctors in training, administrators and patients.[17]

A study from a major Australian referral hospital showed 5 major causes of equal magnitude of same day cancellations, namely; no theatre time due to over-run of previous surgery (18.7%), no post-operative bed (18.1%), cancelled by patient (17.5%), change in patients clinical status (17.1%) and procedural reason for example list error, no surgeon, patient not ready (21%). All 5 major factors needed urgent review and attention. Changes to any single factor would not likely result in an improvement in the numbers of cancellations.[18]

Pre-admission clinics and booking of cases by consultants might reduce cancellations for clinical reasons.[16] A study from Oxford investigated the inconvenience caused by late cancellations and how a pre-surgical assessment clinic might be used to minimise

the risk of late cancellations. Amongst others, use of such a clinic allowed for anaesthetic assessment, reduced the risk of failed attendances, reduced the length of stay in hospital, validated waiting lists and allowed patient investigations to be carried out more efficiently.[19]

3.5 REFERRALS

An aspect which has a direct bearing on the workload of any hospital unit is the appropriateness of the referrals. A study by Coulthard et al[20] showed that the most common reasons for referral of patients to a maxillofacial and oral surgery unit was the lack of facilities for general anaesthesia. Only a few referrals were found to be inappropriate. Reduction in facilities for general anaesthesia in the primary health care setting would inevitably result in an increase in the number of hospital referrals.

Practitioners who had ungergone some oral surgery post graduate training were more likely to undertake more surgery in their practices and to refer fewer patients for specialist care. Young female practitioners were less confident in their own surgical abilities, nevertheless there was no difference in the numbers of referrals made between young male and female dental practitioners.[21]

Few facilities exist for the direct referral from general dental practitioners for day-case oral surgery. A prospective study of 1581 cases showed the referrals to be appropriate in 82% of cases, this however was after the development of referral criteria in this study.[22]

3.6 TRAINING OF REGISTRARS

The adequacy of training of registrars was raised in a study by Melo et al[23] who evaluated the current status of implant training in oral and maxillofacial residency programs in the United States. In total 48% of residents received less than 20 hours of didactic training in implantology per year and 57.5% reported using 2 or fewer implant systems. Some 57% estimated that they would place fewer than 20 implants in one year of their training and 28.5% felt inadequately prepared by their residency training in implant placement.

3.7 TYPE OF ANAESTHESIA

A change in the type of anaesthesia used has been reported. The survey of day-cases from Ireland showed that while general anaesthesia remained the most commonly used form of anaesthesia there had been an increase in utilization of sedation.[4,5]

After 1998 there had been a major decline in the use of general anaesthesia in the general dental service but no similar trend was noted for the hospital dental service in the UK.[8]

3.8 REMOVAL OF WISDOM TEETH

Surgical removal of third molar wisdom teeth was one of the most commonly performed operations in England and Wales prior to 2000. It has been estimated to have cost the NHS in the region of 30 million pounds in 1994 and accounted for up to 90% of patients on maxillofacial waiting lists.[24] In a survey from the UK it was reported that 35% of 25,000 wisdom teeth removed were disease free.[25]

The National Institute for Clinical Excellence (NICE) is a part of the National Health Service (NHS) and was established in 1999 as a special health authority to provide patients, health authorities and the public with reliable and authoritative guidance on current best practice. In 2000 NICE issued guidelines on the removal of wisdom teeth which stated that the routine practice of prophylactic removal of pathology free impacted wisdom teeth should be discontinued in the NHS and that the standard of care for wisdom teeth, by health care workers, should be no different to that given to other teeth.[26,27]

The NICE committee issued the guidelines after concluding that there was no reliable research to show that the practice of removal of disease free wisdom teeth benefited patients in any way and that patients who do have their healthy wisdom teeth removed were being exposed to the risks of surgery.[26,27]

For professionals the estimation of a high probability of complications was a pivotal factor in deciding to prophylactically remove impacted third molars.[28] The level of complications is in fact very low. The most common form of pathological lesion detected in a radiographic survey of 6780 panoramic radiographs of patients referred for removal of third molars was impacted teeth (22.5%) and retained roots (12.2 %).[28]

Compliance in the West-Midlands with the NICE guidelines was investigated by Kim and associates[29], who audited 3 departments of Maxillofacial and Oral Surgery. Despite differences in resources all the units adhered strictly to the NICE guidelines achieving 100% compliance. Referral of patients for removal of disease free wisdom teeth by dentists accounted for only 6% of all referrals.

3.9 SURGICAL AUDITS AND AUDIT SYSTEMS

All surgical units would benefit from the systematic collection and collation of appropriate clinical data as this is the only way that they will be able to motivate for additional staff, space and facilities. Any system used must enjoy wide acceptability by staff, be computer based must allow for local and for global audits and be easy to use and administer. Such an audit system was financed by the Faculty of Dentistry of the Royal College of Surgeons and supplied to the Royal London Hospital and the Leeds Dental Institute. The data supplied by the system was regarded as the most accurate available and has subsequently been used to support requests for additional beds. Introduction of the system has allowed the units to accurately record in-patient activity, and to take an active role in the management processes involved in the local development of the specialty.[30] Similarly a regional computerized surgical audit system has been developed in the North – West Thames region of the British National Health Service.[31]

The level of audit activities and the perceptions of registrars with respect to their audit activities was analysed by Firth-Cozens et al.[32] Respondents considered that the audits had helped patient care. Suggested improvements to the educational value of the audit included requests for less “witch hunting”, better feed back, more training and more participation by consultants.[32]

3.10 **PERFORMANCE INDICATOR INDEX (PII)**

The performance indicator index is a benchmark standard which is usually determined by a national regulatory authority which provides a measure against which individual hospital or surgical units can monitor their performance. The index has more to do with overall total patient hospital care rather than any individuals' treatment. In the UK the responsibility for determining PII rests with bodies such as the Commission for Health Improvement (CHI)[33] and more recently the Quality Care Commission. A study by Dhariwal et al[16] found that the PII of 0.5% for re-admission of patients within 28 days after cancellation had consistently been met, but that it was too easy to manipulate the results.

CHAPTER 4

4. MATERIAL AND METHODS

The study material consisted of the procedures registers kept by the staff of the Maxillofacial and Oral Surgery unit at C.H. Baragwanath Hospital. In these registers all surgical procedures carried out in the unit are recorded on a daily basis. Patient files are not kept in the MFOS unit but are returned to the central records keeping department. Retrieval of patient files after a period of only a few years is impossible so that the procedures register is the only record of the workload of the unit.

The register records surgical procedures performed both under local or general anaesthesia in theatre on either in-patients or day-case patients.

The information recorded consists of the following:

Patient name

Age

Gender

Diagnosis

Type of anaesthesia used

Duration of the operation

Treatment performed

Names of attending clinicians and anaesthesiologists

The diagnosis recorded was the reason for the surgery taking place and was determined by the clinicians after consideration of the history, main complaint, clinical examination and radiographic analysis. The diagnoses were grouped as follows:

a. Trauma related:fracture, laceration, foreign body, gun-shot wounds, or any other lesions which occurred as a direct result of any trauma.

b. Tumours and tumour like lesions: tumours, cysts or tumour like lesions of the jaws or oral soft tissues such as ameloblastoma, fibrous dysplasia or squamous cell carcinoma.

c. Post–surgical complications: post-extraction/surgery complications including uncontrolled bleeding, dry socket, haematoma, oro-antral communuication, dehiscence, septic bone grafts or septic bone plates.

d. Impacted teeth including unerupted teeth. If the patient had more than one impacted tooth these were not recorded separately i.e the patient and not the number of teeth was recorded.

e. Carious teeth including mobile teeth: the patient was recorded and not the number of teeth.

f. Cellulitis or abscess.

g. Disorders of the temporo-mandibular joint and coronoid process resulting in ankylosis, internal joint derangements and myofacial pain dysfunction syndrome.

h. Facial deformity/malocclusions.

The treatments performed were categorized as follows:

a. Treatment of jaw fractures either by:
   - Open reduction with internal fixation (ORIF); or
   - Closed reduction with inter-maxillary fixation (CR-IMF)

b. Surgical removal of impacted or unerupted teeth.

c. Surgical removal of grossly carious teeth or retained roots or complicated extractions.

d. Incision and drainage of pyogenic abscess.

e. Biopsy.

f. Extraction of all remaining teeth prior to radiation therapy.

g. Jaw reconstruction/bone grafts.

h. Orthognatic surgery for malocclusion or facial deformity.

i. Resection.

j. Surgery to the T M J usually to relieve ankylosis.

k. Implant placement.

l. Treatment of post-operative complication. This includes oro-antral communication, haemorrhage , sepsis , removal of plates and wires.

The data was extracted from the registers for the six month periods 1 January to 30 June 1987 and 2007 respectively and transferred onto an Excel® spreadsheet. (Annexure B)

The data was analysed, and was presented in the form of tables, bar charts and pie charts where appropriate. Statistical significance was tested for using the Chi Square, Fishers exact test and Student t-tests. Probability levels of <5% were regarded as being significant. The GraphPad InStat® statistical program was used for all the statistical calculations.

In all the graphic representations frequency values for both time periods of <2% have been omitted.

4.1 **ETHICS**

Application was made to the University of the Witwatersrand Committee for Research on Human Subjects (Medical) who approved the research protocol unconditionally. Clearance Number R14/49 Damtew (Annexure A)

CHAPTER 5

5. **RESULTS**

5.1 **WORKLOAD**

The numbers of patients surgically treated in the maxillofacial unit increased from 445 in 1987 to 609 in 2007 respectively for the corresponding six month periods from 1st January to 30th June (Figure 5.1). This is an increase of 36.8%.

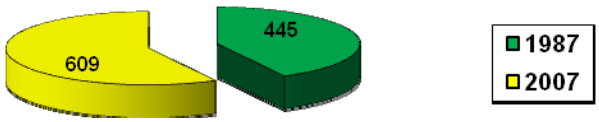

Figure 5.1: Number of patients who had operations in the period 1 January to 30 June 1987 and 2007 respectively

5.2 GENDER

As can be seen in Table 5.1 and Figure 5.2 substantially more males were treated during both time periods with a male to female ratio of 2.3:1 in 1987 and a male to female ratio of 2.6:1 in 2007. This difference was not statistically significant. (Fisher's exact test; p=0.3360).

Table 5.1: **Number of males and females treated surgically for corresponding six month periods in 1987 and in 2007**

	1987	2007
Males	309 (69%)	440 (72%)

Females	136 (31%)	169 (28%)
Total	445 (2.3:1)	609 (2.6:1)

Fisher's exact test; p=0,3360

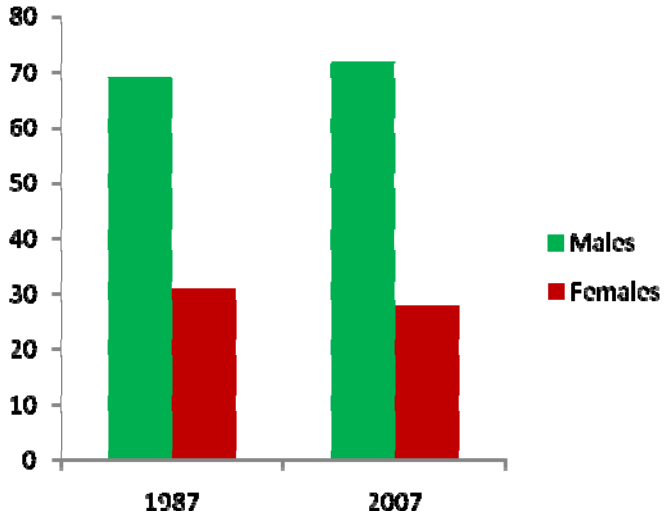

Figure 5.2: Gender distribution in percentages of patients who had operative procedures during the periods 1 January to 30 June 1987 and 2007 respectively

5.3 AGE

Patients of all ages were treated in both time periods (Table 5.2, Figure 5.3). The majority of the patients treated were in the 3rd decade in both time periods. There were relatively few children and elderly persons in the sample. The unpaired student t-test showed the differences in age distribution not to be statistically significant (p=0,572).

Table 5.2: Age distribution in decades of patients treated in the first 6 month time periods of 1987 and 2007 respectively

	1987	**2007**
1st	21	9
2nd	113	102
3th	166	234
4th	82	136
5th	37	84
6th	11	26
7th	9	17
8th	6	1
Total	445	609

Unpaired student t-test ; p=0.572

Ages in Decades

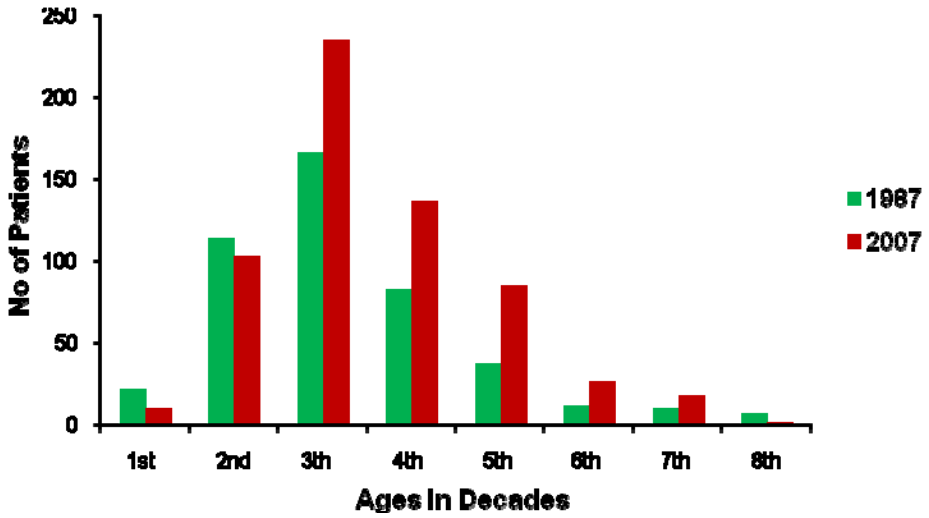

Figure 5.3: Age distribution (in decades) of patients treated surgically during the first six months of 1987 and the corresponding period in 2007

5.4 RACE

In the 1987 time period all of the patients treated were black whereas in the 2007 time period a small number of whites (15), and Indians (5) were also treated.

5.5 ANAESTHESIA

In 1987, patients were predominantly treated using general anaesthesia (87.4%) as opposed to local anaesthesia (12.6%). In 2007 more patients were treated using local anaesthesia (54.7%) as opposed to general anaesthesia (45.3%) (Table 5.3 and Figure 5.4) This difference was highly statistically significant (Fishers exact test; p=0,0001).

Table 5.3: Type of anaesthesia used in the two time periods in 1987 and in 2007

	1987	2007
Local anaesthesia	56 (12.6%)	333 (54.7%)
General anaesthesia	389 (87.4%)	276 (45.3%)
Total	445	609

Fishers exact test; p<0,0001

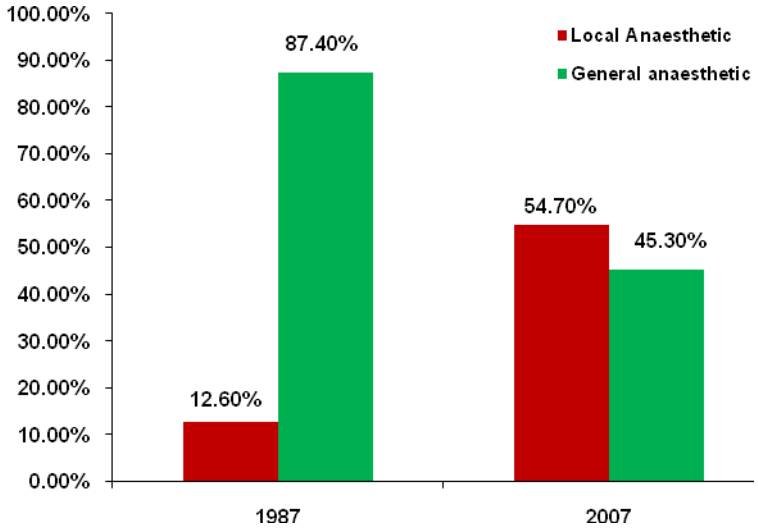

Figure 5.4: Percentage of patients who were treated under local or general anaesthesia during the periods 1 January to 30 June 1987 and 2007 respectively

5.6 DURATION OF OPERATION

The duration of the operations varied from less than 30 minutes (26.1% in 1987 and 37.1 % in 2007) to more than 2 hours (9% in 1987 and 7.7% in 2007). The majority lasted between 30-60 minutes in 1987 (46.3%) and less than 30 minutes in 2007 (37.1%) (Table 5.4 and Figure 5.5). This difference was not statistically significant (unpaired student t-test ; p=0,5410).

Table 5.4: Duration of operation

	1987	2007
<30 minutes	116 (26.1%)	226 (37.1%)
30-60 minutes	206 (46.3%)	178 (29.2%)
60-90 minutes	57 (12.8%)	112 (18.4%)
90-120 minutes	26 (5.8%)	46 (7.6%)
> 120 minutes	40 (9%)	47 (7.7%)
Total	445	609

Unpaired student t-test ; p=0,5410

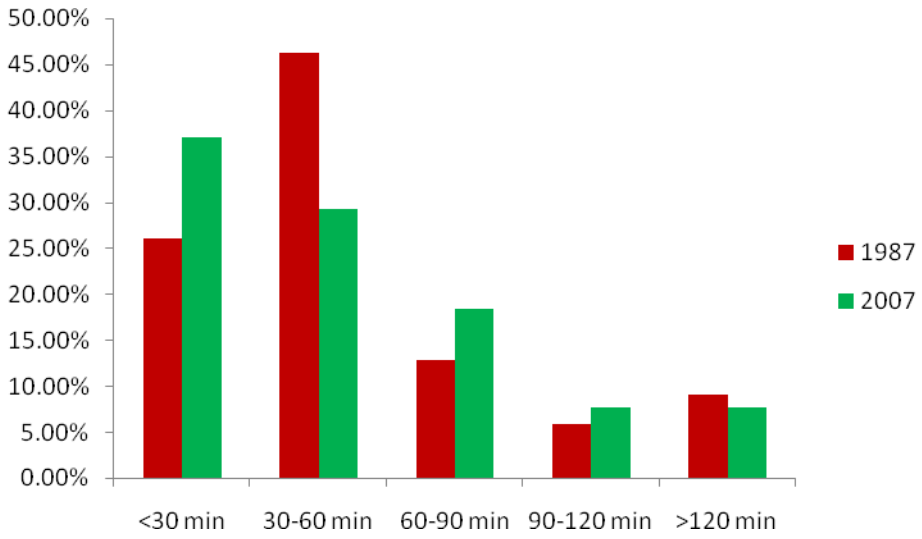

Figure 5.5: A comparison of the duration of the operative procedures carried out during the two time periods concerned i.e 1 January to 30 June 1987 and 2007 respectively

5.7 DIAGNOSIS

The specific diagnosis made by the clinician for all patients treated during the two time periods is presented in Table 5.5 and in Figures 5.6 to 5.8

Table 5.5: Diagnosis made by clinicians for all patients treated surgically during the two time periods

	1987	**2007**
Trauma related	311 (69.9%)	277 (45.5%)
Tumour and tumour like	56 (12.5%)	76 (12.5%)
Impacted teeth	26 (5.8%)	167 (27.4%)
Carious/mobile teeth	8 (1.8%)	37 (6.1%)
Abscess/cellulitis	36 (8.1%)	37 (6.1%)
Post surgical complications	2 (0.4%)	6 (1.0%)
TM J and coronoid abnormalities	4 (0.9%)	8 (1.3%)
Facial deformity	2 (0.4%)	1 (0.2%)
Total	**445**	**609**

Unpaired student t-test ; p=0.4961

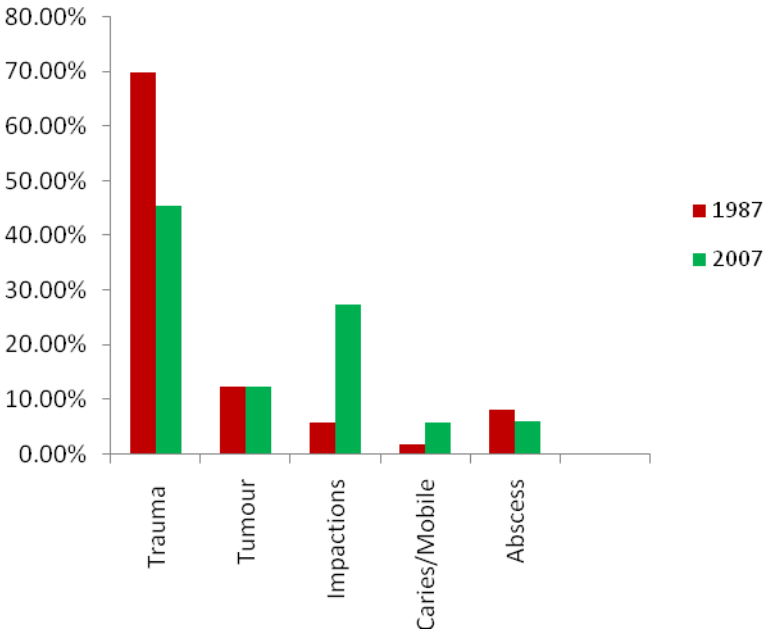

Figure 5.6: **Histogram comparing diagnoses made by the attending clinicians during the two time periods being studied**

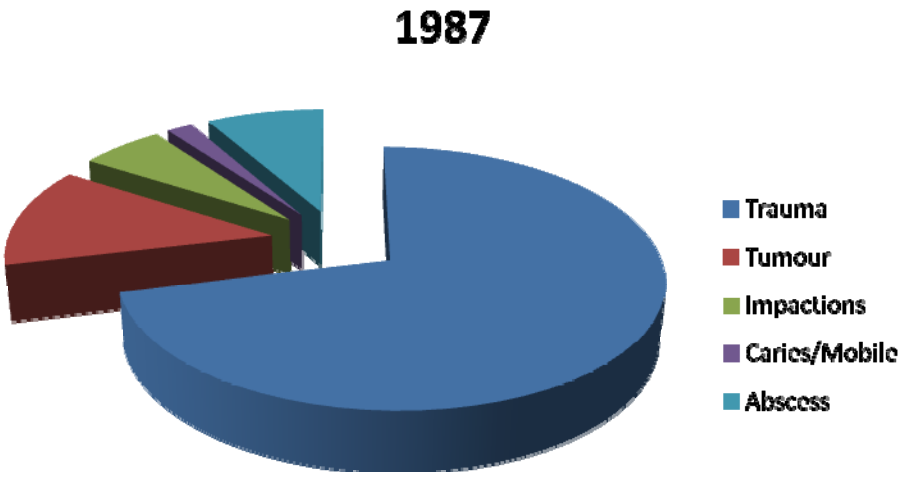

Figure 5.7: **Pie chart showing the relative frequencies of the diagnoses made during the six month period in 1987**

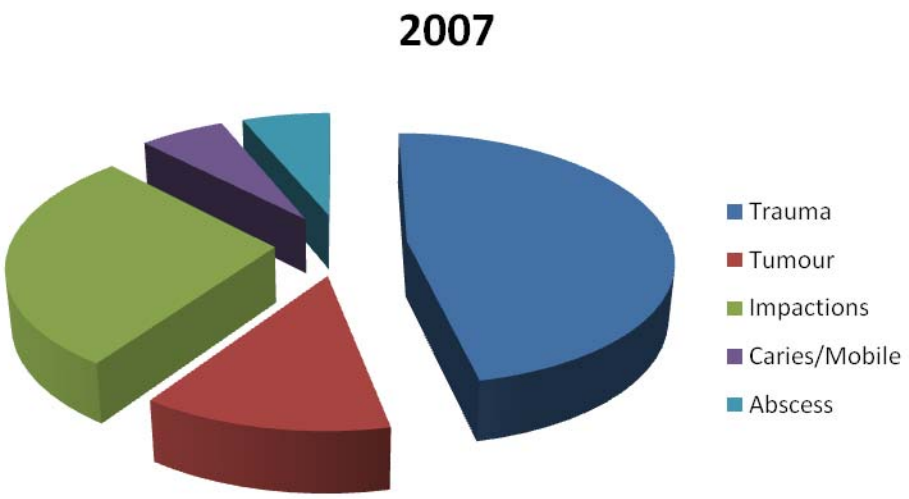

Figure 5.8: Pie chart showing the relative frequencies of the diagnoses made during the six month period in 2007

Analysis of this data shows that the most common diagnosis made during both time periods was injury due to trauma accounting for 69.9% of all cases in 1987 but decreasing to 45.5 % of all cases in 2007. The second most frequent diagnosis made in 1987 was tumours and tumour like lesions but in 2007 it was impacted teeth. Impacted teeth increased from 5.8% of all diagnoses in 1987 to 27.4% in 2007 while carious/mobile teeth increased from 1.8 % in the earlier time period to 6.1% in the later time period. The remaining categories remained more or less the same. The unpaired student t-test showed these differences not to be significant (p=0.4961).

5.8 TREATMENT PERFORMED

The treatments carried out in the two time periods are summarized in Table 5.6 and in Figures 5.9 to 5.11.

An analysis of this data shows that whereas in 1987 the treatment of fractures accounted for 65.4% of all treatments performed, this procedure had decreased to 35 % of all procedures in 2007. However, whereas surgical removal of impacted wisdom teeth comprised only 5.8% of all procedures in 1987, this had increased to 27.4% in 2007.The relative proportions of treatment modality of fractures i.e open reduction with inter-maxillary fixation or closed reduction remained relatively constant. The numbers of full dental clearances increased quite significantly in 2007 from 0.7% to 3.4% of all treatments. Treatment of post-operative complications also increased in 2007 while the numbers of surgical extractions performed increased from 1.8% to 6.2% of all procedures The unpaired student t-test showed that these differences were not statistically significant ($p = 0.6506$).

Table 5.6: Treatment procedures carried out during the two time periods studied

Treatments	1987	2007
Jaw fractures:	291 (65.4%)	213 (35%)
a) Open reduction- intermaxillary fixation. ORIF	138 (31%)	99 (16.3%)
b) Closed reduction-intermaxillary fixation CR-IMF	153 (34.4%)	114 (18.7%)
Surgical removal impacted teeth	26 (5.8%)	167 (27.4%)
Surgical extractions	8 (1.8%)	38 (6.2%)
Incision and drainage	36 (8.1%)	37 (6.1%)
Biopsy	34 (7.6%)	47 (7.7%)
Full dental clearance	3 (0.7%)	21 (3.4%)
Resection	4 (0.9%)	2 (0.3%)
Reconstruction / bone graft	15 (3.8%)	3 (0.5%)
Implants and orthognatic surgery	0 (0%)	1 (0.2%)
Treatment of post-operative complication	24 (5.3%)	72 (11.8%)
T M J interventions (reduction of dislocation, relieve ankylosis)	4 (0.9%)	8 (1.3%)
Total	**445 (100%)**	**609 (100%)**

Unpaired student t- test; p=0,6506

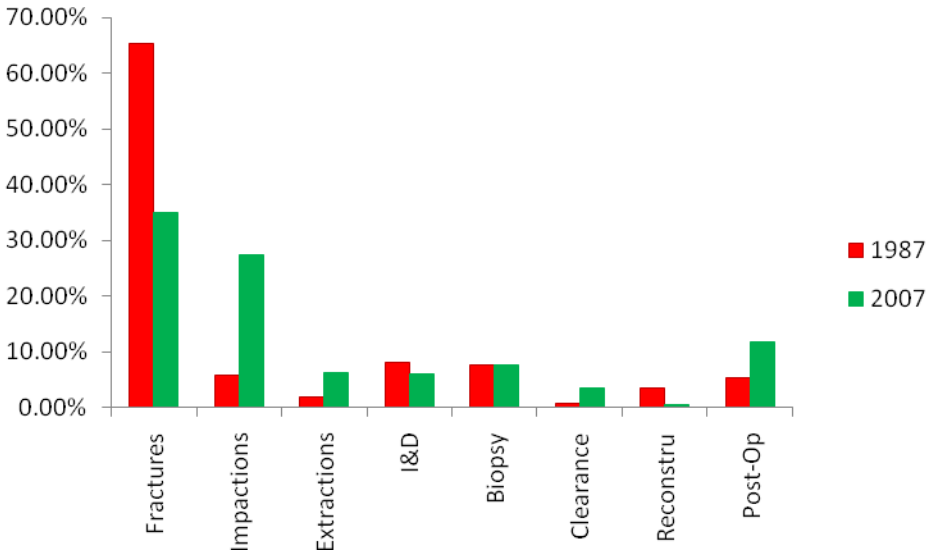

Figure 5.9: Histogram comparing the relative frequencies of the treatments carried out in the two time periods being studied

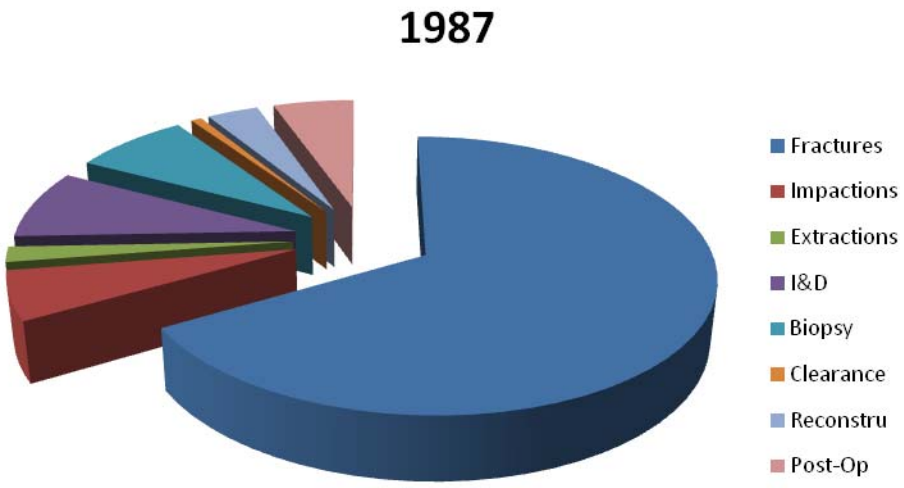

Figure 5.10: Pie chart illustrating the relative frequencies of the treatments carried out in the six month period in 1987

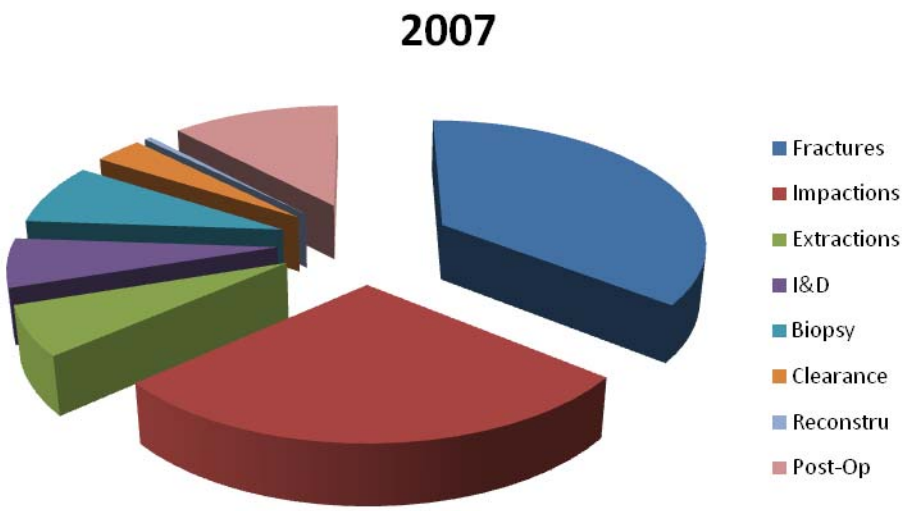

Figure 5.11: Pie chart illustrating the relative frequency of the treatments carried out in the 6 month period in 2007

CHAPTER 6

6. DISCUSSION

Patterns of workload in maxillofacial and oral surgery units are undergoing change as this discipline is taking on the responsibility for treating patients with malignant diseases and with salivary gland diseases, as the prophylactic removal of wisdom teeth decreases, as caries rates decline resulting in fewer teeth being extracted, as open surgery of the TMJ is replaced by arthroscopy and as increasing inter-personal violence and the mandatory wearing of seat belts affects the frequency and pattern of maxillofacial injuries.[3,6] These and other changes will affect the adequacy of staff requirements, the type of procedure being carried out, and the suitability of material available for the training of registrars.

Comparative audits such as the one reported in this study are useful since they provide evidence of changing trends and provide data to motivate for additional staff and facilities. This is the first survey of its kind to be carried out in a unit of maxillofacial and oral surgery in South Africa and indeed very few comparable studies have been published in the international literature, and most of these have been from the United Kingdom.

Audits of maxillofacial units in the UK have regularly appeared in the literature.[3-8] More recently computer based audit systems have been introduced with the onus being on medical personnel to enter the data.[30,31] Regretfully, at Bara an outdated, inadequate procedures register is manually completed by nursing staff in the same way as it has

been for decades. The data it provides is limited and incomplete. The procedures register is kept not so much to provide data which can be used in an audit of the activities of the unit but as a statutory requirement for licensing the operating theatre: It is more a medico-legal requirement than a record of workload. However, it is the only record of surgical activity in the unit.

6.1 PERIOD OF REVIEW

The two time periods in 1987 and in 2007 were arbitrarily chosen. It was felt that a long time period would be preferable to highlight any changing trends. A bio-stastitician confirmed that the available data would be adequately sampled by choosing a 6 month period in each of the years being compared eventhough this did not allow for any seasonal variation. The possibility of choosing a pre-and post-democracy period of time was not considered. Furthermore it needs to be pointed out that an audit of this nature simply compares activity in the unit for a specific period of time 20 years apart. It does not provide information as to what happened in the intervening years.

6.2 WEAKNESSES OF THE STUDY

The weakness of all clinical audits lies in the reliability and completeness of the data recorded in the procedures registers or patient files. Such data can be unreliable and incomplete depending on whose responsibility it was to fill in the register. Where this responsibility is handed over to nursing or to non-professional staff even more serious inconsistencies can be expected. Nevertheless these shortcomings aside the data was probably still reliable enough to answer some of the questions raised.

6.3 MAIN FINDINGS

The main findings of this study were:

- A 36.8 % increase in the workload of the unit
- Only minor changes in the demographics of the patients attending for treatment. No changes in ages or gender with more men than women being treated and relatively few white (15) and Indian (5) patients treated in the 2007 time periods as opposed to 1987 when all patients were black. Most of the patients were in the 3rd decade in both samples.
- A decrease in the numbers of patients being treated for trauma related injuries, namely jaw fractures with a concomitant increase in surgery for wisdom teeth removal and difficult extractions.
- Treatment procedures for jaw fractures remained relatively constant with apparently equal use of open and closed reduction.
- A change from the use of predominantly general anaesthesia to the use of local anaesthesia.
- A shorter duration of operative procedure in 2007 although this difference was not statistically significant.

6.4 WORKLOAD: NUMBERS OF PATIENTS

It was indeed surprising to find that the workload had increased by only 38.6% when the two time periods were compared. This is especially so since it can reasonably be assumed that the population being served by Bara must have increased given the rapid urbanization that has taken place and the large influx of illegal immigrants. Furthermore maxillofacial and oral surgery units in other Gauteng hospitals such as Tembisa, Leratong, Natalspruit and JG Strydom have been closed and these hospitals refer all

maxillofacial cases to Bara which now functions as a tertiary academic hospital. The question might reasonably be asked as to how the unit is coping with the increased workload? Have the staff numbers increased or are waiting lists getting longer? Unfortunately we do not have the data to satisfactorily answer these questions. Anecdotal evidence suggests that neither surgical nor nursing staff have been increased over the years and the fact that many patients have to wait 2-4 weeks for treatments of a jaw fracture and 3-6 weeks for a surgical extraction has been regarded as a normal feature in the unit for many years.

When comparing our workload data with studies from the UK, it should be borne in mind that routine extractions have not been included in our data as these are performed in a separate dental clinic by dentists. In addition we have not included work carried out in the out-patients department nor the care of patients admitted by other specialties. This may add substantially to the workload of the staff of the maxillofacial unit.

Reports from the literature all indicate an increase in the workload of oral and maxillofacial units from England and Wales which ranges from 32% to 100% over periods of 25 years.[3-8] At the same time increases in numbers of in-patients and in oral surgery waiting lists of up to 66% have also been reported.[6,8] Interestingly from Ireland in a day case oral surgery unit a decline in total numbers of procedures was reported.[4,5]

6.5 DEMOGRAPHICS OF PATIENTS

There was virtually no change in the demographics of the patients being treated between the first and second time periods with more men than women being treated in the unit and most patients consisting of young adults (3rd decade) in both time periods.

In 1987 Government race policies dictated that only black patients could be treated at Bara, but since 1994 there is no such racial distinction. Despite this, only 20 patients of other races were treated at Bara during the second time period. This is almost certainly due to the physical location of Bara which is some distance away from, Indian and white residential areas. There is little doubt that as the blurring of residential areas continues the perception of Bara as a black hospital will change and more patients of other races will be treated in this hospital. The greatest increase in the rates of admissions for patients in the UK was for young women (ages 10-39 years) due, it was speculated, to an increase in demand for removal of posterior teeth for orthodontic reasons.[3]

6.6 DIAGNOSIS

While the most common diagnosis made in the two time periods being compared remained injury as a result of trauma this had decreased in frequency from 69.9% of all procedures in 1987 to 45.5% in 2007. This decreasing trend was somewhat surprising, but as we do not know what the causes of the injuries were we can only speculate as to the reasons for the decrease. Perhaps there has been a change in the levels of interpersonal violence although this seems unlikely. Or perhaps the reasons can be found in the mandatory wearing of seat belts or the decreasing levels of political violence with the advent of “democracy” in 1994.

On the other hand the number of patients presenting for wisdom teeth removal has increased from the first to the second time period as have the numbers of patients presenting for surgical extractions. In contrast in the UK, the number of wisdom teeth removals has decreased since publication of the NICE guidelines in 2000 whereas the number of surgical extractions has increased dramatically in the period 1991-2000. As

far as the wisdom teeth are concerned the variation in our results is easy to understand bearing in mind the strict adherence to NICE/NHS policy in the UK as reported by Kim et al[29] but the increasing numbers of extractions of special difficulty is much more difficult to explain. Perhaps in our study the dentists in the dental clinic are simply referring more patients for special surgical extractions or perhaps because of the socio-demographic profile of our patients, teeth are neglected and are being retained for longer and hence break down further requiring surgical removal rather than simple extraction.

6.7 TYPE OF TREATMENT

When the overall types of treatment performed were statistically compared there was no statistical difference between the two time periods. However if individual procedures are analysed certain trends do emerge. The treatment of jaw fractures has declined from 65.4% of all treatments in 1987 to 35% of all treatments in 2007 although there has been no change in whether the fracture was treated by open or closed reduction with approximately equal numbers being treated by each of the two modalities in both time periods. This might be explained by financial considerations which dictate that the more expensive open reduction technique not be routinely used because of the cost of bone-plates. An analysis of changing trends in the management of fractures of the mandible in Cardiff (Wales), during the period 1983 to 1993 showed a dramatic increase in the cases of internal fixation using bone plates from 2% in 1983 to 53% in 1993.[34]

Although we do not have the data to determine the major causes of the jaw fractures most clinicians with experience of Bara will tell you that inter-personal violence is the major cause.

It is indeed disturbing that in South Africa such a large part of the units activities have to be directed to treating the effects of inter-personal violence and that resource which are desperately needed to treat and prevent TB and AIDS have to be directed to treating jaw fractures caused by assaults. At least the trend seems to be on the decrease.

It is very difficult to compare changing patterns of workload between the UK and South Africa. Firstly some of the reports of changing trends are from day-case clinics, others from hospital admissions and still others from the General Dental Service. Our data was derived from a large academic referral hospital. Secondly it should be borne in mind that in the UK a distinction is drawn between maxillofacial surgery and oral surgery with the former practitioners being both medically and dentally qualified. The scope of work undertaken by the two groups is distinctly different. In South Africa no such distinction is made. Thirdly, as already mentioned, routine extractions of teeth are not performed in the maxillofacial unit at Bara but in a separate dental clinic. This data was then not included in our study.

Nevertheless analysis of the international studies, shows that the major activities in MFOS units consists of routine extraction of carious teeth, surgical extraction of teeth and removal of impacted wisdom teeth with trauma related injuries accounting for only a small proportion of the workload of these units. In most instances the injuries are the result of motor-vehicle accidents. This is in contrast to the treatment procedures performed at Bara which in both in 1987 and 2007 consisted mainly of the treatment of jaw fractures.

6.8 TYPE OF ANAESTHESIA

The significant change to the use of local anaesthesia in preference to general anaesthesia in the 2007 time period is perhaps not so much a question of choice but rather of circumstances. It is certainly much cheaper to treat patients under local rather than general anaesthesia with decreased use of theatres and hospital beds. Problems with staff availability in the anaesthesiology department have meant that theatre lists are continually being cancelled or curtailed and MFOS staff are often faced with the prospect of a long delay before the patient can be treated using general anaesthesia. On the other hand immediate treatment using local anaesthesia is possible.

The audit from St. Mary's Hospital in Ireland[4,5] showed that while general anaesthesia remained the most common form of anaesthesia there had been increased utilization of conscious sedation. In a similar vain an audit from England and Wales reported a large shift of in-patients to day-case patients.[3,6-8]

Oral surgeons prefer to work on patients using general anaesthesia. It is quicker and easier, however it is also very much more expensive and therefore hospital administrators and third party health-care providers and funders are demanding that many procedures be carried out using local anaesthesia, no longer authorizing work under general anaesthesia.

6.9 DURATION OF THE OPERATION

The duration of the operative procedure decreased when the two time periods were compared although this difference was not statistically significant. Changes in the use of

local anaesthesia as opposed to general anaesthesia may partly explain this trend although other factors may also be responsible

6.10 TRAINING OF REGISTRARS

The question of adequate exposure to all aspects of maxillofacial and oral surgery is one that is of concern to all who are involved in the training of registrars. Analysis of the operative procedures performed in the unit show a large exposure to trauma related injuries such as jaw fractures. On the other hand there is virtually no exposure to implantology and to orthognathic surgery. The exact opposite may be true in the UK, where exposure to trauma related injuries and to resections for tumours may be too low. Cognisance needs to be taken of these shortcomings by those in charge of training. Rotations of registrars through either private practices which have been approved or through other hospitals with a different work profile needs to take place. This is indeed happening at many institutions. Monitoring of the range of procedures registrars are exposed to is an essential pre-requisite towards meeting accreditation requirements.

6.11 CANCELLATIONS, NO-SHOWS AND LOSS OF THEATRE TIME

Anecdotal evidence from the MFOS unit staff confirm that this is a major problem and point to shortages of anaesthetists and no-shows by patients to be the biggest single contributors to this problem which affects all surgical disciplines in the hospital.

Indeed this is a world-wide problem affecting even developed countries.[15-18] Review of the literature shows how use of pre-admission clinics can be used to partly reduce the frequency of cancellations by patients.[19]

6.12 SCOPE OF DATA COLLECTION

It is indeed unfortunate that the unit does not keep data on all factors which have an influence on service delivery. The keeping of data on cancellations and no-shows, waiting lists, numbers of staff, referrals, follow up, work done in the OPD or on patients admitted by other specialties and after hours emergency service, would be of great value in planning future services in the unit.

6.13 PERFORMANCE INDICATOR INDEX (PII)

Determination of PII is primarily the responsibility of national regulatory authorities such as the Quality Care Commission in the UK and does not relate to the quality of operative care but rather to the overall care of patients in hospitals or institutions. Nevertheless the idea is an attractive one and the setting of benchmark standards by units in order to monitor the quality of their own service delivery should be considered.

CHAPTER 7

CONCLUSIONS

1. Clinicians are increasingly being called upon to take managerial responsibility for the service in which they work.

2. Surgical audits provide evidence of changing trends in workload, in patterns of disease, in treatment procedures and in patient demographics. The systematic collection and collation of reliable data is essential when motivating for additional staff, finance or facilities.

3. Computer based audit systems are widely used in hospitals in the UK.

4. It is recommended that the scope of the data collected in the MFOS unit at Bara be expanded to include information such as numbers of staff, work done in the OPD or on patients admitted by other specialties, cancellations or no-shows by patients, length of hospital stay, waiting periods, referrals and waiting lists and that a computer based data collection system be introduced based on the models used in the UK.

5. Clinical staff will need to take responsibility for entering the data.

6. All surgical units need to consider setting benchmark standards against which their own performance can be monitored.

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APPENDIX A

ETHICAL CLEARANCE

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Damtew

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER M080821**
PROJECT	Changing Trends in Maxillo-facial and Oral Surgery at CH Baragwanath Hospital from 1987-2007
INVESTIGATORS	Dr MM Damtew
DEPARTMENT	Maxillo-facial and Oral Surgery
DATE CONSIDERED	08.08.29
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 08.09.01 **CHAIRPERSON** .....
(Professor P E Cleaton Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Prof M Altini

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX B

DATA COLLECTION FORMS WITH AN EXAMPLE OF SOME DATA FROM EACH TIME PERIOD