

# **Evaluation of dental emergency outcomes of the Oral Health Fitness Classification of the South African Military Health Service (SAMHS) in Gauteng - South Africa**

By

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Submitted in partial fulfilment of the  
requirements for the degree of

**Magister Chirurgiae Dentium (Community Dentistry)**

In the

**School of Dentistry**

**Faculty of Health Sciences**

**University of Pretoria**

**Pretoria**

**July 2012**

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## DECLARATION

I declare that every aspect of this dissertation entitled “Evaluation of dental emergency outcomes of the Oral Health Fitness Classification of the South African Military Health Service (SAMHS) in Gauteng – South Africa” was undertaken by me. It has not been submitted for any degree or examination at any university, and all the resource materials used and or quoted have been duly acknowledged

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## DEDICATION

This dissertation is dedicated to the memory of my late parents, Alfred and Ruth Madiba whose passion for education inspired me and to my father- and mother-in-law Rex and Bertha Mdhluhi for their prayers, encouragement and support.

## ACKNOWLEDGEMENTS

I wish to extend my sincere gratitude and appreciation to all the people who provided assistance in making my study a success, especially the following:

- The South African Military Health Service for allowing me to undertake studies for the Masters degree, for financing the studies as well as providing the data for this study.
- Brigadier General Derik Janse van Rensburg for initiating the commencement of my studies and his staff at the Oral Health Directorate of the SAMHS for taking over my duties so that I can complete my studies.
- Prof P.J. Van Wyk, my supervisor and Head of Department, for his dedicated supervision and expert guidance to ensure that an excellent product is produced.
- Prof OA Ayo-Yusuf for his guidance with the analysis and Dr Yolanda Kolisa for her input with the writing of the dissertation.
- Drs Masego Rantao and Buki Olutola for their valuable support.
- Colleagues in the department for their encouragement.
- My loving wife Thandi for her unwavering support and for taking over some of my duties in the house to ensure that I complete my studies as well as my daughter, Lehlogonolo and my two sons Mpho and Amukelani.
- My appreciation also goes to my granddaughter, Relebogile for her sloppy kisses whenever I arrived home late at night.
- My twin brother Jerry, for support and encouragement.
- Above all, I thank God, my redeemer, pillar and strength who saw me through the completion of the dissertation.

## ABSTRACT

**Background:** The South African National Defence Force (SANDF) like other Defence Forces of the world, conducts medical classification on their members. This medical classification has, as one of the components, an Oral Health Fitness (OHF) classification which is done according to North Atlantic Treaty Organisation (NATO) standards. The aim of the Oral Health Fitness classification is to standardize dental readiness, assess oral health, prioritize dental care, minimize the number of dental emergencies (DE), and emphasize the importance of good oral health to all active duty and reserve forces. Medical classification is conducted by the South African Military Health Services (SAMHS).

**Aim:** The aim of the study was to evaluate the dental emergency outcomes of the Oral Health Fitness classification of the SAMHS in Area Military Health Unit Gauteng (AMHU GT), South Africa

**Objectives:** To determine dental emergency rate for the SAMHS, analyse the dental emergencies and to make recommendations regarding dental emergencies to the SAMHS

**Methods:** A cross-sectional retrospective record analyses of members of the SANDF that received an OHF classification of 1 and 2 in AMHU GT in 2009. The AMHU GT members were followed up for a year to determine if they developed dental emergencies. Data analysis included frequency tables, chi-square tests and logistic regression analysis. The level of significance was set at  $p < 0.05$ .

**Results:** The dental emergency rate for AMHU Gauteng was 307/1000 per year. The type of dental emergencies were: 58.5% dental restorations, 13% extractions and related complications, 4.3% crown and bridge, 3.9% emergency root canals, 9.9% recementations, 3.6% denture related problems while other emergencies were 6.8%. Patients were more likely to experience a dental emergency if they were white, female, of OHF 2 classification and older than fifty years of age. Conversely they were least likely to experience a dental emergency if they were black, male, of OHF 1 classification and in the age group 31-40.

**Conclusion:** The dental emergency rate of 307/1000 per year for the SANDF is high compared to military health units from other countries and it was influenced by race, age and gender. The types of dental emergencies were mainly preventable.

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## List of Abbreviations

AMHU: Area Military Health Unit  
DE: Dental Emergency  
DENCLAS: Dental Classification  
DoD: Department of Defence  
DTF: Dental Treatment Facility  
ECC: Early childhood caries  
FTX: Field training exercises  
NHANES: National Health and Nutrition Examination Survey  
NATO: North Atlantic Treaty Organisation  
OHCS: Oral Health Care System  
OHF: Oral Health Fitness  
SAMHS: South African Military Health Services  
SANDF: South African National Defence Force  
STANAG: Standard Agreement  
UK: United Kingdom  
UN: United Nations  
USA: United States of America

# Chapter 1: Introduction

## 1.1 Background

The South African Military Health Services (SAMHS) is one of the four arms of the South African National Defence Force (SANDF), the other three being the South African Army, the South African Air Force and the South African Navy.<sup>1</sup> The main function of the SAMHS is to support the other three arms of services by providing health services to members of the SANDF, their families, the retirees and some members of parliament seconded by the State President.

While the responsibility of SAMHS is to take care of the health of the other arms of services, it also deploys its members outside the borders of the country in peace missions or peace support as the country and the Commander in Chief decide. These deployments are done under the auspices of the United Nations (UN) which implies that standards in respect of deployment should be in line with the United Nations standards for member countries deployment.<sup>2</sup>

According to UN, all personnel deployed in a UN mission must be physically, mentally and emotionally fit. Fitness must not simply imply the absence of disease, but also the ability to work effectively in a potentially hostile environment. Medical examination and clearance of personnel remain the responsibility of the troop contributing country.<sup>2</sup>

Medical readiness includes the following;

- a. Periodic health assessment
- b. No deployment-limiting conditions
- c. Dental readiness
- d. Immunization
- e. Medical readiness laboratory tests and
- f. Individual medical equipment.

Individual Medical Readiness is defined as fully medically ready in all Categories, including Oral Health Fitness Classification (OHF) 1 or 2.

The OHF classification utilised by the SANDF is similar to the classification used by the North Atlantic Treaty Organisation (NATO) members which is defined in the Standard Agreement (STANAG) 2466.<sup>3</sup> NATO nations classify their military personnel into four OHF classification/ dental fitness categories as follows:

- a. Category or Class 1, fully dentally fit;
- b. Category or Class 2, dental treatment is required but the condition is not expected to cause a problem within the next year;
- c. Category or Class 3, treatment is required and the condition is expected to cause a problem within the next year;
- d. Category or Class 4, dental examination has expired after 12 months or the member has never been classified.

In theory, only personnel in dental fitness categories 1 and 2 should be deployed, but the precise definitions of each category and whether personnel in any of the categories are prevented from being deployed varies from nation to nation.

Many nations have standard operating policies that mandate that certain types of conditions require classification in category or Class 3. Other nations allow more freedom of classification to clinicians to assess the level of risk. Where there is doubt concerning classification, a higher classification should be given.<sup>3</sup>

OHF, according to the Oral Health Care System of the SAMHS, prescribes that: "Dental care delivered to achieve OHF is focused towards treating those conditions which, if left untreated, could result in a dental emergency within 12 months". Dental emergency (DE) is defined as a condition, which causes pain, uncontrolled haemorrhage, acute infection or loss of masticatory function that significantly impacts on the patient's performance of duties.<sup>1</sup>

The following guidelines and criteria are used for the Oral Health Fitness Classification in the SAMHS:

Class 1.

Patients not requiring dental treatment or re-evaluation within 12 months. On examination the member is of optimal dental health requiring no dental treatment or appointments. (Appendix A)

Class 2.

Patients who have oral conditions that if not treated or followed up, have the potential but are unlikely to cause dental emergencies within 12 months. (Appendix A)

Class 3.

Patients who have oral conditions which if not treated are likely to cause dental emergencies within 12 months. (Appendix A)

Class 4.

Patients who;

- require an annual dental examination (or other required dental examinations),
- have an undetermined dental status,
- have no dental record,
- have an incomplete dental record and
- have no pantomograph confirmation. (Appendix A)

An additional guideline is that where there is doubt whether to classify 2 or 3; the patient should be classified 3.

The OHF classification is done under the following conditions and classified as such:

- a. During concurrent health assessment
- b. When a patient treatment plan is completed within three months of the initial examination. If the treatment plan is completed after three months, an appointment is scheduled specifically for dental fitness classification.
- c. During an emergency dental visit whereby conditions fall within OHF class 3. An example will be if the patient has an emergency

root canal treatment which requires many dental visits to be completed.

- d. When a patient is new to the South African National Defence Force, an example being recruits who come into contact with an oral health care practitioner for the first time.
- e. When the assessment has expired after twelve months of classification.
- f. When the practitioner uses specific South African Dental Association treatments codes namely 8101, 8102 and 8120 and certain unique codes of the SAMHS (0051, 0050 and 0052)
- g. When the patient has been referred to a dentist by an oral hygienist to change the classification to Class 3.

The following dental care practitioners can perform the OHF classification.

- a. Dentists
- b. Dental Specialists
- c. Dental Therapists. It should be noted that up until 2009 there was only one dental therapist in the SAMHS who has since left the Oral Health Care System (OHCS) of the SAMHS.
- d. Oral Hygienists. Although oral hygienists are allowed to classify class 1 and 2, they are not allowed to change a classification to 3. When an oral hygienist notices that the condition in the mouth should be classified 3, they refer the patient to a dentist who then confirms or refutes the classification. <sup>1</sup>

The oral health care system (OHCS) of the SAMHS has in total 42 dental clinics distributed throughout the country in all provinces referred to as Dental Treatment Facilities (DTF's). The DTF's are distributed as follows throughout the provinces referred to as Area Military Health Units (AMHU's) :<sup>1</sup>

- a. AMHU Gauteng: 10
- b. AMHU Eastern Cape: 1
- c. AMHU Bloemfontein: 5
- d. AMHU Kwa-Zulu Natal: 4
- e. AMHU Limpopo: 3

- f. AMHU Mpumalanga: 2
- g. AMHU Northern Cape: 4
- h. AMHU North West: 3
- i. AMHU Western Cape: 10

The highest number of DTFs is in Gauteng and the Western Cape.

## **1.2 Research problem (The rationale)**

Dental emergencies are a threat to the military mission because emergency dental conditions take soldiers away from their assigned places of duty. The prevention and treatment of dental diseases are important factors in maintaining a combat ready military force.<sup>4</sup> Dental readiness is an integral component of the SANDF's overall readiness program, and therefore dental care should be delivered to avoid dental emergencies.<sup>1</sup>

It is known within the Departments of Defence worldwide that oral diagnosis by dental providers is an art, as well as a science. Although guidelines are meant to ensure standardization of the patients' recorded information, the various services have different interpretations of the guidelines.<sup>5</sup> The SAMHS is not immune to this. This is observed with the guidelines that states that "if there is doubt with classification, one should classify higher" i.e. if there is doubt to classify 2 or 3 then the classification should be 3.<sup>1</sup>

Soldiers are dentally ready to deploy when classified Class 1 or 2 and are not ready to deploy when classified Class 3.

## **1.3 Potential benefits of the study**

The findings of the study may be used by policy makers to make informed decisions on which intervention strategies to utilize to prevent dental emergencies.

## Chapter 2: Literature review

### 2.1 Effects of dental emergencies on a soldier

Soldier dental emergencies reduce combat effectiveness and are a major concern of military planners. Dental readiness is an important part of mobilization and has a direct effect on the capability of a deployed force to accomplish its assigned mission. Dental emergencies can significantly degrade the ability of mission accomplishment where there is expertise required and each soldier is important.<sup>6</sup> Dental readiness has been shown to have a direct effect on deployed soldiers' disease and non-battle injury.<sup>6</sup>

The objective of the Department of Defence (DoD) Oral Health and Readiness Classification System is to standardize dental readiness, assess oral health, prioritize dental care, minimize the number of dental emergencies (DE) and emphasize the importance of good oral health to all active duty and reserve forces.<sup>7</sup> Preventing dental emergencies is not only an objective, (as has been stated) but is a primary objective for the prioritization of dental care delivered to military personnel. Dental classification guidelines are used by military dental services to predict which patients are most likely to experience a dental emergency within a 12-month period.

It is important to note that although dental morbidity is seldom fatal, it can affect the ability to eat and to speak and can affect the general well-being of a soldier. Despite the perception of soldiers as more stoic individuals, the military is not immune to the impact of poor oral health.<sup>8</sup> Dental emergencies can significantly degrade the ability of mission accomplishment in a highly technological force that depends on each soldier's unique experience and knowledge in team tactics and crew-served weapons. Traditionally, the amount of expected dental emergencies was one facet in determining the size of the dental footprint on the battlefield. Not only are dental emergencies important for determining staffing, but preventing them is vital to soldiers'



lives, as travelling to a dental facility in the presence of an active combat is more risky than a toothache.<sup>4</sup> One study of a deployed armoured division found that "dental complaints ranked second only to upper respiratory infections as a cause of lost duty time." This means that poor dental health of one individual may compromise the effectiveness of the entire unit.<sup>9</sup>

One of the objectives of OHF classification or Dental Classification as referred to by other authors is to minimise the rate of dental emergencies during deployments. The question that can be asked is whether OHF classification can be used as a predictive measure for dental emergencies? The answer to the question is a definite no. This is evidenced by the fact that despite this classification dental emergencies are still experienced. Some authors even label the OHF classification as a triage system where members presenting with problems during their annual dental examinations can receive an appropriate treatment plan to rectify a member to a deployable dental status.<sup>10,11</sup> Reports on Australian forces that were deployed in East Timor and Bougainville reported that a high number of members presenting as DE were OHF I or 2 and therefore suggested that that the OHF classification was not predictive of dental emergencies.<sup>10</sup>

## **2.2 Dental emergency rates in other countries**

Payne and Posey<sup>12</sup> evaluated the incidence and causes of DE that occurred in U.S. Army personnel during 39 days of field training exercises in 1978. An annual incidence of 167 DE's per 1,000 personnel per year (DE's/1,000 per year) was reported, 26% of which DE were considered non preventable. Teweles and King<sup>13</sup> reported an annual incidence of 160 DE's/1,000 per year and stated that 33% of the DE's that occurred during a 6-month peacekeeping deployment of the U.S army in Egypt in 1982 could not have been prevented even with proper diagnosis and treatment.

Keller<sup>14</sup> reported incidence rates for DE's of 324 and 272 DE's/1,000 per year during 1981 to 1982 and 1983 to 1984, respectively. He estimated that 39%

and 29% of DE's experienced by U.S. army personnel in 1981 to 1982 and 1983 to 1984, respectively, were non preventable. Richardson<sup>15</sup> reported annual incidence rates of 148 and 160 DE's/1,000 Royal Navy/Royal Marines and Army, respectively. He reported a much higher estimate of 75% non preventable DE's in these troops deployed to Iraq in 2003.

King<sup>11</sup> reported on the DE's determined<sup>11</sup> by various authors on US military personnel and the results of these studies are shown in Table 1.

**Table 1: Dental emergencies: King 2008.<sup>11</sup>**

Countries	(N/1000/year
VIETNAM	
Hutchins & Barton (1967)	66-99
Cassidy (1968)	142
Ludwick, et. al. (1969)	184
FIELD OPERATIONS	
Sumnicht/FTX (1964)	152
Payne & Posey/FTX (1978)	167
Parker, King & Brunner/FTX (1981)	234
King & Brunner/FTX (1982)	259
Teweles & King/ peacekeeping (1983)	160
GULF WAR	
Tolson (1991)	214
Deutsch & Simecek (1990-1991)	149
SOMALIA	
Swan & Karpetz (1993)	232
BOSNIA	
Chaffin, King & Fretwell (2000)	156
Moss (2001)	170
IRAQ	
Dunn, et. al (2003)	153/145

## 2.3 Definitions of a dental emergency

Dental emergencies are defined differently by different authors. The obvious conclusion is that comparisons for research and proper planning will be different until there are agreements to both the clinical examinations and interpretations of the definition of a dental emergency.

The following are interpretations of what constitute a dental emergency by different authors:

- a. A DE is defined as "any unscheduled dental attendance for which a patient has a chief complaint." The subjectivity of the outcome dictates that many of the DE experienced are attributable to individual patient pain threshold levels and behaviours rather than disease progression or infection.<sup>16</sup>
- b. "Symptoms of pain, loss of function, or sufficient psychological concern to cause a patient to seek or be referred for emergency dental treatment."<sup>17</sup>
- c. One other definition of unknown origin is: "Care provided for the purpose of relief of oral pain, elimination of acute infection, control of life-hazardous oral conditions and treatment of trauma to teeth, jaws, and associated facial structures."<sup>17</sup>
- d. An emergency is any condition that prompts a soldier to leave their duty station to seek care.<sup>6</sup>
- e. *Dental emergency* (DE) is defined as a condition, which causes pain, uncontrolled haemorrhage, acute infection or loss of masticatory function that significantly impacts on the patient's performance of duties.<sup>1</sup>

In view of the inconsistencies in defining what constitute a DE, workshop attendees at a symposium held in the United States arrived at a consensus

definition that a DE is a condition of oral disease, trauma or loss of function, or other concern that causes a patient to seek immediate dental treatment.<sup>17</sup> This definition is different from SAMHS which define a dental emergency as a condition, ***“which causes pain, uncontrolled haemorrhage, acute infection or loss of masticatory function that significantly impacts a patient’s performance of duties”***

## **Chapter 3: Aims, objectives and methodology**

### **3.1 Aim of the Study**

The aim of the study was to evaluate the dental emergency outcomes of the OHF classification of the SAMHS in Area Military Health Unit Gauteng, South Africa.

### **3.2 Objectives**

1. To determine the rate of dental emergencies for the SAMHS after Oral Health Fitness Classification.
2. To determine the types of dental emergencies.
3. To make recommendations to the SAMHS concerning Oral Health Fitness Classification

The first two objectives will provide the SAMHS with a scientific evidence–based calculated dental emergency rate and a profile of the types of dental emergencies to inform planning.

### **3.3 Methodology**

#### **3.3.1 Study Setting**

Gauteng AMHU and Western Cape AMHU of the SAHMS have each ten dental treatment facilities (DTFs) and are the two provinces that treat most members of the SANDF. AMHU Gauteng was selected for the purpose of the study.

### **3.3.2 Study design**

A cross-sectional retrospective study that analysed records of members of the SANDF that received an OHF classification of 1 and 2 in AMHU Gauteng during 2009. The records were followed up for 12 months after their initial OHF classification to determine the dental emergency rate as well as to analyse the profile of the dental emergencies that developed.

### **3.3.3 Study population**

Area Military Health Unit Gauteng classifies on average about hundred and forty members of the SANDF per week. The OHF classifications as well as all the dental treatment records of members of the SANDF are captured on the Dental System mainframe.

All the members that received OHF classification 1 and 2 in Gauteng Province during 2009 constituted the study population. The records of members were followed up for 12 months after they were classified to assess if they had developed a dental emergency within that period.

### **3.3.4 Data managements and analysis**

Data analysis was done by using STATA version 10 software (STATA Corporation, College Station TX) and SPSS version 20. Data analysis included descriptive statistics, describing the profile of the users using frequency tables. The chi-square tests were used to calculate the statistical differences between variables. The level of significance was set at  $p < 0.05$ .

Multiple variable-adjusted logistic regression was performed to analyse factors most likely to independently influence dental emergency consultation a year after the initial visit during which an OHF class 1 and 2 was classified. Logistic regression is useful for situations in which there is a need to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. The Hosmer–Lemeshow test was also

used to determine if the logistic regression model used adequately fitted the data. A value of above 0.05 for the Hosmer–Lemeshow test is an indication that the logistic regression test performed adequately fits the data.

### ***3.3.5 Ethical and legal considerations***

The study protocol was reviewed and approved by University of Pretoria, Faculty of Health Sciences Ethics Committee. Permission to use dental records was granted by the SAMHS and the SANDF Intelligence Division gave clearance for the study as it would not compromise security prescripts of the organization. (Appendices C, D and E)

## Chapter 4: Results

### 4.1 Demographic factors (race/gender/age)

The total number of the soldiers who received an OHF classification in Gauteng in 2009 was 6352. The ages ranged from 20 to 64 years with a mean age of 40.13 years. The population was subdivided into four age groups and most (37.3%) of the soldiers were within the 41-50 years age group. The 51 years and higher age group had the least number of soldiers - 871(13.7%). Table 2 below shows the demographic profile of the study population

**Table 2: Socio-demographic profile of soldiers, OHF classification by dental emergencies**

Variables		No Emerg N=4405	Emerg N=1947	Total N=6352 (%)
Gender n(%)	Male	3158(71.1%)	1282(28.9%)	4440(69.9)
	Female	1248(65.3%)	664(34.7%)	1912(30.1)
Race n(%)	White	641(48%)	699(52%)	1340(21.1)
	Coloured	245(65%)	139 (35%)	393(6.2)
	Black	3477(76%)	1080(24%)	4557(71.7)
	Asian	33(53%)	29 (47%)	62(1)
Age group in years; Mean (SD)	20-30	1000(75.0%)	334(25.0%)	1334(21)
	31-40	1284(72.3%)	492(27.7%)	1776(28)
	41-50	1665(70.3%)	705(29.7%)	2370(37.3)
	≥ 51	456(52.4%)	415(47.6%)	871(13.7)
OHF classification n (%)	OHF Class1	2140(72.5%)	810(27.5%)	2950(46.4)
	OHF Class2	2266(66.6%)	1136(33.4%)	3402(53.6)

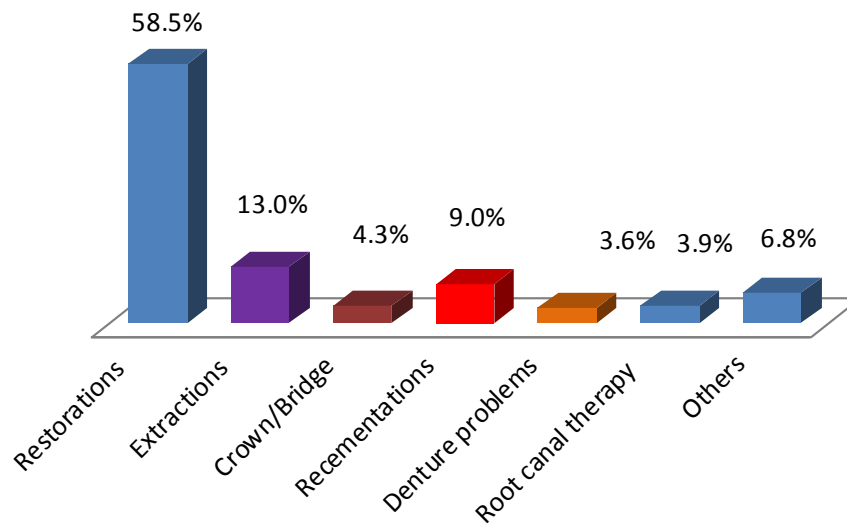
### 4.2 Dental emergency rate in AMHU Gauteng

Of the total population of 6352, 4405 (69.3%) did not develop an emergency while 1947(30.7%) developed a dental emergency within a year of classification, which imply that the dental emergency rate for AMHU Gauteng is 307/1000 per year.



### 4.3 Types of emergencies

When type of dental emergencies were analysed, the results show that dental restorations as a group contributed the most, 58.5% followed by extractions and related complications (13%) while denture problems contributed the least at 3.6% (Fig 4.1). For a detailed contribution of dental procedures to the type of dental emergencies see Appendix F.



**Figure 4.1: Type and percentage of dental emergencies experienced by the soldiers in 2009-2010**

### 4.4 Bivariate association between gender and dental emergency stratified by age groups

Bivariate association between gender and dental emergency stratified by age group is shown in Table 3. DE's are expressed as a percentage of the total number of people in the sample for gender and age group

**Table 3: Bivariate association between gender and dental emergency stratified by age groups**

Age group	Male		Female		p- value
	DE's (%)	n	DE's (%)	n	
20-30	167 (22.4)	744	167 (28.3)	590	<u>0.014</u>
31-40	315 (25.6)	1231	177 (32.5)	545	<u>0.003</u>
41-50	508 (27.5)	1845	197 (37.5)	525	<u>0.000</u>
51 and higher	292 (47.1)	620	123 (49)	251	0.61

Data in Table 3 clearly shows that for the age groups 20 to 50 the difference in dental emergencies for males and females was highly significant ( $p < 0,05$ ). There was no statistical significant difference in DE's by gender in the older age group ( $p > 0.05$ ).

Table 3 further shows that the prevalence of dental emergency increases with age, with the age group 20-30 years of age contributing the least and the age group 51 years of age and higher contributing the most. Females of all the age groups consistently contribute more than males towards dental emergencies ( $p < 0.05$ ).

#### **4.5 Bivariate association between race and dental emergency stratified by age groups**

Table 4 shows the bivariate association between race and dental emergency stratified by age groups. DE's are expressed as a percentage of the total number of people in the sample for a particular race group for that age group.

**Table 4: Bivariate association between race and dental emergency stratified by age groups**

Age group	Black		White		Coloured		Asian		p-value
	DE's (%)	n	DE's (%)	n	DE's (%)	n	DE's (%)	n	
20-30	257 (22.9)	1123	34 (35.8)	95	38 (36.9)	103	5 (38.5)	13	0.001
31-40	268 (22.2)	1262	174 (47.7)	365	42 (33.3)	126	8 (34.8)	23	0.000
41-50	415 (23.6)	1758	244 (51.6)	473	40 (31.7)	126	6 (46.2)	13	0.000
51 and higher	140 (33.8)	414	246 (60.6)	406	19 (50)	38	10 (76.9)	13	0.000

For all age groups the differences in dental emergencies for the different races was highly significant ( $p < 0.05$ ). White military personnel in all the age groups consistently contributed more towards dental emergencies than all races except in the age group 51 years of age and higher where Asians contributed more. Blacks contributed the least to dental emergencies.

#### **4.6 Bivariate association between OHF classification and dental emergency stratified by age groups**

Table 5 shows the bivariate association between OHF classification and dental emergency stratified by age groups. DE's are expressed as a percentage of the total number of people in the sample for OHF classification for that age group.

**Table 5: Bivariate association between OHF classification and dental emergency stratified by age groups**

Age group	OHF 1		OHF 2		p- value
	DE's (%)	n	DE's (%)	n	
20-30	142 (20.1)	706	192 (30.6)	628	<u>0.000</u>
31-40	209 (24.5)	852	283 (30.6)	924	<u>0.004</u>
41-50	277 (27.4)	1012	428 (31.5)	1358	<u>0.029</u>
51 and higher	182 (48)	379	233 (47.40)	492	0.846

Table 5 shows that for the age group 20-50 years of age the difference in dental emergency for the age groups was highly significant ( $p < 0.05$ ) with OHF 2 contributing more towards dental emergencies than OHF 1 but for age group 51 years of age and higher there was no difference in DE between the patients who were classified as OHF 1 and those classified OHF 2 ( $p = 0.846$ ).

#### 4.7 Logistic regression

For logistic regression, dental emergencies were used as dependent variables while the predictors or independent variables were gender, race, OHF classification and age groups. For the purpose of logistic regression, the age group 51 and higher, whites, OHF classification class 2 and males were used as references.

The Hosmer–Lemeshow test gave a value of 0.08 which suggests that the logistic regression model adequately fits the data. On average the logistic regression model gave a value of 71, 5% as the percentage of dental emergencies being correct, which confirms that this is an appropriate model to use.

The results of logistic regression analysis are shown in Table 6.

**Table 6: Results of logistic regression analysis using dental emergency as the dependent variable**

		Sig.	Odds Ratio Exp(B)	95% C.I. for Exp(B)	
				Lower	Upper
GENDER	Male		1		
	Female	0.000	1.38	1.22	1.56
RACE	White	0.000	1		
	Asian	0.350	0.78	0.46	1.31
	Black	0.000	0.30	0.26	0.35
	Coloured	0.000	0.55	0.43	0.70
OHF CLASSIFICATION	OHF 2		1		
	OHF1	0.000	0.67	0.60	0.76
AGE GROUP	Age group 51 &.higher	0.000	1		
	Age group 20-30	0.000	0.55	0.45	0.67
	Age group 31-40	0.000	0.54	0.45	0.64
	Age group 41-50	0.000	0.62	0.53	0.74

Table 6 indicates that with males as reference, females are 38% more likely to develop an emergency than males. With race and with whites as reference all the other races are below one, which means that whites are more likely to have an emergency. Whites are closely followed by Asians and Coloureds while Blacks are the least likely to have a dental emergency. The results of table 6 indicates that blacks have 70%, coloureds 45% and Asians have 22% less chance of having a dental emergency than whites. Using OHF 2 as reference the results show that OHF 1 patients are 33% least likely to have a dental emergency than OHF 2 patients. With age and with the 51 and older age group as a reference, the 20-40 year old age group have 45% less chance of experiencing a dental emergency and the 41-50 year old age group 38%

### Summary results for logistic regression

Logistic regression results suggest that patients are more likely to experience a dental emergency if they are white, female, of OHF 2 classification and older than fifty and that they are least likely to experience a dental emergency if they are black, male, of OHF 1 classification and in the age group 31-40.

## Chapter 5: Discussion

### 5.1 Demographic factors (race/gender/age)

The total population of the study was 6352, of which 4440 (69.9%) were male and 1912 (30.1%) female. As far as race was concerned 4557 (71.7%) were black, 1340(21.1%) white, 393(6.2%) coloured while 62(1%) were Asian.

Table 7 below compares the representation of the different race groups in the study population with the representation of race groups ( $p>0.05$ ) in the total population of the SANDF and the population of South Africa during the period of the study. The representation is expressed in percentages.

**Table 7: Population of the study compared with the SANDF and South African population**

Race	Demographics in SA <sup>18</sup>	Demographics in SANDF <sup>19</sup>	Demographics in the study)
African	79.4%	81.2%	71.7%
Coloureds	8.8%	13%	6.2%
Indian/Asians	2.6%	1.3%	1%
White	9.2%	13.8%	21.1%
p-value	0.213	0.213	Not applicable

Table 7 shows that the representation of the different race groups in the study population is comparable with the representation of the different race groups in the total population of the SANDF or the total population of South Africa. It can therefore be concluded that the results of the present study can also be made applicable to the total SANDF population.

## **5.2 Dental emergency rate in AMHU Gauteng**

The SAMHS define a *dental* emergency as a condition, which causes pain, uncontrolled haemorrhage, acute infection or loss of masticatory function that significantly impacts on a patient's performance of duties.<sup>1</sup> The dental emergency definition used in this study confers with the consensus reached at a dental emergency symposium in 2006 that defines a dental emergency as follows: “DE is a condition of oral disease, trauma or loss of function, or other concern that causes a patient to seek immediate dental treatment”<sup>17</sup>

The dental emergency of 307/1000 per year implies that for every 100 people who are declared dentally fit, 31 will report for dental emergencies. The dental emergency rate of 307/1000 per year for the SANDF can be compared with that of the UK forces at base units which was 308/1000 per year in 2001.<sup>20</sup> This dental emergency rate compared favourably with that found in the US army in 1981 to 1982 which was 320/1000 per year. In the very same army the dental emergency rate during 1983 to 1984 dropped to 270/1000 per year.<sup>14</sup> Dental emergency rates reported thereafter for the US army were much lower, 230/1000 per year for soldiers deployed to Somalia in 1993 and 140/1000 per year to 150/1000 per year for the soldiers deployed to Iraq in 2003.<sup>11</sup>

Based on dental emergencies reflected in literature the dental emergency rate for the SANDF can be defined as high.

## **5.3 Type of emergencies**

An analysis of the type of dental emergencies showed that dental restorations contributed 58.5%, extractions and related complications 13%, crown and bridge related emergencies contributed 4.3% and emergency root canal treatments 3.9%.

In order to reduce dental emergencies in the SAMHS, there is a need to know what percentage of the emergencies could have been prevented and what

percentage is non preventable. There is very little consensus on which dental emergencies are preventable and which are not.<sup>16</sup> Emergencies such as aphthous ulcers, herpetic lesions, root sensitivity, restoration fractures and trauma are considered not preventable.<sup>16</sup> While this is true, it is also accepted that some of the trauma on anterior teeth that are malaligned could have been prevented by orthodontic treatment.<sup>16</sup> Furthermore, the fact that an unscheduled visit by a patient, as per definition of dental emergency can be attributable to an individual pain threshold as opposed to disease progression or infection adds to the complexity.

Payne and Posey<sup>12</sup> considered dental emergencies due to dental caries and gingival conditions as preventable and all others as non preventable.<sup>12</sup> Keller considered all dental emergencies non preventable, except dental emergencies due to pulpal disease, periodontal conditions and pericoronitis<sup>14</sup> and Teweles and King considered fractured teeth which otherwise appeared sound, fractured restorations, restored teeth which required endodontics treatment and the results of traumatic injury to be non preventable.<sup>13</sup>

Considering the abovementioned definitions one could conclude that emergencies resulting from dental caries and periodontal conditions are preventable while all other dental emergencies are non preventable. Based on the definition above the dental emergencies described in the current study could be classified into preventable and non preventable emergencies. (Table 8)



**Table 8: Dental emergencies classified into preventable and non preventable.**

Restorations	58.5%	preventable
Extractions	13%	preventable
Crown and bridge	4.3%	preventable
Maxillofacial injuries	0.0%	Non preventable
Recementations of crowns/bridges, inlays	9.9%	Preventable
Emergency root canals	3.9%	Preventable
Denture related problems	3.6%	Preventable/non preventable
others	6.8%	Preventable/non preventable

Table 8 show that a large percentage of the dental emergencies experienced in AMHU GT are preventable and to reduce the dental emergency rate these preventable emergencies should be specifically targeted.

In a study by Austin and others in London that investigated who and for what reason people visited dental emergency rooms it was reported that more than 70% visited because of toothache.<sup>21</sup> Other reasons were a swollen face, fractured tooth and or restorations. This specific study also reported that people visit emergency dental rooms mainly because of dental caries and periodontal disease and therefore concluded that it is mainly patients with preventable emergencies that presented at emergency rooms.<sup>21</sup> Another study conducted in California which investigated emergency visits for preventable dental conditions showed that it was mainly whites and females that were likely to visit as compared to other races and males respectively.<sup>22</sup>

## 5.4 Gender and dental emergency stratified by age group

The results of this study show that older patients (age group 51 years of age and higher) contributed more to dental emergencies (47%) compared to the 25% of the younger age groups (20-30 years of age). Females of all age groups consistently contributed more than males toward dental emergencies. Females in the age group 20-30, 31-40, 41-50 and 51 years of age and older respectively contributed 5.9%, 6.9%, 10% and 2% more than their male counterparts to dental emergencies.

Studies show that when dental caries rates are reported by gender, females are found to exhibit higher prevalence rates than males.<sup>23, 24</sup> In a study from the Canary Island females were found to have twice the frequency of dental caries than males.<sup>23</sup> The explanation for females having a higher percentage of caries could be explained by one of three theories.<sup>23</sup>

- a. Earlier eruption of teeth in girls, hence longer exposure of teeth to a cariogenic oral environment,
- b. Easier access to food supplies by women and frequent snacking during food preparation, and
- c. Hormonal differences and pregnancy

Research performed on laboratory animals reveals that caries rates increase proportionally with increasing estrogen levels, whereas increasing androgen levels have no effect. There is also an association between increased thyroid levels in the blood, and a decrease in caries rate. Fluctuations in the level of estrogens influenced thyroid activity, and led to a reduction in the saliva flow rate and an increase in caries rate. It was found that females had a significantly lower mean saliva flow rate than men, for both unstimulated whole saliva as well as stimulated saliva and that postmenopausal women were reported to have a reduced salivary flow rate.<sup>23</sup>

Pregnancy on the other hand is one life-history event that presents an extreme case of hormonal fluctuation. During pregnancy, estrogen levels

reach a peak which is higher than at any other time in the life history of a female and hence caries rates also increase among pregnant women as compared to women who are not pregnant. Pregnancy modifies the biochemical composition of saliva, reducing the buffer capacity and promoting bacterial growth, factors that play a pivotal role in cariogenesis.<sup>25</sup>

In a study of 504 pregnant women, a correlation between pregnancy and caries rates was established. There was a positive correlation between the number of children a woman had and the total incidence of caries.<sup>26</sup> A number of investigators have noted sex hormone-mediated alteration of the subgingival flora and the subsequent increase in gingival inflammation.<sup>27, 28</sup>

All the above factors can account for a higher prevalence of dental emergencies found in females as compared to males.

## **5.5 Age and dental emergencies**

This study consistently showed that dental emergencies increased with age. A study conducted in 10 000 subjects that ranged from 5-20 years of age showed that caries is an age dependent phenomena. Dental caries begins shortly after eruption, increases in the late teens and then plateaus during the third decade of life.<sup>29</sup>

The composition and flow rate of human saliva can be indirectly affected by factors including disease, medical procedures and medications, through their effects on the endocrine system. Xerostomia, a term describing dryness resulting from low salivary flow, is positively correlated with increased caries rates in the elderly and those who suffer from a variety of ailments, including arthritis, diabetes, and hypertension.<sup>23</sup> The above medical conditions are experienced by the elderly and therefore support the findings of this study which shows positive correlation of dental emergencies with an increase in age.

A National Health and Nutrition Examination Survey (NHANES) conducted in 1999–2004 that examined people 20-64 years of age showed that dental

caries prevalence increases with age, is more in females than males and more in whites as opposed to the other races.<sup>30</sup> This survey correlates with the current study in terms of the results and the age distribution.

## **5.6 Race and dental emergency stratified by age**

The summary results for race and emergency in this study showed that whites contributed more than blacks to dental emergencies; 52.1% and 23% respectively. The other two major race groups in South Africa, Asian and Coloured occupy positions between the whites and blacks. These findings are also evident from the NHANES study.<sup>30</sup> In another study conducted in Atlanta it was concluded that for every tooth at all ages and for both males and females, black individuals experience less dental caries than whites and that differences in caries experience between blacks and whites was large and consistent.<sup>29</sup>

The latest survey to determine the prevalence of edentulousness in the South African population gave the following results: Asians 4.5%, Black 6.3%, Coloured 51.6% and White 16.2%, with females being more edentulous than males.<sup>31</sup>

The study conducted for AMHU GT shows a higher rate of dental emergencies for whites than all the major racial groups which is a finding that is consistent with literature.<sup>22, 29, 30</sup>

## **5.7 OHF and dental emergency stratified by age**

The summary results for OHF classification showed that OHF 2 for all age groups consistently contributed more than OHF 1 toward dental emergencies. This finding is consistent with the definition of the OHF classification which defines people in OHF 1 as people who, at the time of examination, are of optimal dental health and who do not require an appointment or dental treatment while those in OHF 2 are “patients who have oral conditions that if not treated or followed up, have the potential but are unlikely to cause dental emergencies within 12 months”. (In line with the definitions) it is therefore expected that OHF 2 patients will have more dental emergencies than OHF 1.

## **5.8 Logistic regression**

The logistic regression model used for the study was shown to adequately fit the data both by the Hosmer-Lemeshow statistic and a higher percentage of the cases classified correctly as emergencies and therefore the conclusion is that a member is more likely to experience a dental emergency if white, female, OHF 2 and older than fifty years of age and that a member is least likely to experience a dental emergency if black, male, of OHF 1 classification and in the age group 31-40 years of age.

## **5.9 Limitations of the study**

The study objectives were to determine dental emergency rate and to analyse dental emergencies of the population of AMHU GT who were classified OHF 1 and 2 in 2009, to follow each subject for a year to determine if they developed a dental emergency and to analyse dental emergencies experienced. This study assumed that the OHF classification performed on the subjects is valid, reliable and objective. This assumption might be wrong and might have contributed to a percentage of emergencies and hence the high DE rate.

## Chapter 6: Conclusion and recommendations

### 6.1 Conclusion

This study sought to determine the dental emergency rate for the SAMHS/SANDF as well as analyse the profile of dental emergencies

- The dental emergency rate of SANDF was 307/1000 per year. This dental emergency rate could be regarded as high if compared to other countries, but was comparable to the 320/1000 per year emergency rate that was experienced by the US Army in 1981/82 and for the UK forces in 2001.
- When dental emergencies were analysed the study showed that dental restorations contributed 58.5% followed by extractions and related complications at 13%. The results also show that a high percentage of dental emergencies were preventable.
- An increase in age was positively correlated with an increase in dental emergencies.
- Females contributed more to the dental emergencies than their male counterparts.
- In terms of race, Whites contributed more to the dental emergencies followed by Asians and Coloureds, and Blacks contributed the least.
- With regards to OHF classification, class 2 contributed more to dental emergencies than class 1.
- The logistic regression model chosen for this study was shown to have adequately fitted the data and confirmed a higher chance of reporting for a dental emergency if white, female and in the age group of 51 years and older and a lower chance of reporting for a dental emergency if black, male and in the age group 31 to 40 years

## 6.2 Recommendations

The following recommendations are made on the basis of the findings:

- This study only focused on the dental emergency outcome of the OHF classification and therefore assumed that oral health personnel who conduct OHF classification do it objectively, reliably and uniformly. The high DE rate could well be attributed to the fact that the patients were initially not classified correctly. It is therefore recommended to the SAMHS that oral health personnel must be trained and calibrated in the OHF classification index.
- The number of preventable emergencies is high and if reduced this will ensure that the dental emergency rate of SAMHS/SANDF will also reduce. It is therefore recommended that the oral health professionals be enlightened about this and steps be taken to ensure that preventable dental emergencies are reduced.

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## Appendix A

### **GUIDELINES TO THE ORAL HEALTH FITNESS CLASSIFICATION**

#### INTRODUCTION

1. Good oral health of deployable forces is essential for mission sustainability. While the *Oral Health Fitness Classification System* is necessary to designate oral health readiness for deploying personnel, it is also of importance in determining overall dental treatment needs for all active duty and reserve personnel.
2. An objective oral health assessment of each patient, based on an individual risk assessment of the potential for rapid deterioration is essential to provide the most accurate oral health fitness classification possible.

#### **STANDARDISED ORAL HEALTH FITNESS CLASSIFICATION**

3. Standard. The Oral Health Fitness (OHF) Classification to be used in the SANDF is similar to STANAG 2466 (Edition 1) (Ratification Draft).
4. Lay Definition. The term *Dentally Fit* (OHF Class 1 and 2) is defined in STANAG 2466 (Edition 1) as a stage of oral health which, once attained and maintained, ensures that service personnel are fit to carry out all military duties without loss of time or effectiveness being attributable to dental causes.
5. Definition. The award of *Dentally Fit* categorisation for uniformed personnel is appropriate where:
  - a. There is no evidence of the progression of monitored carious lesions, or of active caries extending into dentine. Care is to be exercised when interpreting radiographic data involving lesions extending to the amelo-dentinal junction.
  - b. There are no teeth present with signs of irreversible pulpal damage. Pulp capping or inadequate endodontic treatment should not necessarily negate dental fitness provided where there is good evidence of clinical and radiographic stability. Direct pulp capping is usually unacceptable in personnel subject to barometric pressure changes.
  - c. There is no evidence of active periodontal disease that is beyond control by self-care.
  - d. There are no periodontally involved teeth with associated apical involvement which are untreated, and when treated do not show both clinical and radiographic signs of resolution
  - e. There is no significant tooth mobility. In particular pathology which interferes with speech or occupational function such as the wearing of oxygen masks or diving mouthpieces.
  - f. There are no permanent restorations which are cracked, loos or leaking. There are no temporary restorations present.

- g. The occlusion should be stable with speech and function uncompromised. Excessive parafunctional activity should be considered in the light of potential long-term damage and may preclude an award.
- h. There should be no history of recent unresolved problems diagnosed as of probable dental origin.
- i. Dental prostheses should be retentive and stable in function commensurate with the occupational commitment of the individual.
- j. The presence of third molars in communication with the oral cavity which are unlikely to erupt into functional occlusion and with a history of repeated pericoronal infection may preclude the award of the *Dentally Fit* category. Where the prognosis is unclear, individual occupational and operational commitments must be taken into consideration. In such cases the advice of a consultant oral surgeon is to be sought.
- k. There are no functionless roots in communication with the oral cavity. Buried roots with no association pathology may be left in situ and a revised frequency of review considered.

6. Subject to any change in clinical status, the award of *Dentally Fit* category is normally valid for a period of twelve months. Personnel found to be *Dentally Unfit* (OHF Class 3 and 4), may be re-categorised as *Dentally Fit* by meeting the above criteria at a clinical examination. Unless considered necessary by the examining dental officer, screening radiographic examinations should comply with the criteria laid down in the Dental Policy Directive (CSADF Directive 7/1).

7. Oral Health Fitness Classification. Dental care delivered to achieve OHF is focused towards treating those conditions which, if left untreated, could result in a dental emergency within 12 months. In this guideline, a *dental emergency* is defined as a condition, which causes pain, uncontrolled haemorrhage, acute infection or loss of masticatory function that significantly impacts a patient's performance of duties. The following guidelines and criteria is used for the Oral Health Fitness Classification:

- a. **Class 1.** Patients not requiring dental treatment or re-evaluation within 12 months (On examination, no further dental appointments are given or recommended - e.g., if there are missing teeth and no replacement is recommended, the patient is Class 1).
  - i. No dental caries or defective restorations.
  - ii. Arrested caries for which treatment is not indicated.
  - iii. Healthy periodontium, no bleeding on probing; oral prophylaxis not indicated.
  - iv. Replacement of missing teeth not indicated.
  - v. Unerupted, partially erupted, or malposed teeth that are without historical, clinical, or radiographic signs or symptoms of pathosis, and are not recommended for prophylactic removal.

- vi. Absence of temporomandibular disorders; stable occlusion.
- b. **Class 2.** Patients who have oral conditions that if not treated or followed up, have the potential but are unlikely to cause dental emergencies within 12 months.
  - i. Treatment or follow-up indication for dental caries with minimal extension into dentin or minor defective restorations easily maintained by the patient where the condition does not cause definitive symptoms. Minimal extension is defined as radiologic evidence of caries up to 1/3 the distance from the dentinoenamel junction to a point closest to the dental pulp.
  - ii. Interim restorations or prostheses that can be maintained by the patient for a 12-month period. This includes teeth that have been restored with permanent restorative materials but for which protective coverage is indicated.
  - vii. Edentulous areas requiring prostheses but not on an immediate basis.
  - viii. Periodontal diseases or periodontium exhibiting:
    - (1) Requirement for oral prophylaxis.
    - (2) Requirement for maintenance therapy; this includes stable or nonprogressive mucogingival conditions requiring periodic evaluation. Also include previously treated currently stable periodontitis, or mucogingival conditions such as gingival clefts and aberrant frena.
    - (3) Nonspecific gingivitis. Inflammation of the gingiva characterised clinically by changes in colour, gingival form, position, surface appearance, bleeding upon brushing or flossing, or the presence of bleeding after periodontal probing is included.
    - (4) Early or mild adult periodontitis. Progression of gingival inflammation into the deeper periodontal structures, slight loss of connective attachment, and slight loss of alveolar bone.
  - ix. Unerupted, partially erupted, or malposed teeth that are without historical, clinical or radiographic signs or symptoms of pathosis but are recommended for prophylactic removal.
  - x. Active orthodontic treatment.
  - xi. Temporomandibular disorder patients in maintenance therapy.
  - xii. Absence of soft or hard tissue infection or dysphasia requiring treatment.
- c. **Class 3.** Patients who have oral conditions that if not treated are likely to cause dental emergencies within 12 months. Patients currently under care for a dental condition that, if the treatment is not completed, the patient would likely experience a dental emergency. Patients should be

placed in class 3 when there are questions in determining classification between class 2 and class 3.

- i. Dental caries, tooth fractures, or defective restorations where the condition extends beyond the dentinoenamel junction and causes definitive symptoms; dental caries with moderate or advanced extension into dentin; and defective restorations not maintained by the patient.
- ii. Interim restorations or prostheses that cannot be maintained for a 12-month period. This includes teeth that have been restored with permanent restorative materials but for which protective coverage is indicated.
- iii. Periodontal diseases or periodontium exhibiting:
  - (1) Acute gingivitis or pericoronitis.
  - (2) Active moderate to advanced periodontitis. Significant progression of periodontitis with clinical or radiographic evidence of moderate to advanced loss of connective tissue attachment or alveolar bone, possibly accompanied by increased tooth mobility, or furcation involvement in multirooted teeth (adult periodontitis). Also included are conditions such as:
    - (a) rapidly progressive periodontitis,
    - (b) refractory periodontitis (periodontitis resistant to normal therapy),
    - (c) juvenile and prepubertal periodontitis, either localised or generalised,
    - (d) acute necrotizing ulcerative gingivitis,
    - (e) necrotizing ulcerative periodontitis.
  - (3) Periodontal abscess.
  - (4) Progressive mucogingival conditions. Pathologic changes in the position and relationship of the gingiva and gingival margin to the alveolar mucosa.
  - (5) Periodontal manifestations of systemic diseases or hormonal disturbances.
- iv. Edentulous areas or teeth requiring immediate prosthodontic treatment for adequate mastication, communication, or acceptable esthetics.
- v. Unerupted, partially erupted, or malposed teeth with historical, clinical, or radiographic signs or symptoms of pathosis that are recommended for removal.
- vi. Chronic oral infections or other pathologic lesions including:
  - (1) Pulpal or periapical pathology requiring treatment.

- (2) Lesions requiring biopsy or awaiting biopsy report.
- vii. Emergency situations requiring therapy to relieve pain, treat trauma, treat acute oral infections, or provide timely follow-up care (e.g., drain or suture removal) until resolved.
- viii. Temporomandibular disorders requiring active treatment.
- d. **Class 4.** Patients who (No examination within 1 year-patients):
  - i. require an annual dental examination (or other required dental examinations),
  - ii. have an undetermined dental status,
  - iii. have no dental record,
  - iv. have an incomplete dental record,
  - v. have no panograph confirmation.

## ***GUIDELINES FOR THE FIRST CONCURRENT HEALTH EXAMINATION FOR THE SANDF***

8. Forensic Charting. Form DD3532 must be used for charting purposes.
9. Examination and Classification
  - a. A totally objective oral health assessment of each patient is essential to provide an accurate OHF classification. Due to the nature and complexities of dental clinical manifestations, interpretation, diagnosis, and treatment, not every situation can be accounted for. Therefore, these criteria are to be used as a guideline to clinicians in assuring some degree of practical standardisation in assigning an oral health fitness classification.
  - b. The OHF Classification (Class 1, 2 or 3) must be recorded on the upper right-hand corner of the front of Form DD3532 and in the space provided for on Form DD2844.
  - c. **Note:** Since it is not practical to take panoramic radiographs of patients during mass screenings, a panograph is not required for the OHF Classification (See OHF Class 4 here above).
10. Credits. A standard *Consultation, Suitability Examination* (Procedure Code 0051) must be recorded on the Dental Clinical System in order to value the OHF Classification.
11. Authority. Due to the shortage of dentists to conduct mass oral health evaluation over a short period of time, dentists, dental therapists and oral hygienists are authorised to do the first OHF Classification.

## **GUIDELINES FOR A PHASED ORAL HEALTH CARE PROGRAM**

### **INTRODUCTION**

12. Establishment. All Oral Health Care Clinics must have a program to meet or exceed the operational OHF standards set by the Director Oral Health. The program will, as a minimum, consist of:
  - a. Treatment programs which will ensure attainment of the OHF standards for all units which they support.
  - b. Establishment of direct liaison with all supported units to ensure accomplishment of this program in a timely fashion.
13. Standard. The minimum OHF Standard for unit readiness is established at 80 percent of unit personnel in OHF Class 1 and 2.
14. Phased Oral Health Care Program. Dilemmas will occur for clinicians when the need for oral health care necessary to achieve sustainable OHF exceeds clinical capabilities. A phased oral health care program will, through active management of resources in response to real-time treatment needs, provide continuity of care to a service member from accession to retirement. By means of such a program, widespread and sustainable levels of OHF can be achieved. The initial phase focuses the delivery of care to patients with treatment needs identified as likely to result in an emergency within the next 12 months. Its primary goal is to achieve operational readiness for all individuals before they reach their operational duty assignment. The second phase will promote health and wellness by addressing the underlying diseases and their control through patient education and treatment.
15. OHF Class 3 and 4 Monitoring. OHF Class 3 and 4 programs are very important to assure OHF. Members identified in these categories of oral health must continue to receive expedited care.
16. Combined Examination/Prophylaxis Appointments. There are several methods for providing combined examination and oral prophylaxis appointments. One method would be to schedule staggered/extended prophylaxis appointments in lieu of the standard 10-15 minute examinations. The dental officer would rotate from room to room to provide the annual examination. This service should be provided to the greatest extent possible.
17. Refusal of Dental Treatment. Patients who refuse dental treatment, or are unwilling to keep their dental appointments, and who require dental treatment should be identified. The Oral Health Care Provider (OHCP) should be counseled these individuals concerning the need to maintain proper oral health. The individual's commander must be notified in writing of the consequences of refusing dental treatment on the patient's readiness capability if the patient continues to refuse dental treatment.

### **EXAMINATIONS AND/OR PERIODIC RECALL EXAMINATIONS**

18. Oral health evaluations of all active duty SANDF personnel must be conducted at least annually, and on other appropriate occasions to determine the need for dental treatment.



19. Although the individual members are responsible for their own oral health, members shall be notified of their need for a recall examination in the 11<sup>th</sup> month following their last dental examination, and will become Class 4 at the end of the 13<sup>th</sup> month. Thus, members have up to a 90-day window to complete the examination.

20. Each dental treatment facility will implement a system that enables adequate notification to allow service members an opportunity to seek and exam appointment prior to Class 4 conversion.

21. Members that are Class 3 will remain Class 3 regardless of when their last exam was performed. When treating a dental class 3 patient who has not had an examination in 12 months or more, the OHCP must ensure that the dental health questionnaire is current.

22. A standard type of oral health evaluation (SADA Procedure Code 8101 - Full mouth examination) must be recorded to value an individual's OHF classification. Upon the completion of the patient sitting, the provider must record the OHF classification by making the following entry in the patient's clinical record:

- a. Date of treatment plan.
- b. OHF Classification (Note: Only dentists may change the dental classification).
- c. OHCP who created the treatment plan.

23. Form DD 3532 must be completed for all active duty SANDF personnel during the first examination and retained in the patient's file (Note: No credits are to be taken for the completion of the form during initial examinations and/or periodic recalls).

24. Completion of Treatment Plan

- a. When the treatment plan is completed (patient converts to dental Class 1, if the clinical situation allows) within 3 months of the previous examination, a new examination is not required. If the treatment plan is completed more than 3 months after the current examination, a new follow-up examination is required to reclassify the patient to dental Class 1. A procedure code for an oral health evaluation (SADA Procedure Codes 8101, 8102 or 8104) shall not be recorded. The OHCP completing the last element of the treatment plan will reclassify the patient to dental Class 1 by making the following entry in the patient's clinical record:
  - i. Date of completion of treatment plan.
  - ii. OHS Classification (Note: Only dentists may change the dental classification).
  - iii. OHCP who completed the treatment plan.
- b. Form DD 3532 shall be updated when the treatment plan is completed (Note: No credits shall be taken for updating the form).
- a. In order to minimise conversions to Class 4, dental records will be reviewed at each treatment appointment to determine date of last exam. Patients with examination dates that are at least ten months old will receive an annual examination update prior to dismissal from the

treatment appointment. All dentists, including specialists, will be actively involved in meeting this requirement. Upon the completion of the patient sitting, the provider must record the dental classification by making the following entry in the patient's clinical record (Note: No credits shall be taken for an oral health evaluation):

- i. Date of completion of treatment plan.
- ii. OHS Classification (Note: Only dentists may change the dental classification).
- iii. OHCP executing the treatment plan.

25. Recall examinations. The next recall dental examination will normally be 12 months from the completion of previous recall examination/treatment plan. OHCPs have the option of recalling the patient at more frequent intervals if the clinical situation dictates.

### ***IDENTIFICATION OF CLASSIFICATIONS ON CLINICAL RECORD***

26. To identify the four dental classifications, attach a strip of appropriately coloured cellophane tape to the Dental Treatment Record, Form DD 164, diagonally across the upper right-hand corner of the back of the Form. Use coloured tape to designate dental classifications in the following manner:

<b>Ser No</b>	<b>Dental Class</b>	<b>Coloured Tape</b>
	a	b
1	1	white
2	2	green
3	3	yellow
4	4	red
5	Priority	blue (see (c) below)

- a. Place clear cellophane tape on the dental record before affixing various coloured tapes. This will help the future placement and removal of coloured tapes without tearing or damaging the file.
- b. Identify dental class 4 patients by placing a piece of red cellophane tape over the top half of the existing dental classification tape. In this manner, the patient's previous classification is preserved.
- c. To readily identify patients who require high priority dental care, flag selected class 2 and 3 dental patients' records by placing a strip of blue cellophane tape over one half of the green class 2 tape or yellow class 3 tape. The following categories are examples of those patients who should receive high priority care:
  - i. Patients with extensive and severe caries or periodontal disease or other pathology requiring immediate attention.

- ii. Personnel ordered to duty at isolated or under served areas where dental care is not readily available, such as to an embassy or Antarctica.
  - iii. Submarine personnel.
  - iv. Candidates for aviation and diving programs.
  - v. Personnel assigned as members of a rapid deployment force.
  - vi. Any personnel ordered to duty assignments where dental pathology might interfere with their mission.
- d. Assignment to dental classification 1 or 2, should be based on a oral health evaluation, or the completion of a treatment plan which was based on a examination.
  - e. Dental officers must review and change as needed, the colour coded dental classification after each appointment.
  - f. The procedures described in this paragraph are optional for Area Military Health Units (AMHU) (Including the Military Hospitals within the appropriate AMHU). If the AMHU opts to use the dental classification tape, all dental records maintained by the AMHU/Hospital must have the correct tape.

## ***AUTOMATION OF THE ORAL HEALTH CARE FITNESS PROGRAM***

27. The OHF Classification program will be incorporated within the Oral Health Information System in due time to facilitate the management of patients. Until such time, OHCPs are urged to do whatever they can to assist in the achievement of the set standard. The following fields will be introduced in the Oral Health Information System:

- a. Date Field. Date of Treatment Plan, Sustainment Assessment, Treatment Completed or Clearance Assessment.
- b. Occasion/event Field. Treatment Plan; Sustainment Assessment, Treatment Completed or Clearance Assessment.
- c. Authorised OHCP Field. Force number of authorised OHCP who rendered the service.

28. In addition to the above, a Priority Field will be provided to facilitate the management of high priority care patients.

## Appendix B Data collection sheet

The following data was collected for each member that was classified Class I and 2 OHF classification in AMHU GT in 2009 and each member followed up for a period of one year following classification:

Age, gender, race, date of OHF classification, OHF classification, date of expiry of classification, date of emergency and the type of emergency. The following table indicated the treatment codes that were regarded as dental emergencies

Code	Description	Code	Description
8104	limited oral examination	8353	resin 3 surfaces anterior
8129	after hours visit	8354	resin 4+ surfaces anterior
8131	emergency treatment	8361	inlay metal 1 surface
8132	pulp removal	8362	inlay/onlay metal 2 surfaces
8133	recement in-onlay/crown/veneer	8363	inlay/onlay metal 3 surfaces
8135	remove in-onlay/crown	8364	inlay/onlay metal 4+ surfaces
8136	access through crown/inlay	8367	resin 1 surface posterior
8137	emergency crown	8368	resin 2 surfaces posterior
8165	sedative filling	8369	resin 3 surfaces posterior
8166	appl desensitising resin	8370	resin 4+ surfaces posterior
8167	appl desensitising medicament	8413	repair crown
8192	suture - minor	8514	recement bridge
8201	extraction exposed tooth/root	8516	remove bridge
8213	surg removal of roots 1st	8517	tooth reimplantation
8214	surg removal of roots 2nd+	8518	repair bridge
8220	cost of suture material	8553	occlusal adjustment minor
8263	reline denture (chairside)	8931	tx of local haemorrhage
8269	repair denture/intraoral appl	8935	tx of septic socket(s)
8275	adjust denture	8937	surg removal of tooth
8301	pulp cap direct	9011	ins&dr abscess intra soft
8303	pulp cap indirect	9013	ins&dr abscess extra soft
8307	pulp amputation	9015	apicectomy anterior
8341	amalgam 1 surface	9016	apicectomy posterior
8342	amalgam 2 surfaces	9025	mandible closed rduct
8343	amalgam 3 surfaces	9027	mandible closed rduct eyelet
8350	resin crown ant	9029	mandible closed rduct splints
8351	resin 1 surface anterior	8353	resin 3 surfaces anterior
8352	resin 2 surfaces anterior	9031	mandible open rduct
9093	sialolithotomy		

## Appendix C

The Research Ethics Committee, Faculty Health Sciences, University of Pretoria complies with ICH-GCP guidelines and has US Federal wide Assurance.



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

- \* FWA 00002567, Approved dd 22 May 2002 and Expires 13 Jan 2012.
- \* IRB 0000 2235 IORG0001762 Approved dd 13/04/2011 and Expires 13/04/2014.

Faculty of Health Sciences Research Ethics Committee  
Fakulteit Gesondheidswetenskappe Navorsingsetiekomitee

DATE: 27/06/2011

PROTOCOL NO.	98/2011
PROTOCOL TITLE	Evaluation of dental emergency outcomes of the Oral Health Fitness Classification of the South African Military Health Service (SAMHS) in Gauteng-South Africa
INVESTIGATOR	Principal Investigator: Dr TK MADIBA
SUBINVESTIGATOR	Not applicable
SUPERVISOR	Prof PJ Van Wyk Phone: 012-3192418 Email: <a href="mailto:fljp.vanwyk@up.ac.za">fljp.vanwyk@up.ac.za</a>
DEPARTMENT	Dept: Community Dentistry Phone:012-3192417 Fax:012-3237616 E-Mail: <a href="mailto:thommy.madiba@gmail.com">thommy.madiba@gmail.com</a> or <a href="mailto:thommy.madiba@up.ac.za">thommy.madiba@up.ac.za</a> Cell:0845036175
STUDY DEGREE	MChD in Community Dentistry
SPONSOR	Not applicable
MEETING DATE	22/06 /2011

The Protocol was approved on 22/06/2011 by a properly constituted meeting of the Ethics Committee subject to the following conditions:

1. The approval is valid for 2 years period [till the end of December 2013] , and
2. The approval is conditional on the receipt of 6 monthly written Progress Reports, and
3. The approval is conditional on the research being conducted as stipulated by the details of the documents submitted to and approved by the Committee. In the event that a need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.

Members of the Research Ethics Committee:

Prof M J Bester	(female) BSc (Chemistry and Biochemistry); BSc (Hons)(Biochemistry); MSc(Biochemistry); PhD (Medical Biochemistry)
Prof R Delport	(female) BA et Scian, B Curatiosis (Hons) (Intensive care Nursing), M Sc (Physiology), PhD (Medicine), M Ed Computer Assisted Education
Prof JA Ker	MBChB; MMed(Int); MD – Vice-Dean (ex officio)
Dr NK Likibi	MBB HM – Representing Gauteng Department of Health) MPH
Dr MP Mathebula	(female) Deputy CEO: Steve Biko Academic Hospital; MBChB, FDM, HM
Prof A Nienaber	(female) BA(Hons)(Wits); LLB; LLM; LLD(UP); PhD; Dipl.Datametrics(UNISA) – Legal advisor
Mrs MC Nzeku	(female) BSc(NUL); MSc(Biochem)(UCL, UK) – Community representative
Prof L M Ntshhe	MbChB (Natal) FCS (SA)
Snr Sr J Phatoli	(female) BCur(Eet.A); BTec(Oncology Nursing Science) – Nursing representative
Dr R Reynders	MBChB (Pret), FCPaed (CMSA) MRCPCH (Lon) Cert Med. Onc (CMSA)

# Appendix D



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SG(1)/R/ 83003202PF

Telephone: (012) 671-5142  
Cellular: 084 503-6175  
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Enquiries: Lt Col T.K. Madiba



Servamus 2  
Oral Health Directorate  
Private Bag X 102  
Centurion  
0046

Oral Health Directorate 26 May 2011

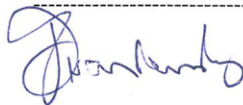
**REQUEST FOR PERMISSION TO ACCESS DENTAL RECORDS AS PART OF A MCHD DEGREE (MASTERS IN COMMUNITY DENTISTRY) – 83003202PF LT COL T.K MADIBA**

1. The abovementioned request refers.
2. In terms of the requirement of the Promotion of Access to Information Act 2 of 2000 permission is hereby requested for the use of dental records in the Dental mainframe of the South African Military Health Service (SAMHS) for a research project. Successful completion of the project is part of the requirements for the Masters program in Community Dentistry for which permission has been granted in 2008 with studies at state expense.
3. The title of the research project is: Evaluation of dental emergencies outcomes of the Oral Health Fitness classification of the South African Military Health Service in Gauteng South Africa.
4. Your support will be highly appreciated

  
(T.K. MADIBA)

SO1 ORALHEALTH SURVEILLANCE: LT COL

~~RECOMMENDED/NOT RECOMMENDED~~



(J.F. JANSE VAN RENSBURG)

D ORAL HEALTH: BRIG GEN

2011/05/26

DATE

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2

**REQUEST FOR PERMISSION TO ACCESS DENTAL RECORDS AS PART OF A MCHD  
DEGREE (MASTERS IN COMMUNITY DENTISTRY) 83003202PF LT COL T.K.  
MADIBA**

Approved / Not Approved

Remarks: All security prescripts to be complied with!



**(L.Z. MAKE)**  
**CHIEF DIRECTOR MILITARY HEALTH FORCE SUPPORT: MAJ GEN**

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## Appendix E

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Telephone: (012) 315-0216  
Fax: (012) 326-3246  
Enquiries: Brig Gen E.L. Pule



DI/SDCI/DCIC/R/202/3/7

Defence Intelligence  
Private Bag X367  
Pretoria  
0001  
22 December 2011

### AUTHORITY TO ACCESS DEPARTMENT OF DEFENCE (DOD) DENTAL RECORDS AS PART OF A MCHD DEGREE: LT COL T.K. MADIBA

1. Your letter SG(1)/R/83003202PF dd 14 December 2011 and our letter DI/SDCI/DCIC/R/202/3/7 dd 30 August 2011 has reference.
2. Permission is hereby granted from a security perspective for Lt Col T.K. Madiba to access the records requested if the authorisation from the user and the ethics committee has been received for the research entitled "Evaluation of dental emergencies outcome of the oral health fitness classification of the South African Military Health Service in Gauteng South Africa".
3. The findings of the research must first be submitted to DI (SDCI) for scrutiny before it is disseminated to any organisation or person outside the DOD.
4. For your attention.

  
(MAJ GEN T. MATLAKENG)  
CHIEF OF DEFENCE INTELLIGENCE: LT GEN

VWM/VWM (Research Lt Col T.K. Madiba)

**DISTR**

For Action

 C Dir MHSF

(Attention: Maj Gen L.Z. Make)  
(Attention: Lt Col T.K. Madiba)

Internal

DI/SDCI/DCIC/R/202/3/7

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## Appendix F: Dental emergencies experienced stratified by treatment codes

Treatment code	Treatment description	Frequency	Percent
8131	Emergency treatment	115	3.5
8132	Pulp removal	125	3.8
8133	Revetment in-onlay/crown/veneer	296	9.1
8135	Remove in-onlay/crown	46	1.4
8136	Access through crown/inlay	4	0.1
8137	Emergency crown	24	0.7
8165	Sedative filling	141	4.3
8166	Appl desensitising resin	48	1.5
8167	Appl desensitising medicament	86	2.6
8192	Suture - minor	5	0.2
8201	Extraction exposed tooth/root	358	11.0
8213	Surg removal of roots 1st	8	0.2
8214	Surg removal of roots 2nd+	2	0.1
8220	Cost of suture material	25	0.8
8263	Reline denture (chairside)	7	0.2
8269	Repair denture/intraoral appl	88	2.7
8275	Adjust denture	23	0.7
8301	Pulp cap direct	11	0.3
8303	Pulp cap indirect	57	1.8
8307	Pulp amputation	1	0.0
8341	Amalgam 1 surface	207	6.4
8342	Amalgam 2 surfaces	319	9.8
8343	Amalgam 3 surfaces	86	2.6
8350	Resin crown ant	0	0.0
8351	Resin 1 surface anterior	97	3.0
8352	Resin 2 surfaces anterior	62	1.9
8353	Resin 3 surfaces anterior	90	2.8
8354	Resin 4+ surfaces anterior	103	3.2
8361	Inlay metal 1 surface	1	0.0
8362	Inlay/onlay metal 2 surfaces	8	0.2
8363	Inlay/onlay metal 3 surfaces	11	0.3
8364	Inlay/onlay metal 4+ surfaces	17	0.5
8367	Resin 1 surface posterior	396	12.2
8368	Resin 2 surfaces posterior	272	8.4
8369	Resin 3 surfaces posterior	78	2.4
8370	Resin 4+ surfaces posterior	34	1.0
8413	Repair crown	1	0.0

<b>Treatment code</b>	<b>Treatment description</b>	<b>Frequency</b>	<b>Percent</b>
8514	Recement bridge	27	0.8
8516	Remove bridge	7	0.2
8517	Tooth reimplantation	0	0.0
8518	Repair bridge	0	0.0
8553	Occlusal adjustment minor	26	0.8
8931	Tx of local haemorrhage	1	0.0
8935	Tx of septic socket(s)	30	0.9
8937	Surg removal of tooth	24	0.7
9011	Ins&dr abscess intra soft tiss	2	0.1
9013	Ins&dr abscess extra soft tiss	1	0.0
9015	Apicectomy anterior	5	0.2
9016	Apicectomy posterior	0	0.0
9025	Mandible closed reduct	0	0.0
9027	Mandible closed rduct eyelet	0	0.0
9029	Mandible closed rduct splints	0	0.0
9031	Mandible open rduct	1	0.0
9093	Sialolithotomy	0	0.0