

https://dspace.org/

An analysis of the patients presenting to a private hospital emergency department in the Ethekweni Metrpolitan area during holiday and non-holiday periods

Dayaram, Mukund Manhur

2015
http://hdl.handle.net/10539/20859

Downloaded from a DSpace repository. https://dspace.org/

AN ANALYSIS OF THE PATIENTS PRESENTING TO A PRIVATE HOSPITAL EMERGENCY DEPARTMENT IN THE ETHEKWINI METROPOLITAN AREA DURING HOLIDAY AND NON-HOLIDAY PERIODS

Mukund Manhur Dayaram

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

Johannesburg, 2015

DECLARATION

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

_____

……. day of May, 2015

ABSTRACT

Background There has always been anecdotal reports that the ED is busier during the holidays and this increase in utilization is due to an increased incidence of trauma.

Methods The retrospective data was collected from the Study Hospital's Database and from the billing records of the doctor practice managing the ED. The data included all patients attending the Study Hospital ED during November 2011 (Non-holiday Period) and between the 10th December 2011 and 8th January 2012 (Holiday Period).

Results It was noted that the age, gender and racial profile of the patients attending the ED during the Holiday and Non-holiday Periods were similar. However there was a 39.9% increase in ED utilization during the Holiday Period. The Holiday Period was also associated with increased utilization by tourists (29.9% vs. 8.2%); with a slightly lower incidence of trauma (23.4% vs. 24.6%); with patients presenting with less urgent Triage Scores; fewer patients arriving at the ED via ambulance (3.2% vs. 7.2%) and a lower admission rate (10% vs. 17.5%).

Conclusions There was a significant increase in the utilization of the Study Hospital ED during the Holiday Period. This increased utilization was due to an increase in visitors to the Umhlanga area during the Holiday Period and was associated with an increased presentation to the ED of low acuity patients probably as a result of a lack of availability of their GP.

ACKNOWLEDGEMENTS

This body of work would not have been possible without the loving support, sacrifice and encouragement of my family. My wife, Maduri; my children, Vedna and Pranav; Champabha and Luxmibha have been pillars of strength during this process.

I sincerely appreciate the patience and cajoling from Prof Efraim Kramer which has ensured that this research project was completed.

A heartfelt thank you to Dr Andy Geard, the Administrative Staff (Sarah, Annie, Maggie, Rashree, Shane and Kasturi) and Sr Y Geringer and all her nursing staff at the Netcare Umhlanga Hospital ED for their advice and help with the data collection. Also many thanks to Dr B Kana for his insight and input.

My sincere gratitude to Cameron Alston, Mitesh Govan and Mayur Govan for their IT support.

Last but not least to Prof R Crouch and the students at the WITS writing retreat, my sincere appreciation for your support, help and advice. These writing retreats are a

wonderful initiative which is sponsored by the University of Witwatersrand and I have highly recommended them to my fellow post-graduate students.

T ABLE OF CONTENTS PAGE

DECLARATION ii

ABSTRACT iii

ACKNOWLEDGMENTS iv

TABLE OF CONTENTS vi

LIST OF FIGURES ix

LIST OF TABLES xii

1. INTRODUCTION 1

2. LITERATURE REVIEW 4

3. METHODOLGY 18

3.1. STUDY AIM 18

3.2. METHODS 18

3.3. DATA ANALYSIS 24

3.4. FUNDING 25

3.5. LIMITATIONS 25

4. RESULTS 28

4.1. DEMOGRAPHICS OF PATIENTS 28

4.1.1 Age 28

4.1.2 Gender 29

4.1.3 Racial Group 30

4.1.4 Nationality 31

4.1.5 Residential Address 34

4.1.6 Payer Information 38

4.2. CLINICAL PARAMETERS 42

4.2.1 Triage Diagnosis 42

4.2.2 Discharge Diagnosis (ICD 10) 47

4.2.3 Trauma versus Non-trauma 52

4.2.4 SATS 55

4.2.5 TEWS 57

4.2.6 Mode of Arrival 60

4.3. DISPOSITION OF PATIENTS 64

5. DISCUSSION 69

6. CONCLUSION 83

7. REFERENCES 88

8. APPENDICES 96

LIST OF FIGURES PAGE

3.1 Google® Map showing a 15km radius around the Study Hospital. 22

4.1 Graph depicting the Nationality of the Patients Attending the ED during the Holiday Period 32

4.2 Graph depicting the Nationality of the Patients Attending the ED during November 2011 33

4.3 Graph depicting the Province of Origin of Patients Attending the ED during the Holiday Period 35

4.4 Graph depicting the Province of Origin of Patients Attending the ED during November 2011 36

4.5 Comparison of the Province of Origin of Patients Attending the ED during the Holiday and Non-holiday Periods 37

4.6 Comparison of the Area of Residence of patients Attending the ED during the Holiday and the Non-holiday Periods 38

4.7 Comparison of the Payer Information between the Holiday and the Non-holiday Periods 41

4.8 Comparison of the Percentage of Patients presenting with the Five Commonest Discharge Diagnoses during the Holiday and the Non- holiday Periods 51

4.9 Comparison of “GP type visits” during the Holiday and Non-holiday Periods 52

4.10 Comparisons of the Occupational Trauma, Non-Occupational Trauma and Non-trauma Incidence During the Holiday and Non-holiday Periods 55

4.11 Comparison of the two commonest Mechanisms of Injury during the Holiday and Non-holiday Periods 56

4.12 Comparison of the SATS of patients attending the ED during the Holiday and Non-holiday Periods 58

4.13 Comparison of TEWS between the Holiday and Non-holiday Periods 62

4.14 Comparison of the Mode of Arrival of patients Attending the ED during the Holiday and Non-holiday Periods 64

4.15 Comparison of the Disposition of the Patients during the Holiday and Non-holiday Periods 66

4.16 Comparison of the Admissions during the Holiday and Non-holiday Periods 67

LIST OF TABLES PAGE

4.1 Comparison of the racial demographics of the patients Presenting to the ED during the Holiday and Non-holiday Periods 30

4.2 The Five Commonest Medical Aids of Patients Attending the ED during the Holiday Period 39

4.3 The Five Commonest Medical Aids of Patients Attending the ED during the Non-holiday Period 40

4.4 The Ten Commonest Triage Diagnoses for Patients Attending the ED during the Holiday Period 43

4.5 The Ten Commonest Triage Diagnoses for Patients from Gauteng Attending the ED during the Holiday Period 44

4.6 The Ten Commonest Triage Diagnoses for Patients Attending the ED during November 2011 45

4.7 The Ten Commonest Triage Diagnoses for Patients from Gauteng Attending the ED during November 2011 46

4.8 The Five Most Frequent Discharge Diagnoses of Patients Attending the ED during the Holiday Period 48

4.9 The Five Most Frequent Discharge Diagnoses of Patients Attending the ED during November 2011 49

4.10 Comparison of the Five Most Frequent Discharge Diagnoses of Patients Attending the ED during the Holiday and Non-holiday Periods 50

4.11 TEWS for Patients attending the ED during the Holiday Period 59

4.12 TEWS for Patients attending the ED during November 2011 60

CHAPTER 1: INTRODUCTION

The Emergency Department (ED) in any hospital is a constant hub of activity. It is a high flow area with a rapid patient turnover. However, there appears to be peaks and troughs in the level of activity. It is hypothesized that the ED is busier during the school holidays as compared to the school term. It is further hypothesized that this increase in utilization during the school holidays is due to an increase in the incidence of motor vehicle accidents (MVAs) and fall related trauma. These hypotheses have not been tested as regards to their validity in relation to the South African ED (1).

This study was based on patients attending a Private Hospital Emergency Department (ED) located in the urban, coastal, resort town of Umhlanga in the eThekwini Metropolitan area, in the province of KwaZulu-Natal (KZN), on the east coast of South Africa. Umhlanga is a popular, seasonal tourist destination for both domestic and foreign tourists as evidenced by the fact that all available accommodation (i.e. both hotel and bed and breakfast) were fully booked out for the entire month of December 2010 and December 2011 [as per conversation with a Gary Paul (Paramedic) in February 2012 who is a member of the eThekwini Municipality Festive Season Management Committee – FESMAC].The hospital has 204 beds including an ED in which an average of 1719 patients per month are treated (internal ED statistics from January 2009 to January 2011).

There has always been anecdotal opinion that the ED is busier during the school holidays than during the academic term (2). These opinions would appear to be justified by the increase in the town's population due to tourism especially during the December school holidays as stated by FESMAC.

The Study Hospital is located between two major motorways, namely the N2 and the Ruth First Highway which link the northern part of KZN to the city of Durban. Statistics South Africa observed a peak in the road traffic accident deaths during the month of December for most years from 2001-2006 with a trough during November as well as during January and February (3). These statistics lend further support to the view that the ED is busiest during the December school holidays and this increase in utilization is due to an increase in MVA related trauma.

For the purposes of this study, 10th December 2011 to 8th January 2012 was utilized as the holiday period as all schools (both inland and coastal as well as private and public) and all tertiary institutions were on vacation. For the non-holiday period, the month of November was utilized as this precedes the usual school and tertiary summer holidays and hence it was expected that this period would reflect the greatest difference in ED demographics when compared to the holiday period.

The objectives of this study were:

1. To determine the demographics of the patients presenting to the ED, including the age, gender, racial group, nationality, province and town of residence and payer information.
2. To analyse the clinical presentation of the patients presenting to the ED including the ten commonest triage diagnoses and the five commonest disposition diagnoses, whether the illness or injury presentation was occupational or recreational, the related South African Triage Score (SATS) and the Triage Early Warning Score (TEWS) and the mode of arrival to the ED.
3. To determine the disposition of the patients presenting to the ED including discharge, referral, admission or death.
4. To compare ED utilization during the Holiday and Non-holiday Periods and discuss possible reasons for the differences.

The following chapters will review the relevant literature, explain the research methodology, analyse the data, discuss and interpret the results, draw conclusions and make recommendations.

CHAPTER 2 : LITERATURE REVIEW

The perception that the Study Hospital ED is busier during the Holiday than during the Non-holiday Period appears to be supported in the literature by a retrospective study by Zheng et al in the EDs in the state of New South Wales, Australia (4). This study compared patient visits to all the EDs in the state of New South Wales during the Christmas and New Year holiday period (defined as from the 18 December to the 14 January) with the rest of the year; over a 5 year period from 1st January 2001 to 1st January 2006 (4). The authors of the above study have stated that “to our knowledge, this is the first formal study of the impact of the holiday season on ED activity” (4). Their results revealed that New South Wales EDs were busier during the Christmas and New Year holiday period with 2555 more visits per week during this period than during the non-holiday period (4). This observed increase in ED utilization during the holiday period is furthermore indirectly supported by a study by Schoenfeld and McKay (5) who compared weekend versus weekday ED utilization, to all emergency departments in the state of Nebraska, United States of America (USA) (5). It was found that there was a substantial increase in ED utilization on weekends compared with weekdays (5).

The reasons for this increase in ED utilization appear to be multifactorial. Zheng et al (4) in their study in the EDs in New South Wales, Australia found that the greatest increase during the holiday period was in patients presenting with less urgent problems -

“General Practitioner type visits” - and this was particularly the case among adults especially in urban areas (4). “General Practitioner type visits” were defined in this study using the Australasian College of Emergency Medicine (ACEM) criteria which included “patients who: were self-referred; were assigned a less urgent triage category [4 (potentially serious) or 5 (less urgent)]; did not arrive by ambulance; presented between 08:00 and midnight; had a treatment time of less than 60 minutes; and were subsequently discharged from the ED” (4). These findings are supported by Schoenfeld and McKay (5) who concluded that the increased ED utilization in Nebraska, USA over weekends was due to an increase in patients presenting with lower-acuity medical problems (5). This conclusion was based on a lower admission rate and a lower death rate amongst patients attending the ED over the weekends (5). This “inappropriate” ED utilization has been estimated at between 29% and 70% by some studies (6-10). This increase in ED utilization by patients with lower-acuity problems during weekends and holidays is believed to be related to a decrease in General Practitioner (GP) availability (4, 5), a topic which has been much debated with views having been expressed that GPs in the United Kingdom (UK) need to provide their patients with a more comprehensive service including being available after hours (10-12).

Consistent with these observations is the high incidence of patients with low acuity medical problems presenting to the ED in a patient based study conducted amongst ambulant patients attending the EDs of 13 hospitals in the Greater Toronto Area on a weekday, during the school term. In this instance it was reported that only 23% of the

patients presenting to the ED felt that their illness was of significant acuity to require an ED visit (13). In the above study, while the non-availability of the patient's GP was a significant cause for the patient presenting to the ED (52% of patients), numerous other patient factors contributed to these patients presenting to the ED (13). The reasons for GP unavailability included the GP's rooms being closed, GP on holiday, GP's answering service recommending presentation to the ED and the patient being unable to obtain an appointment on that day with the GP (13). Other reasons for patients presenting to the ED included obtaining a second opinion and as the ED was open on a 24 hour basis, it allowed the patient to see a doctor at a convenient time for the patient (6, 9, 10, 13). This is supported by Krass (14) who postulated that tourists to an area are more likely to seek health care at an ED, even for low-acuity problems, due to its accessibility and availability together with the lack of availability of these patients' regular GP (10, 14). This is also confirmed by Willems et al (15) who noted that patients who did not have a regular GP were 3 times more likely to utilize the ED than a primary care centre (15).

However these findings were contradicted by a study at a tertiary care hospital in Antalya, Turkey were it was observed that the commonest reasons for foreign tourists attending the ED were trauma and circulatory disorders which included acute coronary syndromes, chronic heart failure, aneurysm and deep vein thrombosis (16). This study also noted a 31% admission rate and a 1.6% mortality rate amongst this group of tourists attending the ED (16) which would seem to suggest that there was significant injury and illness amongst this group.

Bjornsen et al (17) in a study at St. Olav's University Hospital in Trondheim, Norway observed that the patients attending their ED had a higher acuity level (11% red and 24% orange level) with a consequent higher admission rate (89%) than is observed in other international studies (17). This is probably because in Norway their Health Care System is set up differently (17). In Norway the General Practitioners (GPs) together with Urgent Care Centres act as "gatekeepers" for the ED and specialist health care (17). The majority of patients attending the ED has been referred there by their GP, an Urgent Care Centre or has been transported there via ambulance or air ambulance (17).

Schull et al (18) observed that while low acuity patients (defined as ambulant, low triage score and discharged) represented about half of all patients treated in the EDs in Ontario, Canada; this was not associated with a significant impact on the timeliness and efficiency with which non-low-acuity patients were treated (18). In this study it was observed that for every 10 low acuity patients who presented to the ED per 8 hour period there was an increase in the average length of stay in the ED of 5.4 minutes and the average time to first physician contact of 2.1 minutes for non-low-acuity patients (18). These time differences while statistically significant were not considered to be clinically significant (18).

Willems et al (15) observed that ED utilization was significantly higher among patients from deprived communities who preferred to seek health care at the ED as opposed to a primary care centre (15). However there may also be an increased incidence of

severe disease and trauma in this population group as was noted by Bellis et al (19) who observed an increase in nighttime assault presentations to the National Health Service EDs throughout England by deprived individuals (19).

Krass (14) in his study in the Greater Niagara General Hospital ED in 1974 observed a similar pattern of ailments among both locals and tourists presenting to the ED (14). Thus Krass concluded that public attitudes also contribute to ED utilization over and above the availability of the patient's GP (14). The only difference noted between these two patient populations was that there was a lower rate of admission among the tourist population (14). This difference was more marked in the non-Canadian tourist group (mainly USA tourists) who the study postulated would prefer to be admitted to a hospital closer to home because of the familiarity of the surroundings and for financial reasons (14).

It should, however, be noted that the above views about ED utilization being associated with decreased GP availability is contradicted by Sprivulis (20) who reports that the vast majority of presentations to the Freemantle Hospital ED in Perth, Australia were appropriate presentations (20). This is supported by the fact that in the Zheng et al (4) study in New South Wales only 39% of the increased emergency department utilization during the holiday period was due to non-urgent presentations (4). This study has not evaluated what caused the other 61% increase in utilization. However the authors have postulated that this may be related to an increased incidence of injury or disease during

the holiday period (4). An increase in the incidence of injury and disease is supported by a study by Phillips et al (21) who found an increase in cardiac and non-cardiac mortality during the Christmas/New Year period with the highest peak on Christmas Day, followed by December 26 and then New Year's Day (21). This increased mortality was particularly noted for "*dead on arrival (DOA)*" patients, ED and outpatient populations as opposed to the hospital inpatient population (21).

The atmosphere surrounding holidays is one of excitement and jubilation and this often leads to recklessness and consequently an increase in injuries. This increase in the incidence of injury, both holiday specific injuries and non-specific injuries, is supported by several studies (22-28). In the USA it was noted that there was an increase in fall-related injuries during the holiday season (defined as November 1 to January 31) due to holiday decorating (22). Kimia et al (27) also noted an increased incidence of ingestion of and lacerations from ornament fragments or light bulbs among children during the Christmas holiday period (27).There is an increase in firework-related injuries in Tehran during the Persian Wednesday Eve Festival (Chaharshanbe Soori) (23), in China during the Chinese Spring Festival (24) and in the USA during the Fourth of July celebrations (26). Camping and caravanning holidays in the South West of England are very popular during the British summer school holidays and have been associated with an increased incidence of severe burn injuries which tend to require more complex medical interventions (25). In Israel there is an increased incidence of poison exposures among children, especially to cleaning substances in the two weeks preceding Passover (28).

This is associated with the Jewish custom of house cleaning prior to the Passover Festival and the fact that the school holidays coincide with this period (28). In the USA there is a marked increase in the incidence of injury among children during all the major holiday periods (26). It was noted that the majority of the injuries were not holiday-specific injuries and were associated with sport and recreational activities (26).

A further observation on the differences between ED utilization during holiday and non-holiday periods was noted by Peterson et al (29). In their study conducted among all under 16 year old psychiatric patients presenting to the ED at the Yale-New Haven Hospital over a 10 year period it was found that children presenting with suicidality were more likely to be older, female and would more often present on weekdays and during the school year while children presenting with aggressive behavioural disorders tended to be younger, male and more likely to present on weekends and during school vacations (29).

Psychiatric illness and its relationship to the holiday season have also been reviewed by two other studies conducted at the Duke University Medical Center in Durham, North Carolina, USA (30, 31). The study by Hillard et al between 1972 and 1979 found that psychiatric visits to the ED decreased in the 3 days preceding a major holiday, and on the day of the holiday, with an associated increase in the 3 days following the holiday (30). With regards to Christmas, the subsequent increase was prolonged for approximately 3 weeks after the holiday and this was predicted to be related to the

unique psychosocial supports and stressors associated with this holiday (30). These results were confirmed by Halpern et al in their study of the same population between 1987 and 1993 (31). They found a decrease in psychiatric patient visits to the ED in the week preceding the Thanksgiving, Christmas and New Year's Day holidays with a subsequent increase in the week after the holiday (31). Other studies have noted this decrease of 30-40% in deliberate self harm prior to and during the Christmas/New Year holiday period but with no subsequent increase i.e. no "postponement mechanism" was observed (32-34). The only psychiatric illness for which this pattern differed was that of substance abuse which was associated with an increased incidence during holiday periods (31, 32, 35). The incidence of mortality from substance abuse in the USA has also been shown to increase in the first week of the month and this is believed to be related to the increased availability of money to purchase drugs or alcohol at the beginning of the month (36). The latter point may also explain the increased incidence during the Christmas/New Year holiday period as salaries and bonuses are often paid prior to the Christmas holiday.

An increase in substance abuse, especially alcohol, during holiday periods is believed to be one of the major contributing factors to the increase in road traffic fatalities during the Christmas and New Year holiday periods (37, 38). Motor Vehicle Accidents (MVAs) are the leading cause of death in the USA for persons aged 1 – 34 years and it is believed that 50% of these MVAs are alcohol-related (37). It has been observed that the mortality from MVAs in the USA peaks during long holiday weekends (36). In SA, motor

vehicle accidents are associated with 43 deaths per 100000 population which is more than double the world average (18 per 100000 population) (39, 40). There is a significant peak in traffic-related fatalities during December in SA, which is similar to the data for Australia (38) and consistent with observations of an increase in motor vehicle collisions in Tokyo during December (41). This peak is reached during the prime Christmas/New Year holiday season i.e. weeks 51 and 52 with a notable trough in November (38). This peak is believed to be related to the higher traffic flows (41) and increased alcohol consumption associated with the Christmas/New Year holiday period (38). The higher traffic flows during this period may also be accompanied by an increase in unlicensed and inexperienced drivers as well as an increase in tourists who are unfamiliar with the roads and driving conditions (38).

An increased incidence of substance abuse, particularly alcohol, prior to and during holidays is also associated with an increased incidence of assault-related presentations to the ED (19, 42, 43).

There have been several studies pertaining to the circadian pattern, day of week occurrence and seasonal variability of myocardial infarction (44-50). There appears to be general consensus that myocardial infarction has a circadian pattern with an increased incidence in the morning between 7am and 10am (44, 45, 51). The circadian pattern of myocardial infarction is believed to be related to increases in the

catecholamine levels, serum cortisol levels, blood pressure and platelet aggregability in the morning (45).

There also appears to be consensus that myocardial infarction is more common on Monday and least frequent on the weekend (45, 51-54). It is believed that the transition from a more relaxed frame of mind on the weekends to the scheduled activity of work on Monday is responsible for the increased incidence of myocardial infarction on Mondays (45, 51).

As regards a seasonal pattern to the incidence of myocardial infarction, there appears to be fewer consensuses in the literature and more debate about the reasons for the observed patterns. It appears that in the colder climates of the Northern USA, Canada, United Kingdom, and Finland there is an increased incidence of myocardial infarction in winter, particularly in the months of November, December and January (44, 47-50). It is believed that the decreased environmental temperatures lead to an increase in sympathetic tone with consequent increases in heart rate, blood pressure and hence myocardial oxygen demand, together with haematological effects which enhance platelet aggregation (44, 46). This association between myocardial infarction and decreased temperatures in winter is supported by a study by Seretakis et al (46) which reviewed the monthly incidence of mortality from ischaemic heart disease in the USA from 1937 to 1991 and found that there was a decrease in the seasonality of mortality from ischaemic heart disease up until 1970 which they have attributed to a decrease in

coronary mortality during the winter months due to an increase in the availability of heating in homes and vehicles in the USA, as well as increased urban migration with fewer people thus exposed to the simultaneous risks of physically strenuous work and extreme cold (46).

However this association with a decreased temperature has been contradicted by Kloner et al (47) who observed a winter peak in the incidence of mortality from coronary artery disease in Los Angeles in the USA but found a very weak correlation between daily temperature and the daily coronary death (47). It should be noted that Los Angeles has a very mild climate (47). Kloner et al (47) thus concluded that the increase in coronary mortality during December and January was probably also related to behavioral changes during the Thanksgiving, Christmas and New Year holiday periods which included overindulgence in food, salt and alcohol; as well as increased particulate pollution from increased use of wood fires (47). It was probably also associated with the emotional and psychological stresses that occur during the holidays (47). All the above reasons, as well as poor medication compliance, are similarly postulated for the increase in ED visits during the Christmas/New Year holiday season by patients presenting with heart failure which was observed in EDs in New York and northern New Jersey between 1996 and 2004 (55). This all forms part of the syndrome of “Holiday Heart” which is a presentation of rapid atrial fibrillation associated with alcohol consumption (56).

Furthermore, Spielberg et al (45) in a study in the city of Dessau in the former German Democratic Republic (GDR) in the 1980s observed an increase in the incidence of myocardial infarctions during the February-March period and during the August-September period (45). In the 1980s the GDR school calendar incorporated a standard summer vacation lasting all of July and August and a standard 3 week winter vacation in February (45). Spielberg et al (45) have hence postulated that the transition from the low stress of being on vacation to the higher stress of returning to work may lead to the increased incidence of myocardial infarction observed during February and March; and during August and September (45). An association between coronary artery disease and holiday periods is also supported by the increase in tourist admissions to the medical and coronary care units in the Royal Cornwall Hospital, Treliske, UK during the month of August in 1973 (57). Cornwall in the UK like Umhlanga in SA is a popular tourist destination (57).

It has also been shown that in subtropical regions such as Dallas, Texas and New Orleans in the USA which have hot and humid summers, there is a peak in the incidence of myocardial infarction during August with a trough in December (50, 58). It is believed that the heat and humidity increase the cardiac output and hence, increase myocardial oxygen demand (48). These findings are supported by the Seretakis et al (46) study which observed that the decrease in the seasonality of myocardial infarction in the USA up until 1970 was followed by a subsequent reversal in this trend after 1970 i.e. there was an increasing difference between the summer and winter myocardial

infarction rate. This was believed to be related to the increasing incidence of air-conditioning which has minimized the increased coronary mortality caused by occasional heat waves in summer with the consequent widening of the gap between the winter peak and summer trough (46). However these findings are contradicted by Kovats et al (59) who observed no significant increase in admissions to EDs in the Greater London area in the UK during hot weather (59). Kovats et al (59) have commented that this apparent mismatch between mortality and ED admissions associated with hot weather may be as a result of increased death among isolated people before their health deterioration is brought to anyone's attention (59).

Similar conditions exist in the town of Umhlanga in which the current study was based, with a hot and humid climate in December with average maximum and minimum temperatures of 26.9ºC and 20.0°C and an average relative humidity of 69% (60). This together with the behavioural changes and emotional stresses that accompany the Christmas/New Year holiday period may consequently result in a spike in the incidence of myocardial infarction. There is no research available, pertaining to this region, as regards this hypothesis.

Thus far it has been noted that the holidays are associated with an increased risk for mortality/morbidity from MVAs, myocardial infarction and substance abuse. However it is believed that the psychosomatic processes associated with important political, social and religious occasions may have the effect of delaying death (61). Such an effect was

observed in a study by Phillips et al (61) which found that the number of deaths in a Jewish community was decreased in the week prior to Passover and was conversely increased in the week after Passover (61).

In the context of the above, this study has analysed the patients presenting to the Study Hospital ED in the eThekwini metropolitan area during the holiday and non-holiday periods with a view to observing any differences in the patient profile between these periods.

CHAPTER 3 : METHODOLGY

3.1. STUDY AIM

The aim of this study was to compare the profile of the patients presenting to the ED during holiday and non-holiday periods.

3.2. METHODS

(a) Design

This was a retrospective, transverse and descriptive study.

(b) Site of Study

This study has taken place at a Private Hospital ED situated in the coastal resort town of Umhlanga in the eThekwini metropolitan area in KZN.

(c) Study Population

All the patients attending the above ED during the following periods were included in the study population:

1st November 2011 – 31st November 2011 (School Term)

10th December 2011 – 8th January 2012 (Summer School Holidays)

Patients who presented after midnight on the first day of each study period and those who presented up to midnight on the last day of each study period have been included.

The 10th December to the 8th January had been chosen to represent the holiday period since it incorporated the school (both public and private) as well as all tertiary institutions' summer holidays. It was also a 30 day period and hence allowed equivalent comparisons to be made with November 2011 (30 days).

Any differences in the ED utilization during the holiday period would be accentuated when compared to the period preceding the holiday period. Hence the month of November was used to represent the non-holiday period. Furthermore there were no public holidays in November. It would consequently provide an accurate reflection of non-holiday ED utilization as public holidays and especially long weekends may have a similar ED utilization profile to holiday periods.

(d) Data Collection

The data collected included the patient's age, gender, racial group, nationality, province and town of residence, payer information (i.e. Workman's Compensation, Medical Aid or

private), South African Triage Score (SATS), Triage Early Warning Score (TEWS), an initial broad based diagnostic category determined by the triage officer, diagnosis based on the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version for 2010, mode of arrival to the ED and disposition of the patient.

The data has been collected from the Study Hospital's Database. This is an electronic database which contains the entire patient's demographic and triage details, as well as the mode of arrival and the disposition of the patient. The data in this database is collected and captured by the triage officer on duty at the Study Hospital ED. The triage officer duties are generally performed by the same person for a given nursing team during all their shifts. The four triage officers at the Study Hospital ED were all basic ambulance assistants (BAAs). The BAA qualification is a four week training course in which students are taught emergency medical management up to a basic life support level which includes the different methods of airway management, cardiopulmonary resuscitation and first aid techniques in the emergency situation. When one of the triage officers were on leave then their shifts were generally covered by one of the other three. Alternatively, the duty was performed by a Staff Nurse (ENA) on that nursing team during the assigned triage officer's tea or lunch breaks or if the triage officer assigned to that team was sick and it was not possible to replace him/her in that shift with another triage officer. An ENA is a nurse with two years of formal training who works under the supervision of a registered nurse (RN) who has either four years of

training at a nursing college or a university nursing degree and has completed the national certification examination.

The Study Hospital Database does not contain information as regards the patient's clinical diagnosis. This information was obtained from the electronic billing records of the doctor practice contracted by the Hospital to manage the ED. A list of all the patients who attended the ED during the specified periods was obtained from the Study Hospital's Database and using the hospital assigned file number recorded in this database the patient was cross-referenced with the doctor practice electronic billing records. During the capturing of the ICD 10 codes into the data, any missing demographic information was also updated or corrected. In particular the patient's town of residence, which was missing for numerous patients, was updated. It was also noted that several foreign patients had used the address where they were staying in South Africa and this was corrected based on the doctor practice billing records. Once all data had been collected and updated the patient's hospital file number was deleted to maintain the confidentiality of the data collected.

Patients presenting to the ED who resided south of Durban North; north of Desainagar and west of Phoenix/Verulam/KwaMashu were regarded as visitors to the Umhlanga area and they were inferred as not having access to their regular GP. The area thus

included has a radius of approximately 15km from the Study Hospital as per Google® Maps. Refer to Figure 3.1.

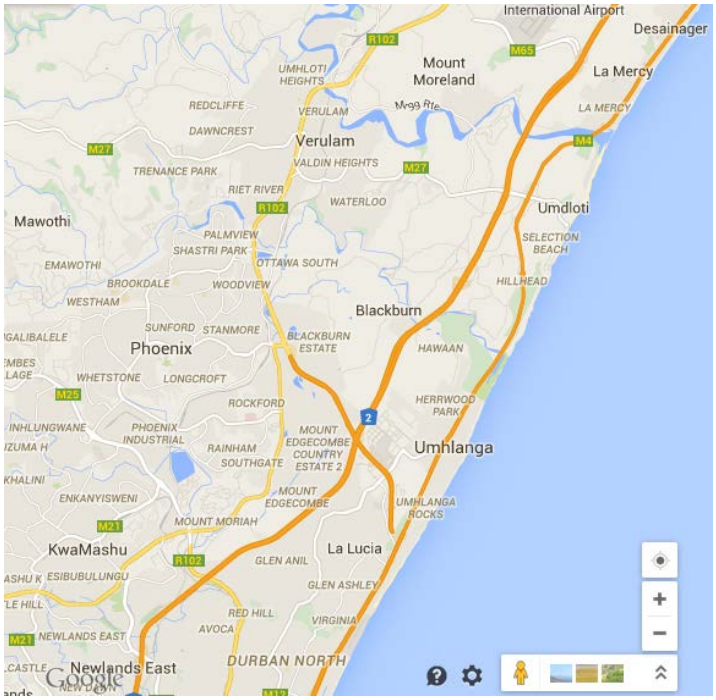


Figure 3.1 Google® Map showing a 15km radius around the Study Hospital.

Within the Study Hospital Database there were numerous patients who were attended to in the ED, but who were not treated by the ED doctor on duty and therefore for whom there was no billing information in the doctor practice billing records. Hence there was no clinical diagnosis for these patients. This group of patients included patients referred to the ED from a specialist's rooms for the administration of medication such as IV/IM Rocephin®, IV Venfer®, etc. These patients were attended to by the nursing staff in the

ED and discharged. Patients are also attended to by the hospital specialists in the ED. These include patients who require a procedure room such as patients requiring excision of a minor skin lesion under local anaesthetic or surgical patients for review of a wound or orthopaedic patients for review/removal of cast/re-application of cast/removal of K-wires, who are attended to by the relevant specialist and discharged. These patients have been excluded from this study.

(e) Ethics

Ethics approval for this study has been obtained from the Human Research Ethics Committee (HREC) of the University of Witwatersrand (Certificate No. M120655). Refer to Appendix C.

All data collected has been stored on a password protected personal computer with any hard copies being kept under lock and key to ensure confidentiality.

3.3. DATA ANALYSIS

Patients have been categorized into “General Practitioner type visits” (4) and those requiring specialist care. As all patients who were admitted were referred to a specialist, hence these patients fall into the latter category. “GP type visits” have been defined

based on a modified form of the Australasian College of Emergency Medicine (ACEM) criteria and includes patients who were self-referred; assigned a SATS score of P3; did not arrive by ambulance; and were discharged from the ED (4). The ACEM criteria included patients who presented between 08:00 and midnight and had a treatment time of less than 60 minutes in addition to the above. As this was a retrospective study information pertaining to these additional criteria was not available.

Descriptive and inferential statistics have been used to analyse the data as appropriate. The data from the holiday period has been compared to the data from the non-holiday period.

Continuous variables such as age have been described using measures of central tendency (e.g. Mean) together with standard deviation and range. Discrete, qualitative data such as sex, address, payer information, mode of arrival and disposition have been analysed and measured using a nominal scale. The numerical data has been compared using an unpaired T-test.

The patient diagnosis has been analysed using frequency distribution tables and the incidence of specific conditions during the school holidays versus during the school term has been analysed using a grouped frequency distribution table.

Pearson's Chi-square, and where appropriate Fisher's exact test have been used to compare pairs of categorical variables (62). A p value of less than 0.05 has been used to indicate statistical significance.

3.4. FUNDING

As this was a retrospective research project the costs incurred were mainly for photocopying, printing and help with the data collection, capturing and analysis. These costs amounted to less than R4000 and have been borne by the researcher.

3.5. LIMITATIONS

One of the limitations of this study was that it was retrospective and hence dependent on the accuracy and availability of the necessary data. With the data being largely collected by four specifically assigned people, it was found to be largely reliable. However there was demographic information which was missing from the Study Hospital Database, which was probably the result of there not being a dedicated data-capturer. Hence when the ED was busy, the triage officer then got caught up with his/her primary role of triaging the patients and would not have captured the data until the ED was quieter. This may have led to patients not being recorded on the database or there being an incomplete record of the patient. This has been minimised as the recorded data has been reviewed and any missing information has been captured and incorrect information has been corrected using the doctor practice billing database.

However if the patient was not recorded on the database then this may skew the results as it was expected that the ED would be busier during the holiday period and hence there would be more missing patients during the holiday period then during the non-holiday period. However this has also been mitigated as patients who were not in the Study Hospital Database but who were in the practice billing database for the study period were added to the data collected.

A further limitation was encountered in the recording of the patient diagnosis as this was entered by the practice administrative staff in the billing records, who may have preferred to record a diagnosis or ICD-10 code that they were familiar with or which was their interpretation of the diagnosis based on either a verbal or written diagnosis given to them by the treating doctor. However, the error made here usually involves a broader or more generalized diagnosis being recorded such as a metatarsal fracture being recorded as a fracture of the foot. This was however unlikely to impact the results of the study as during the analysis of the data similar diagnoses were amalgamated into broader categories. Furthermore if such an error was being made, it would have been made consistently and hence should not have altered differences between the patient profile during the holiday and non-holiday periods.

During the analysis of the data, patients who resided outside a radius of 15kms from the Study Hospital based on a Google® map were considered to be visitors to the Umhlanga area. Patients who reside more than 15kms from the hospital have the option

to utilize other EDs as well as their GP. Thus while the radius of 15kms was selected arbitrarily, it has been applied to both the Holiday and Non-holiday data sets and hence should not interfere with the integrity of the data analysis and the conclusions.

CHAPTER 4 : RESULTS

As per the methods discussed in the previous chapter, a total of 3428 patients attending the Study Hospital ED during the study period were identified and included in the study sample. Of these 3428 patients, 1999 presented to the ED during the holiday period (10th December 2011 – 8th January 2012) and 1429 presented during November 2011. The data collected has been divided into demographics of the patients; clinical parameters and disposition of the patients. In this chapter the data for each study period has been analysed and compared.

4.1. DEMOGRAPHICS OF PATIENTS

4.1.1. Age

The mean age of patients presenting during the holiday period was 31.5 years with a standard deviation of 21.7 years. The youngest patient was a month old, with the data not recording age under 1 month, while the oldest patient was 95 years with a median age of 30 years.

During November 2011 the mean age of patients presenting was 32.2 years with a standard deviation of 21.1 years. The youngest patient was a month old while the oldest patient was 95 years with a median age of 31 years.

Thus, in these two samples, there was no significant difference between the mean (31.5 vs. 32.2), maximum (95 vs. 95), minimum (1 month vs. 1 month), median (30 vs. 31) and standard deviation (21.7 vs. 21.1).

4.1.2 Gender

During the holiday period there were a 1050 male and 949 female patients with a male to female ratio of 1.1 to 1 who attended the ED.

There were 768 male patients and 661 female patients who attended the ED in November 2011 with a male to female ratio of 1.2 to 1.

Thus the ratio of male to female patients was very similar for both the study periods.

4.1.3 Racial Group

Of the 1999 patients attending the ED during the holiday period, race was not recorded for 1 patient. In terms of the others, Caucasians accounted for the greatest number with 883 (44.2%). Indians accounted for 668 (33.4%), Black Africans 386 (19.3%), Mixed Race 39 (2%) and Asians 22 (1.1%) of this sample population.

During November 2011 of the 1429 patients attending the ED, the race for 1 patient was not recorded and this patient has been excluded from this analysis. The majority of patients utilizing the ED in this sample were Indian (562; 39.4%). Caucasians accounted for 544 (38.1%), Black Africans 286 (20%), Mixed Race 23 (1.6%) and Asians 13 (0.9%) of this sample population. However there was no significant difference ($p > 0.999$) in the racial distribution between the holiday and non-holiday samples as illustrated by Table 4.1.

Table 4.1 Comparison of the racial demographics of the patients presenting to the ED during the Holiday and Non-holiday Periods

Racial Group	Holiday Period	Non-holiday Period
Caucasions	44.2%	38.1%
Indians	33.4%	39.4%
Black Africans	19.3%	20%
Mixed Race	2.0%	1.6%
Asians	1.1%	0.9%

4.1.4 Nationality

The vast majority of the patients attending the ED during the holiday period were South African (SA), making up 1972 (98.6%) of the presenting patients. The remainder of the patients was from different parts of the world with 7 from Australasia, 7 from Europe, 8 from Africa, 4 from North America and 1 from the Middle East. Those from Europe included one patient each from the Czech Republic, England, Ireland, Portugal and Switzerland with two patients from the Netherlands. Those from the rest of Africa (excluding SA) included two each from Mozambique, Swaziland and Zimbabwe and one each from Mauritius and Zambia (see Figure 4.1).

Similarly the vast majority of the patients attending the ED during November 2011 were South African (1420; 99.4%). There were only 9 (0.6%) international tourists. Two of them were from the USA with one each from Australia, Germany, Belgium, Singapore, Saudi Arabia, Swaziland and Botswana. See Figure 4.2.

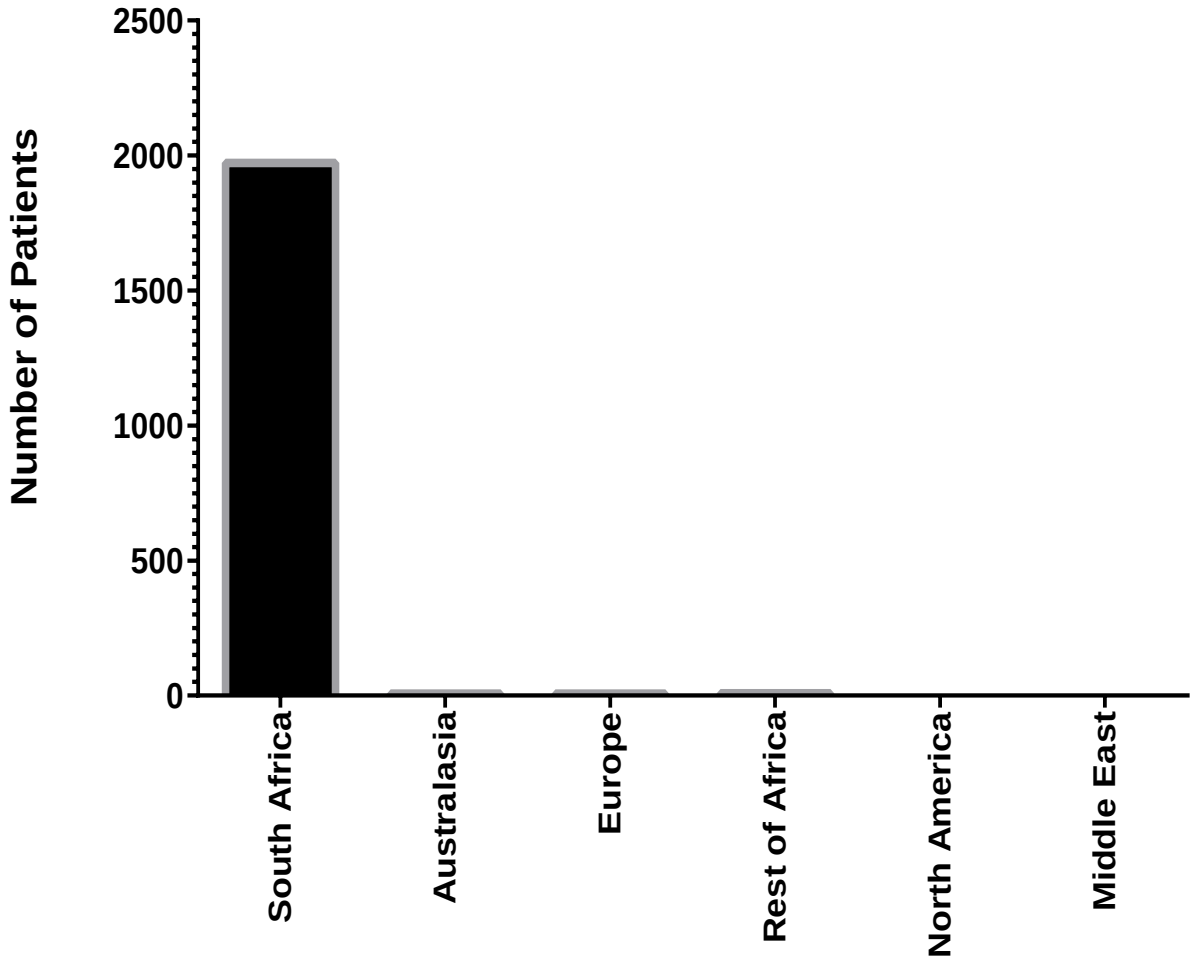


Figure 4.1 Graph depicting the Nationality of the Patients attending the ED during the Holiday Period

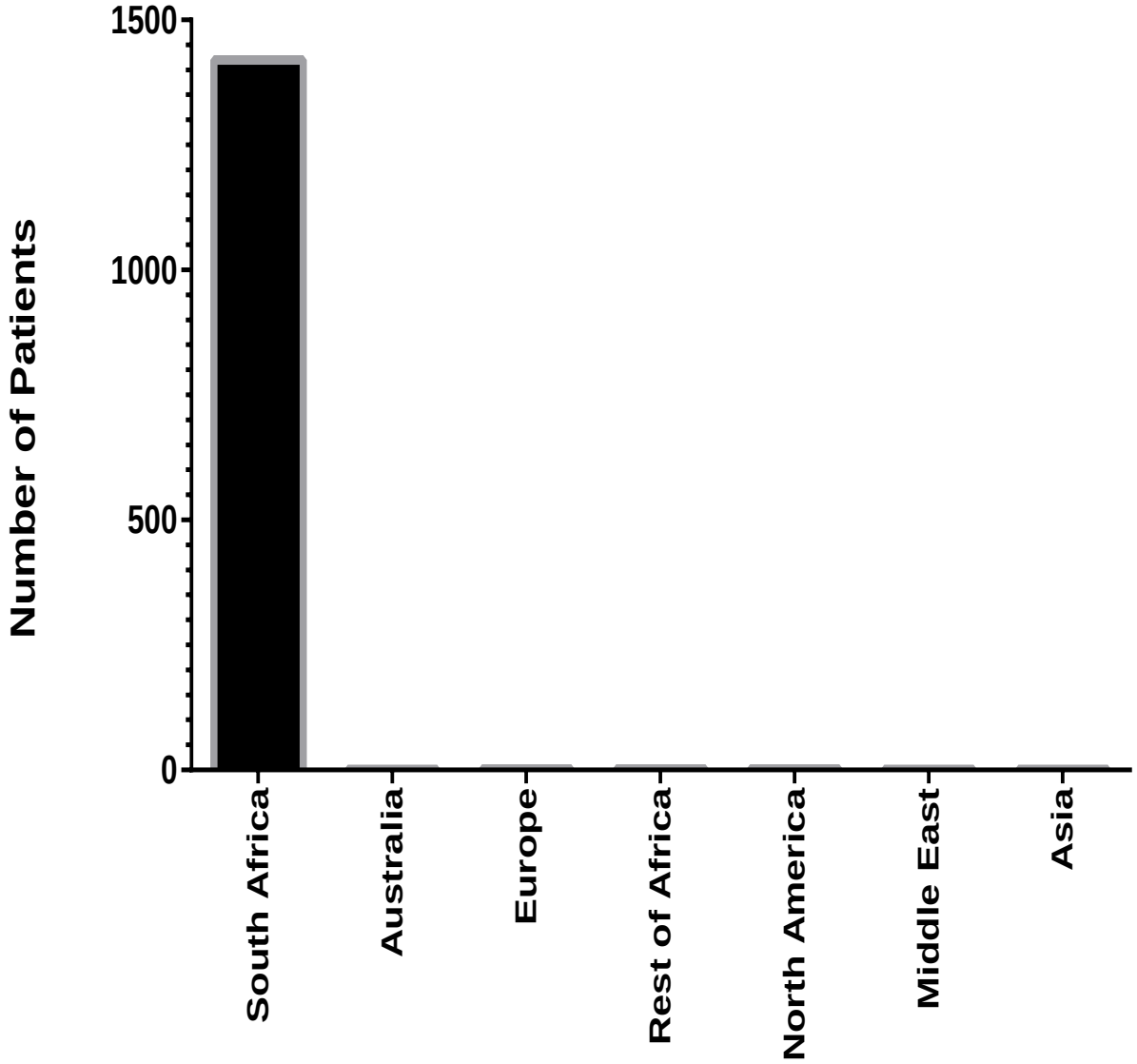


Figure 4.2 Graph depicting the Nationality of the Patients attending the ED during November 2011

Thus while the vast majority of patients attending the ED during the Holiday and Non-holiday periods were South African (98.6% and 99.4% respectively) and while the

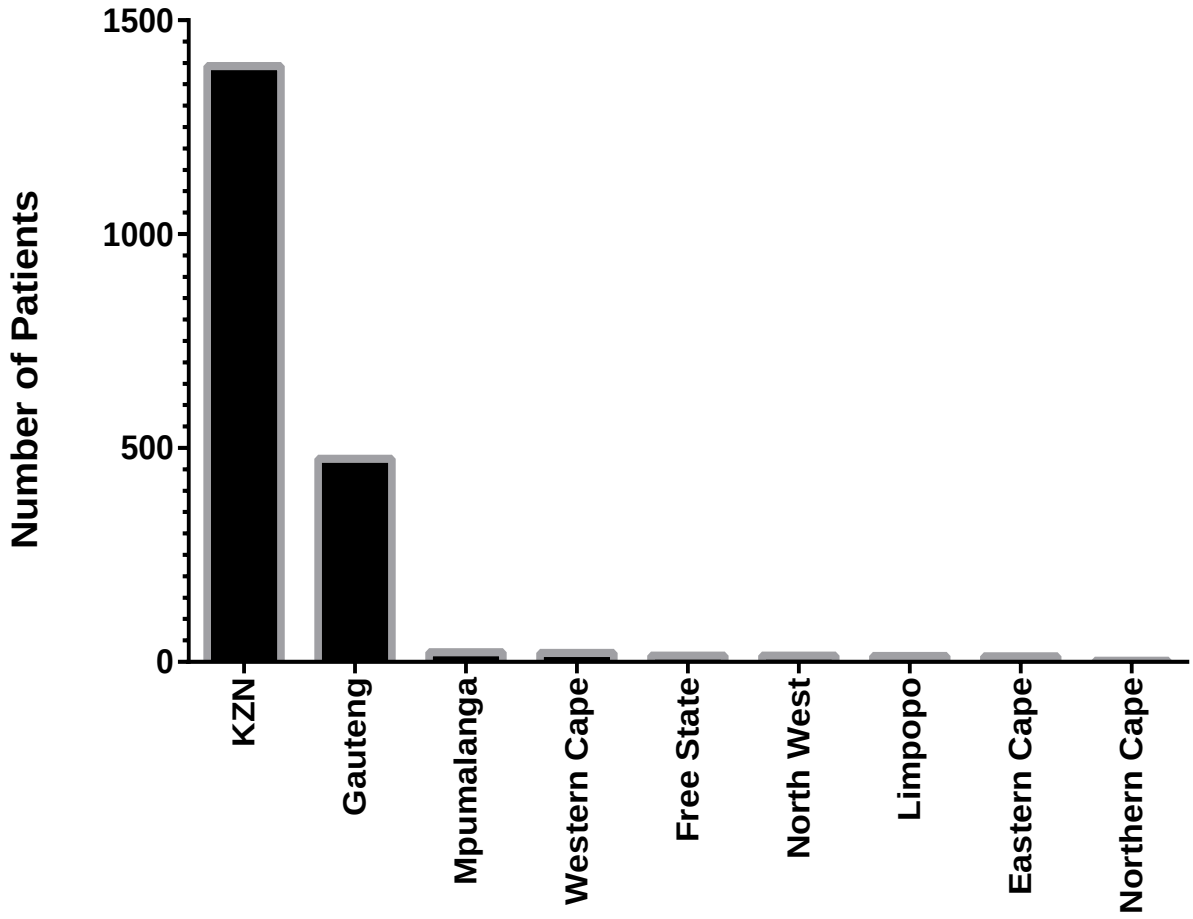
numbers of Foreign Tourists (27 vs. 9) were small, there was a statistically significant (p 0.04) increase in the number of foreigners utilizing the ED during the Holiday period.

4.1.5 Residential Address

Of the 1972 South Africans attending the ED during the holiday period, 1392 (71%) resided in Kwazulu-Natal (KZN), with 476 (24%) from Gauteng, 23 (1.2%) from Mpumalanga, 21 (1.1%) from the Western Cape, 15 (0.8%) each from the Free State and North West Provinces, 14 (0.7%) from Limpopo, 13 (0.7%) from the Eastern Cape and 3 (0.2%) from the Northern Cape (refer to Figure 4.3). Of the 1392 patients residing in KZN there was no residential address for 6 (0.4%) patients and these were excluded from subsequent analysis. Thus from the sample of 1993 patients, 1051 (52.7%) resided in the Umhlanga or surrounding areas which has been defined previously as within a 15km radius of the Study Hospital (see Figure 3.1). The remainder of the sample, 942 patients (47.3%), resided outside the greater Umhlanga area.

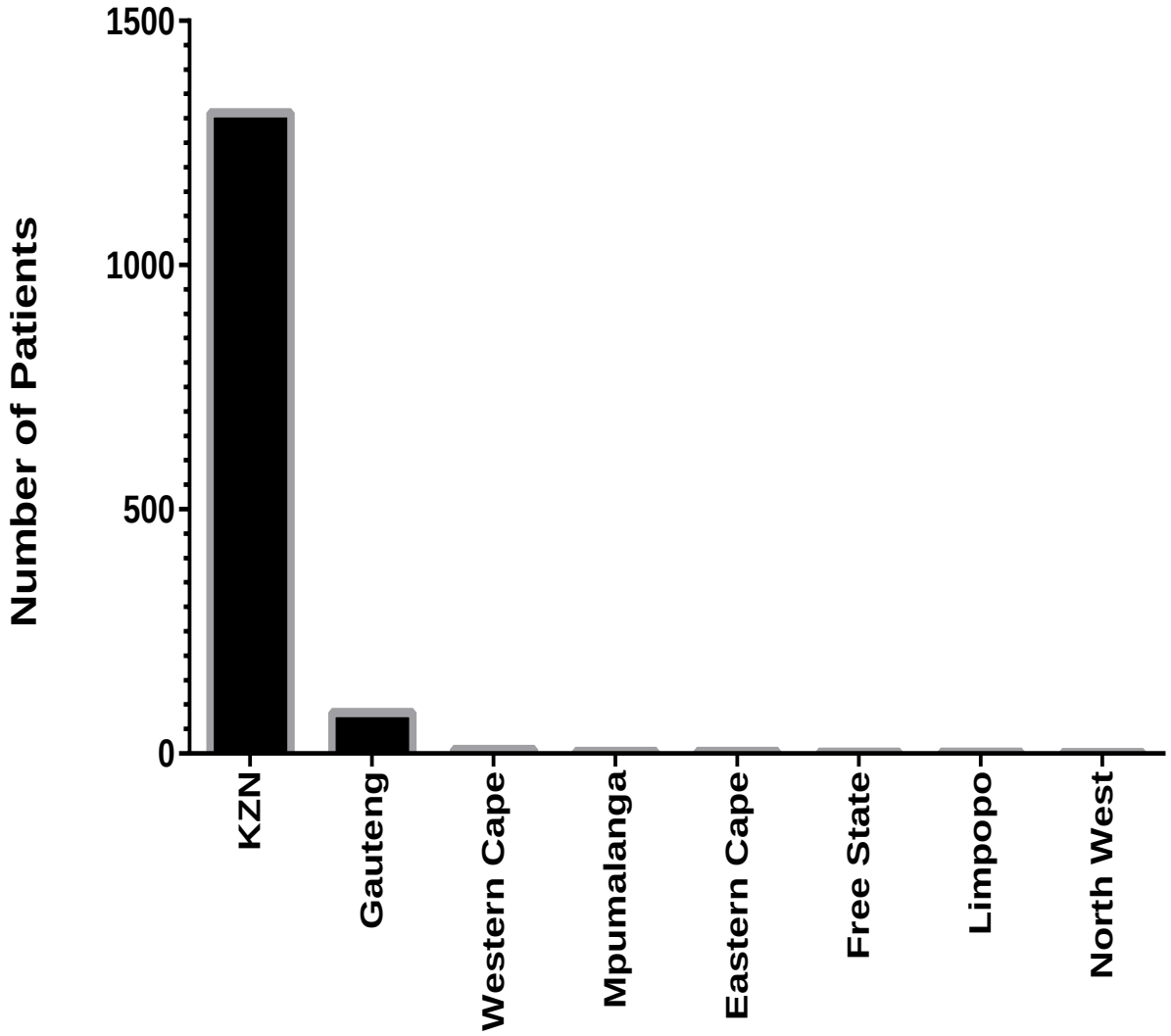
During November 2011, of the 1420 South African patients attending the ED, 1312 (92.4%) were from KZN with 84 (5.9%) from Gauteng, 8 (0.56%) from the Western Cape, 4 (0.28%) each from the Eastern Cape and Mpumalanga, 3 (0.21%) each from the Free State and Limpopo and 2 (0.14%) from the North West (refer to Figure 4.4). Only 1 patient from KZN did not have a specified residential suburb and was consequently excluded. Thus there were 877 patients (61.4%) attending the ED in

November 2011 who resided in the Umhlanga and surrounding areas while 551 (38.6%) of the patients resided outside this specified area.



(KZN – Kwazulu-Natal)

Figure 4.3 Graph depicting the Province of Origin of Patients attending the ED during the Holiday Period

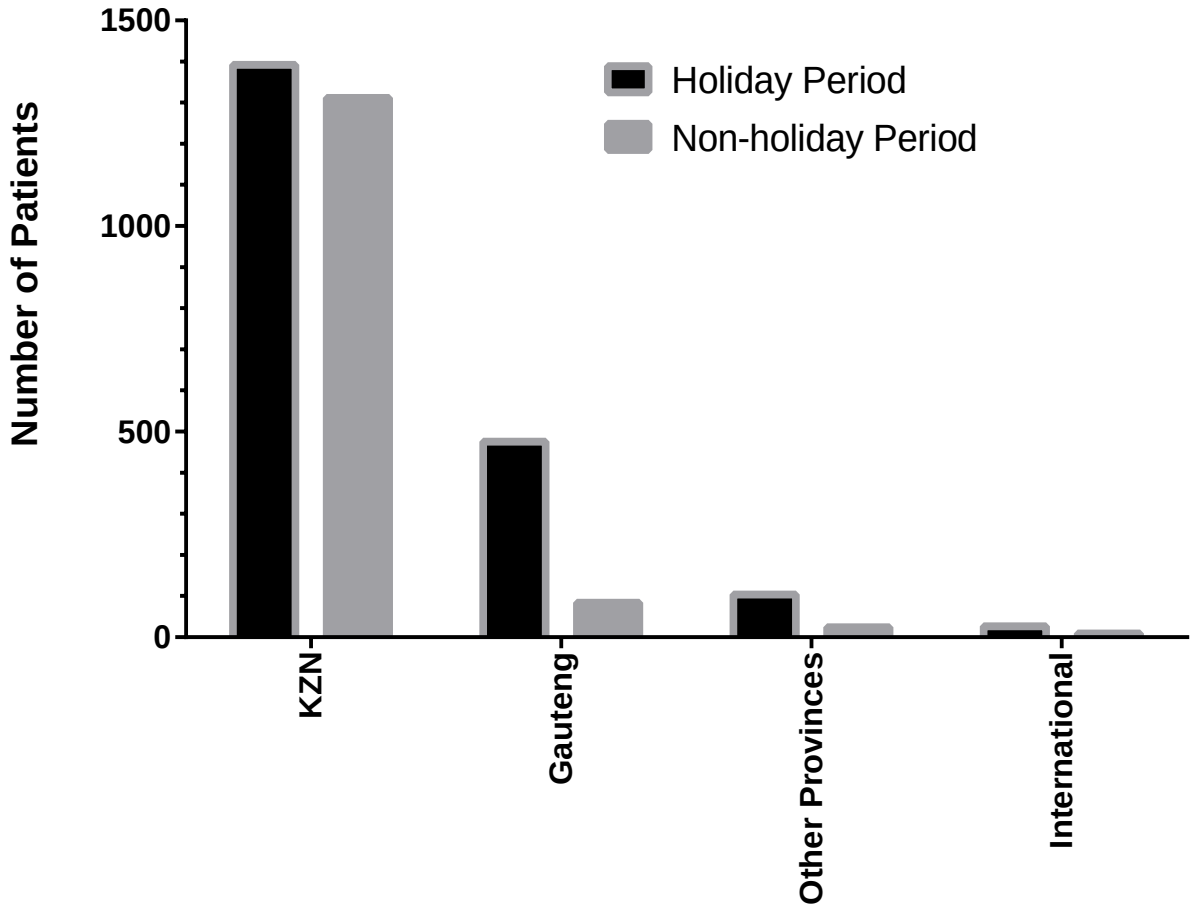


(KZN – Kwazulu-Natal)

Figure 4.4 Graph depicting the Province of Origin of Patients attending the ED during November 2011

There were significant differences in the origin of patients attending the ED during the Holiday and the Non-holiday Periods. There were significantly ($p < 0.0001$) more

patients attending the ED during the Holiday Period who resided outside of KZN (29.9% vs. 8.2%). Refer to Figure 4.5. There were also significantly ($p < 0.0001$) more patients (47.3% vs. 38.6%) attending the ED during the Holiday Period who resided outside the Umhlanga area (as defined in Chapter 3). Refer to Figure 4.6.



(KZN – Kwazulu-Natal)

Figure 4.5 Comparison of the Province of Origin of Patients attending the ED during the Holiday and Non-holiday Periods.

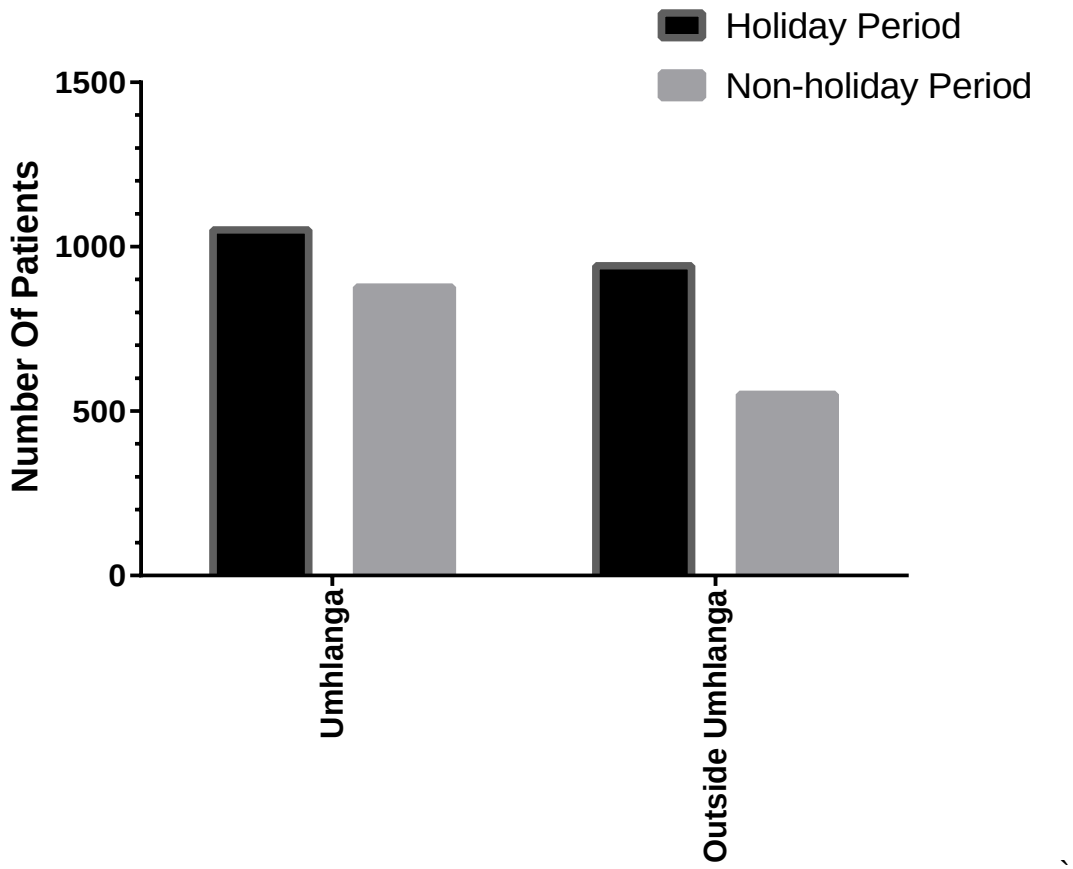


Figure 4.6 Comparison of the Area of Residence of patients attending the ED during the Holiday and the Non-holiday Periods.

4.1.6 Payer Information

Of the 1999 patients attending the ED during the holiday period there were 8 patients (0.4%) for whom no payer information was recorded. Of the remaining 1991 patients, the majority of them belonged to a medical aid (1538 patients i.e. 77.2%). There were also a 121 injury on duty (IOD) patients (6.1%) and 332 privately funded patients (16.7%) who were attended to in the ED during the December holiday period.

The top five medial schemes that patients attending the ED during the holiday period were contracted to is illustrated in the following table (Table 4.2)

Table 4.2 The Five Commonest Medical Aids of Patients attending the ED during the Holiday Period

Medical Schemes	No. of Patients (%)
1. Discovery Health	742 (48.2%)
2. GEMS	141 (9.2%)
3. Momentum Health	83 (5.4%)
4. Bonitas Medical Scheme	65 (4.2%)
5. Bankmed Medical Scheme	38 (2.5%)

(GEMS – Government Employees Medical Scheme)

During November 2011 there were 45 patients (3.1%) for whom no payer information was recorded. From the remaining 1384 patients, 1042 (75.3%) belonged to a medical aid while 157 (11.3%) were IOD patients and 185 (13.4%) were privately funded.

The five commonest Medical Schemes to which patients attending the ED during the Non-holiday period were contracted to is illustrated in the following table. (Refer to Table 4.3)

Table 4.3 The Five Commonest Medical Aids of Patients attending the ED during the Non-holiday Period

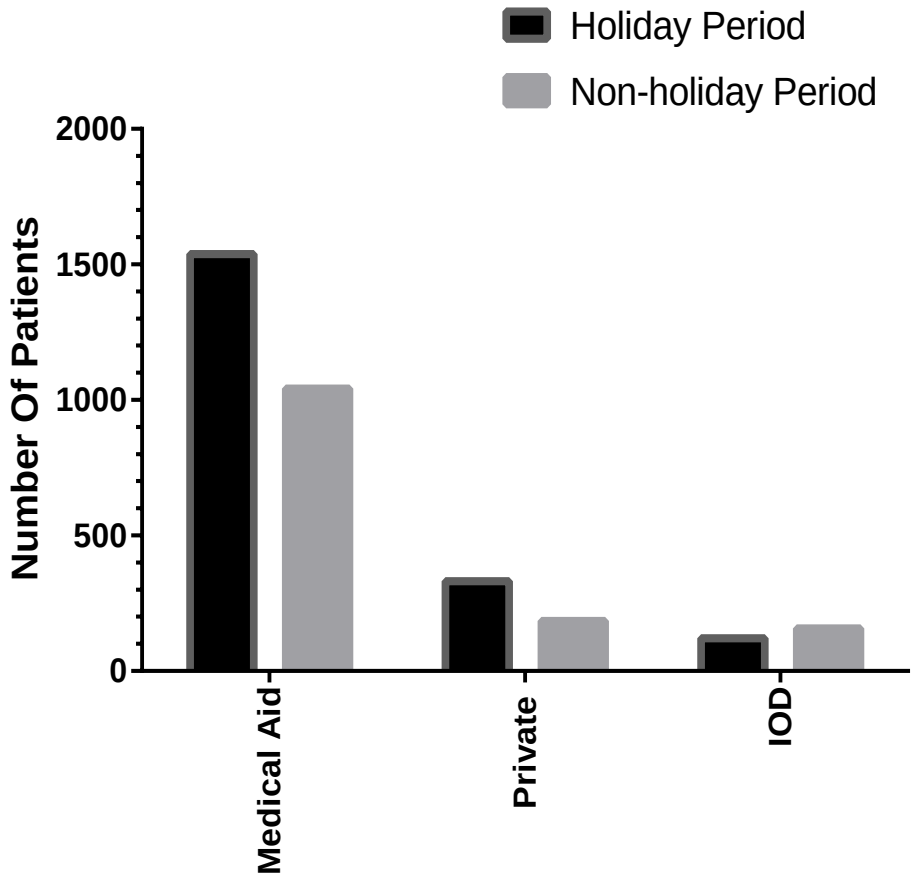
Medical Schemes	No. of Patients (%)
1. Discovery Health	462 (44.3%)
2. GEMS	117 (11.2%)
3. Momentum Health	83 (8.0%)
4. Bonitas Medical Scheme	43 (4.1%)
5. Netcare Medical Scheme	29 (2.8%)

(GEMS – Government Employees Medical Scheme)

There was a statistically significant difference ($p < 0.0001$) in the payer information profile between the Holiday and the Non-holiday periods. Refer to Figure 4.7. This was largely due to the smaller proportion of IOD patients (6.1% vs. 11.3%) as well as the larger proportion of Private patients (16.7% vs. 13.4%) who attended the ED during the Holiday Period. The proportion of Medical Aid patients during the Holiday and the Non-holiday Periods was similar (77.2% vs. 75.3% respectively).

In terms of the commonest medical aids to which patients were contracted, these were similar between the Holiday Period and the Non-holiday Period. While the top four contracted medical aids were Discovery Health, GEMS, Momentum Health and Bonitas for both periods, the fifth commonest contracted medical aid was Bankmed (2.5%)

during the Holiday period compared to Netcare Medical Scheme (2.8%) during the Non-holiday Period.



(IOD – Injury on Duty)

Figure 4.7 Comparison of the Payer Information between the Holiday and the Non-holiday Periods.

4.2. CLINICAL PARAMETERS

4.2.1 Triage Diagnosis

This is the presumptive diagnosis assigned to the patient by the Triage Officer based on the patient's presenting complaint. The table below (Table 4.4) illustrates the ten commonest Triage Diagnoses for patients attending the ED during the holiday period.

Table 4.4 The Ten Commonest Triage Diagnoses for Patients Attending the ED during the Holiday Period

Triage Diagnosis	No. of Patients (%)
1. Medical NFS	562 (28.1%)
2. Fall NFS	170 (8.5%)
3. Follow up	143 (7.2%)
4. GIT (N/V/D)	125 (6.3%)
5. Pain NFS	94 (4.7%)
6. Fever	77 (3.9%)
7. Laceration	77 (3.9%)
8. Pain (Abdomen)	51 (2.6%)
9. Chest Pain	48 (2.4%)
10. Crush Injury	42 (2.1%)

(*NFS – not further specified)*

(GIT – Gastrointestinal Tract)

(N/V/D – nausea/vomiting/diarrhea)

Of the tourists attending the ED during the Holiday Period, the largest group was from Gauteng [473 patients (23.7%)]. The following table illustrates the ten most common triage diagnoses in this group of patients.

Table 4.5 *The Ten* Commonest Triage Diagnoses for Patients from Gauteng Attending the ED during the Holiday Period

Triage Diagnosis	No. of Patients (%)
1. Medical NFS	129 (27.3%)
2. GIT (N/V/D)	39(8.2%)
3. Fall NFS	37 (7.8%)
4. Pain NFS	34 (7.2%)
5. Fever	26 (5.5%)
6. Laceration	14 (3.0%)
7. Follow up	14 (3.0%)
8. Respiratory (Influenza)	12 (2.5%)
9. Pain (Abdomen)	11 (2.3%)
10. Respiratory NFS	11 (2.3%)

(*NFS – not further specified)*

(GIT – Gastrointestinal Tract)

(N/V/D – nausea/vomiting/diarrhea)

The above tables illustrate that the spectrum of illness amongst tourists from Gauteng was similar to the spectrum of illness in the total sample of patients. In the total sample chest pain and crush injuries had a slightly larger incidence than amongst tourists from Gauteng (2.4% vs 1.5% and 2.1% vs 1.7% respectively).

The following table (Table 4.6) illustrates the ten commonest Triage Diagnoses for patients attending the ED during November 2011.

Table 4.6 The Ten Commonest Triage Diagnoses for Patients Attending the ED during November 2011

Triage Diagnosis	No. of Patients (%)
1. Medical NFS	403 (28.2%)
2. Follow up	200 (14.0%)
3. Fall NFS	114 (8.0%)
4. GIT (N/V/D)	76 (5.3%)
5. Chest Pain	51 (3.6%)
6. Pain NFS	48 (3.4%)
7. Fever	48 (3.4%)
8. Laceration	48 (3.4%)
9. Pain (Abdomen)	28 (2.0%)
10. Neurological (Headache)	23 (1.6%)

(NFS – not further specified)

(N/V/D – nausea/vomiting/diarrhea)

(GIT – Gastrointestinal Tract)

The table below illustrates the ten commonest triage diagnoses among patients from Gauteng who attended the ED during November 2011.

Table 4.7 The Ten Commonest Triage Diagnoses for Patients from Gauteng Attending the ED during November 2011

Triage Diagnosis	No. of Patients (%)
1. Medical NFS	20 (27.4%)
2. Fall NFS	9 (12.3%)
3. Follow up	6 (8.2%)
4. GIT (N/V/D)	4 (5.5%)
5. Fever	4 (5.5%)
6. Laceration	4 (5.5%)
7. Crush Injury	3 (4.1%)
8. Pain (Abdomen)	3 (4.1%)
9. Pain NFS	2 (2.7%)
10. Respiratory (Coughing)	2 (2.7%)

(NFS – not further specified)

(N/V/D – nausea/vomiting/diarrhea)

(GIT – Gastrointestinal Tract)

As observed during the Holiday Period the spectrum of illness among tourists from Gauteng during the Non-holiday period was similar to that amongst the total sample of patients. However there were some differences during the Non-holiday Period with an increased incidence of Chest Pain and Neurological (headache) presentations among the total sample (3.6% vs 0% and 1.6% vs 0% respectively). These results however,

maybe unreliable due to the small number of Gauteng tourists attending the ED during this period [73 patients (5.1%)].

The ten commonest triage diagnoses for the Holiday and the Non-holiday Periods were similar with only one difference. The tenth most frequent triage diagnosis was Crush Injuries during the Holiday Period compared with Neurological (headaches) during the Non-holiday Period. There was a marked increase in Crush Injuries during the Holiday Period (2.1% vs. 1.2%) whereas the difference in the proportion of patients presenting with a triage diagnosis of Neurological (headaches) was very small between the two study periods (1.4% vs. 1.6%). There was also a marked difference in Follow up patients between the Holiday and Non-holiday Periods (7.2% vs. 14.0%).

4.2.2 Discharge Diagnosis (ICD 10)

The five most frequent discharge diagnoses in patients attending the ED during the holiday period are listed in Table 4.8. “Review” refers to patients who were asked to come back or who came back to the ED and were reassessed. It includes IOD patients who were followed up until they had made a full recovery; patients who came back because they were not better; patients called back for review of their wounds or fractures, removal of sutures or repeat doses of Rabies vaccine.

Table 4.8 The Five Most Frequent Discharge Diagnoses of Patients Attending the ED during the Holiday Period

Discharge Diagnosis	No. of Patients (%)
1. Upper Respiratory Tract Infections and Otitis Media	265 (13.3%)
2. Gastroenteritis	173 (8.7%)
3. Review	154 (7.7%)
4. Head or Neck Injury	114 (5.7%)
5. Injury to Hand or Wrist	106 (5.3%)

From Table 4.8 it is noted that the two commonest diagnoses are upper respiratory tract infections and otitis media, and gastroenteritis which are common complaints in patients attending a General Practitioner. This is confirmed by the data which indicates that 592 (29.6%) of the patients attending the ED during the holiday period can be categorized as “GP type visits” which have been defined as self-referred patients with a P3 SATS score who arrive at the ED in a private vehicle and who are subsequently discharged home. This is a modified version of the Australasian College of Emergency Medicine (ACEM) criteria which also included patient presentation between 08:00 and midnight and a treatment time of less than 60 minutes (4). Information pertaining to these criteria was not available in the Study Hospital’s Database.

The five most frequent discharge diagnoses in patients attending the ED during November 2011 are listed in Table 4.9.

Table 4.9 The Five Most Frequent Discharge Diagnoses of Patients Attending the ED during November 2011

Discharge Diagnosis	No. of Patients (%)
1. Review	183 (12.8%)
2. Upper Respiratory Tract Infection and Otitis Media	149 (10.4%)
3. Head and Neck Injury	106 (7.4%)
4. Gastroenteritis	92 (6.4%)
5. Injury to Hand or Wrist	83 (5.8%)

It is observed that “GP type visits” as defined previously accounted for 352 (24.6%) of the patients attending the ED during November 2011.

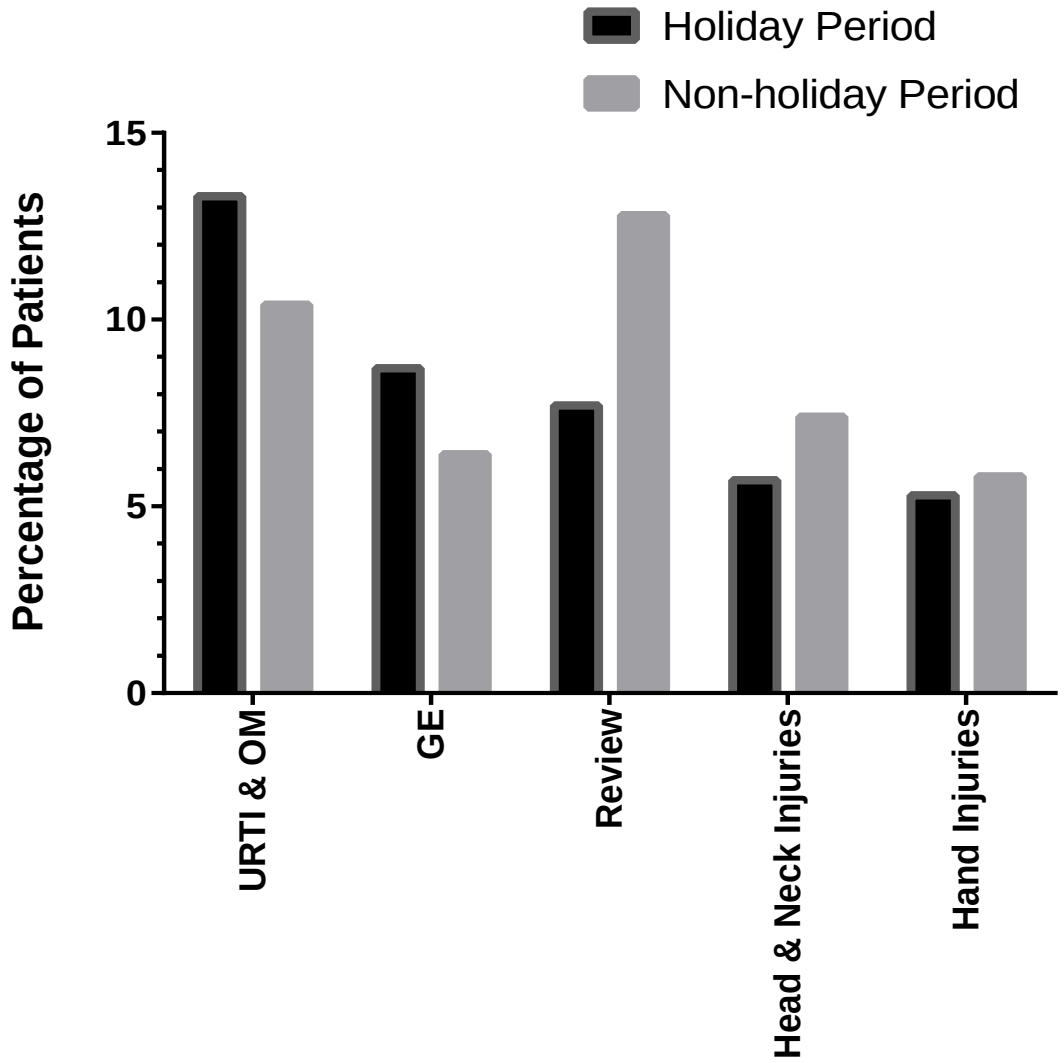
The five commonest diagnoses for patients attending the ED during the Holiday and the Non-holiday Periods were the same. However the percentage of patients presenting with each diagnosis was different. Refer to Table 4.10. During the Holiday Period the commonest diagnosis was Upper Respiratory Tract Infection (URTI) and Otitis Media (OM), which accounted for 13.3% of patients presenting to the ED. While during the Non-holiday Period, Review patients accounted for the greatest percentage (13%) of patients attending the ED.

Table 4.10 Comparison of the Five Most Frequent Discharge Diagnoses of Patients Attending the ED during the Holiday and Non-holiday Periods

Discharge Diagnosis	Holiday Period No. of Patients (%)	Non-holiday Period No. of Patients (%)
1. Upper Respiratory Tract Infections and Otitis Media	265 (13.3%)	149 (10.4%)
2. Gastroenteritis	173 (8.7%)	92 (6.4%)
3. Review	154 (7.7%)	183 (12.8%)
4. Head or Neck Injury	114 (5.7%)	106 (7.4%)
5. Injury to Hand or Wrist	106 (5.3%)	83 (5.8%)

There were significant differences ($p < 0.0001$) in the Diagnosis of patients attending the ED during the Holiday and Non-holiday Periods. Refer to Figure 4.8. The greatest difference was in the patients presenting with URTI and OM (13.3% vs. 10.4% respectively); Gastroenteritis (8.7% vs. 6.4% respectively) and for Review (7.7% vs. 12.8% respectively).

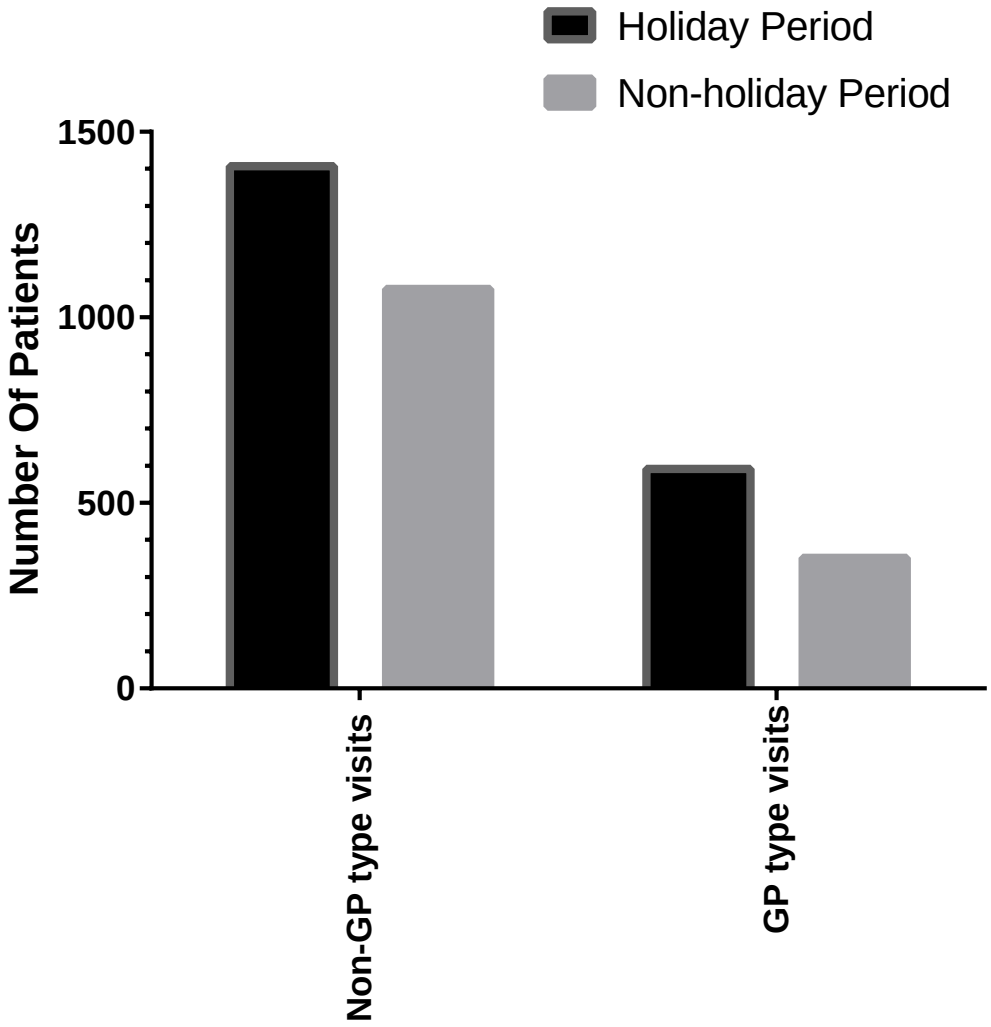
There was also a significant difference (p 0.001) in the “GP type visits” between the Holiday and the Non-holiday periods. There were proportionally more “GP type visits” to the ED during the Holiday Period (29.6% vs. 24.6%). Refer to Figure 4.9.



(URTI & OM – Upper Respiratory Tract Infection & Otitis Media)

(GE – Gastroenteritis)

Figure 4.8 Comparison of the Percentage of Patients presenting with the Five Commonest Discharge Diagnoses during the Holiday and the Non-holiday Periods.



(GP – General Practitioner)

Figure 4.9 Comparison of "GP type visits" during the Holiday and Non-holiday Periods.

4.2.3 Trauma versus Non-trauma

Of the 1999 patients attending the ED during the holiday period there were 468 (23.4%) trauma patients. Of these patients, 48 (10.3%) sustained the trauma during the course of their remunerated employment activities. Thus, there were 420 cases (89.7%) of non-

occupational related trauma. Note that while there were a total of 121 IOD patients presenting to the ED during the holiday period, only 48 of these patients were classified as trauma because the remainder of the IOD patients who were treated were follow-up patients and were hence classified as non-trauma. All IOD patients are followed-up until they have made a full functional recovery or until they are referred to a specialist.

In all the trauma patients attending the ED during the holiday period, the commonest mechanism of injury was a fall. It was the cause of the injury in 200 (42.7%) of these patients with the vast majority (67.1%) being under 40 years of age i.e. among younger and more active people. Transport accidents which includes motor vehicle accidents, motor-bike accidents and pedestrian vehicular accidents, were the second commonest cause for trauma and occurred in 41 (8.7%) of these patients.

Of the 1429 patients attending the ED during November 2011 there were 352 (24.6%) trauma patients. Of these patients, 57 (16.2%) sustained an injury during the course of their remunerated employment activities. The remaining 295 (83.8%) sustained an injury during the course of non-occupational related trauma.

Similar to the holiday period, the commonest mechanism of injury in all the trauma patients attending the ED during November 2011 was a fall. It was the cause of injury in

154 (43.8%) of these patients with the majority (68.2%) occurring in younger patients i.e. patients under 40 years of age. Transport accidents was the second commonest cause of trauma and occurred in 42 (11.9%) of these patients.

While the incidence of trauma was lower during the holiday period as compared to the non-holiday period (23.4% vs. 24.6%) the difference was not statistically significant (p 0.058). The majority of this decrease was due to a decreased incidence of Occupational Trauma during the holiday period (10.3% vs.16.2%). In fact the incidence of Non-occupational Trauma was greater during the holiday period (89.7% vs. 83.8%). Refer to Figure 4.10.

The two commonest mechanisms for trauma during the holiday and non-holiday periods were a fall and a transport accident. There was no significant difference (p 0.27) between the incidences of these two mechanisms of injury in these samples. Refer to Figure 4.11.

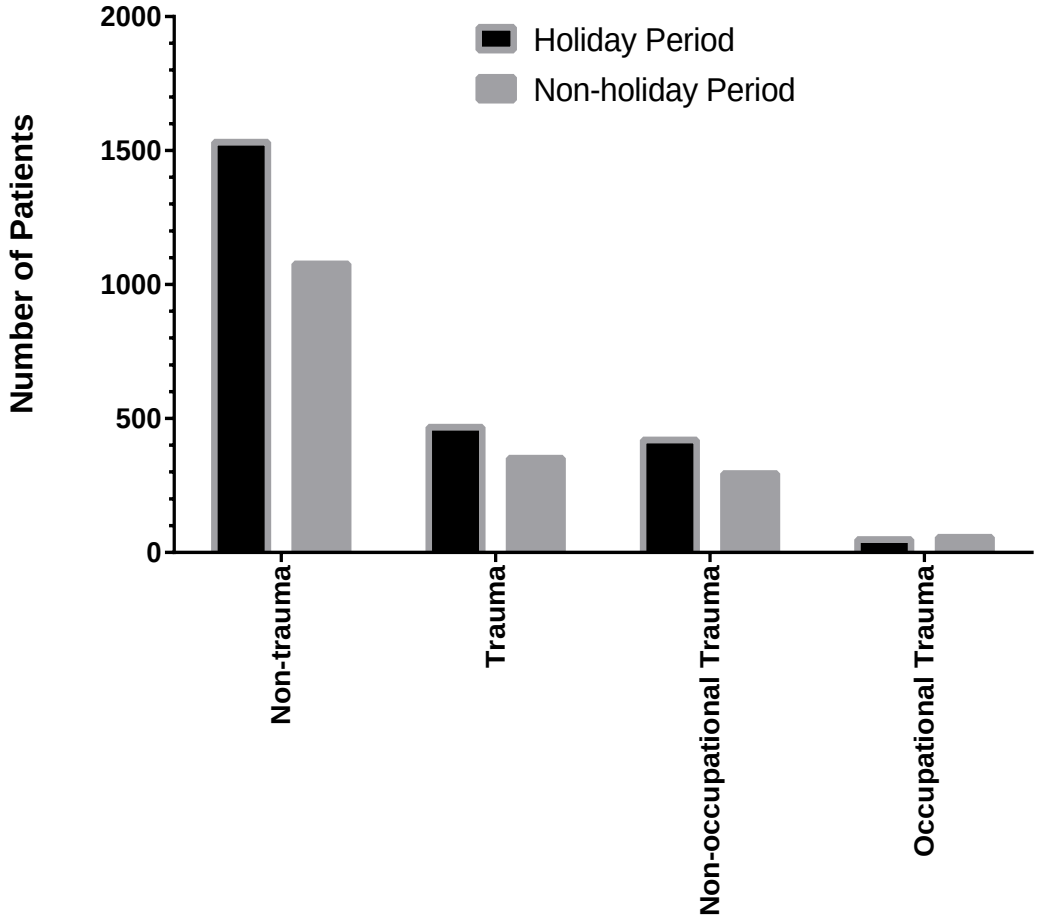


Figure 4.10 Comparisons of the Occupational Trauma, Non-Occupational Trauma and Non-trauma Incidence during the Holiday and Non-holiday Periods.

4.2.4 SATS

The vast majority of patients (1275; 63.8%) during the holiday period were classified as Priority 2 (P2) according to the South African Triage Score (SATS). Of the remainder, 117 (5.9%) were classified as P1 and 607 (30.4%) were classified as P3.

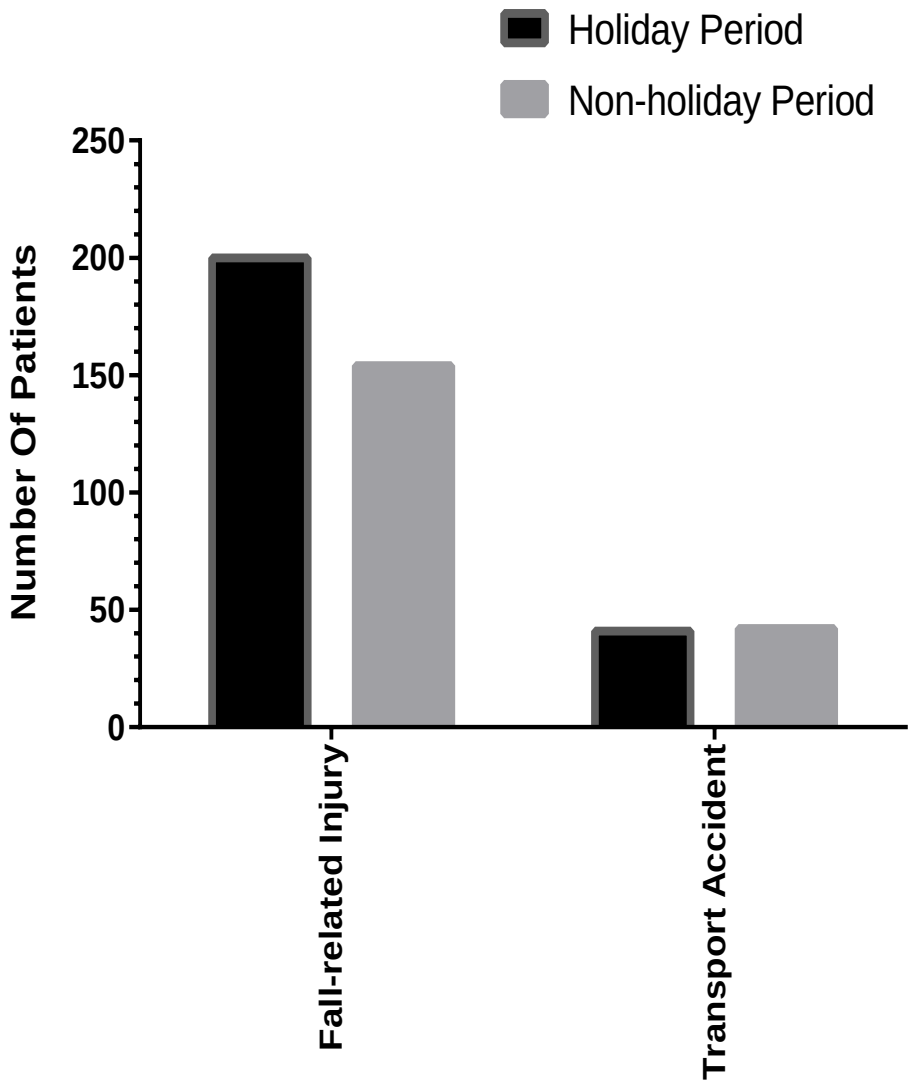


Figure 4.11 Comparison of the two commonest Mechanisms of Injury during the Holiday and Non-holiday Periods.

During the non-holiday period 944 P2 (66.1%), 117 P1 (8.2%) and 368 P3 (25.8%) patients were attended to in the ED.

There was a significant difference (p 0.001) between the SATS profile of the patients attending the ED during the holiday period compared to the non-holiday period. While the number of P1 patients attending the ED during the holiday and non-holiday periods was the same there was a marked decrease in the proportion of P1 patients during the holiday period (5.9% vs. 8.2%). Conversely there were proportionally more P3 patients during the holiday period compared with the non-holiday period [607 (30.4%) vs. 368 (25.8%)]. Refer to Figure 4.12.

4.2.5 TEWS

This refers to the Triage Early Warning Score which is utilized to categorise patients attending the ED. This score utilizes the patient's physiological parameters to determine the severity of the patient's illness and hence the urgency with which the patient needs to be attended to. The following physiological parameters are utilized:

Mobility

Respiratory Rate

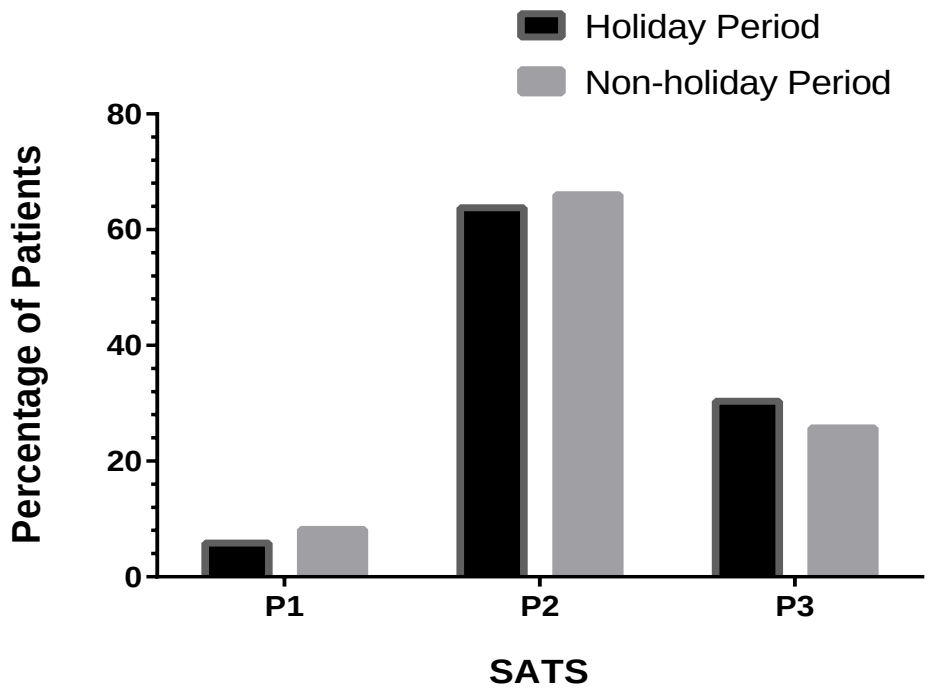
Heart Rate

Systolic Blood Pressure

Temperature

AVPU (**A**lert, Reacts to **V**oice, Reacts to **P**ain, **U**nresponsive)

Trauma



(SATS – South African Triage Score)

(P1 - Priority 1)

(P2 - Priority 2)

(P3 - Priority 3)

Figure 4.12 Comparison of the SATS of patients attending the Emergency Department during the Holiday and Non-holiday Periods.

Each parameter is given a score from 0 – 3 (Refer to Appendix B) with a higher TEWS indicating a more seriously ill patient. The actual TEWS is further modified based on the mechanism of injury and presenting complaint (Refer to Appendix B).

The following table illustrates the TEWS for patients attending the ED during the holiday period.

Table 4.11 TEWS (Triage Early Warning Score) for Patients attending the Emergency Department during the Holiday Period

TEWS (Corresponding Colour Code)	No. of Patients (%)
0 – 2 (Green)	1601 (80.1%)
3 – 4 (Yellow)	375 (18.8%)
5 – 6 (Orange)	18 (0.9%)
7 or more (Red)	5 (0.2%)

Of the 1429 patients attending the ED during November 2011 there was no TEWS for 15 patients who were excluded from the analysis. TEWS (as defined above) for patients attending the ED during November 2011 is illustrated by the table below.

Table 4.12 TEWS (Triage Early Warning Score) for Patients attending the Emergency Department during November 2011

TEWS (Corresponding Colour Code)	No. of Patients (%)
0 – 2 (Green)	1081 (76.4%)
3 – 4 (Yellow)	301 (21.3%)
5 – 6 (Orange)	21 (1.5%)
7 or more (Red)	11 (0.8%)

There was a significant difference (p 0.009) in the TEWS between the Holiday and Non-holiday Periods. Similar to the SATS above it reflects an increase in patients attending the ED with less serious illnesses (green code) during the Holiday Period (80.1% vs. 76.4%). Conversely there was a decrease in patients with serious illnesses (orange and red codes) attending the ED during the Holiday Period (0.9% and 0.2% vs. 1.5% and 0.8% respectively).This is illustrated in Figure 4.13 below.

4.2.6 Mode of Arrival

The vast majority of patients (1935; 96.8%) presenting to the ED during the holiday period arrived via private or public transport. Only 64 patients (3.2%) were brought into the ED via ambulance. There were three levels of pre-hospital care viz. Basic Life Support (BLS), Intermediate Life Support (ILS), and Advanced Life Support (ALS). A

BLS paramedic has successfully completed the five week Basic Ambulance Assistant course which teaches basic assessment techniques and basic life saving skills. An ILS paramedic has successfully completed a three month training course and has at least 1000 hours of practical experience as a BLS paramedic. An ALS paramedic has completed a one year full time critical care assistant programme and passed the critical care assistant entrance examinations and has at least a1000 hours practical experience as an ILS paramedic or has completed a four year Bachelor of Technology Degree or a two year Emergency Care Technician programme. The level of pre-hospital care required by patients transported to the ED via ambulance during the holiday period was not available for 16 cases (25%). Of the remaining patients only six were considered to be severely ill and required transport via an ambulance staffed by an ALS paramedic. A further 40 of these patients required ILS care pre-hospital and only two patients arrived via an ambulance staffed only by a BLS trained paramedic. Due to the low numbers of ambulance transported patients in this sample and that the level of care required was unavailable in such a large proportion, further analysis is unreliable.

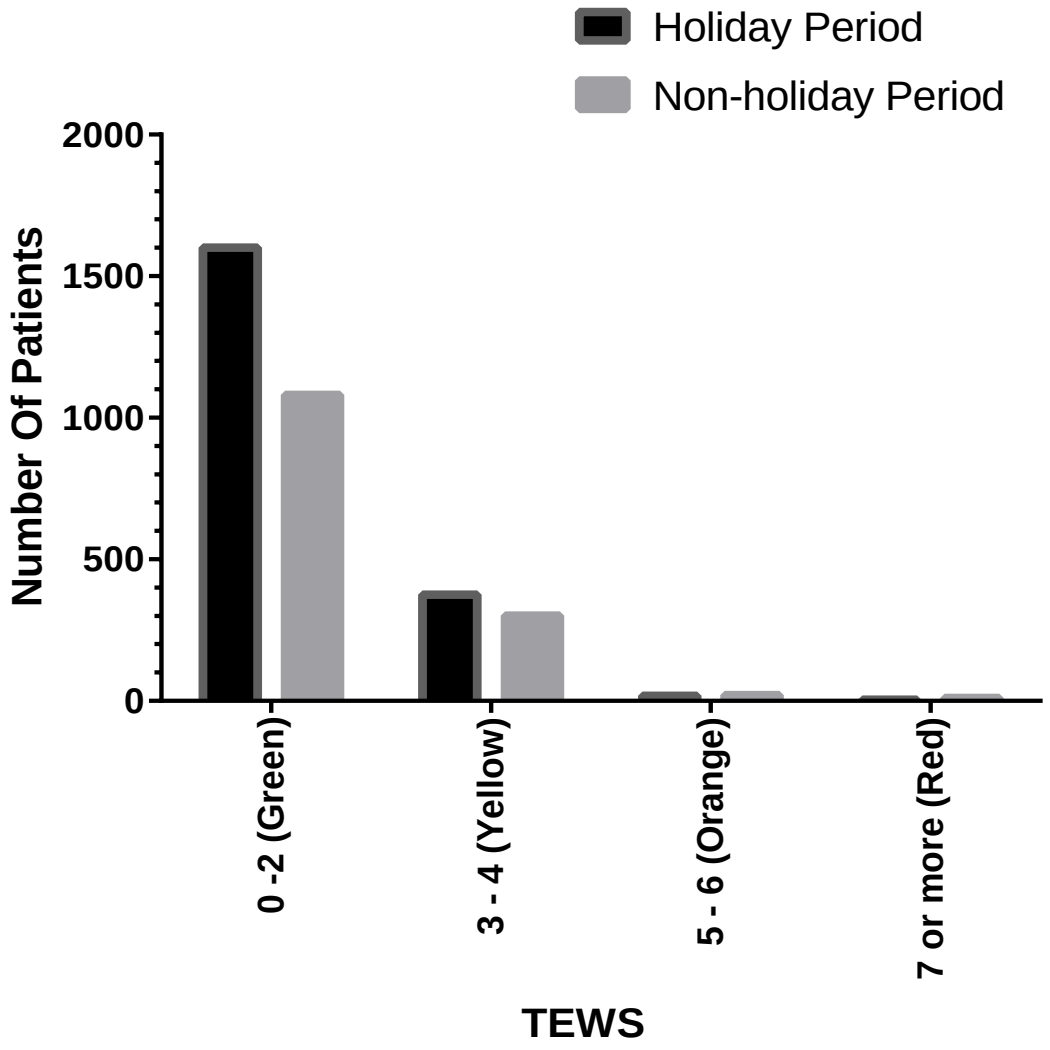


Figure 4.13 Comparison of TEWS (Triage Early Warning Score) between the Holiday and Non-holiday Periods

Similarly during November 2011 the vast majority of patients (1326; 92.8%) attending the ED arrived via private or public transport. Only 103 (7.2%) arrived via ambulance with only nine of these patients being severely ill and requiring ALS transport. A further

68 required ILS transport and six were transported by a BLS crewed ambulance. There were 20 patients transported by ambulance for which no pre-hospital level of care was specified.

There was a significant difference ($p < 0.0001$) in the mode of arrival of patients between the Holiday and Non-holiday Periods. There were proportionally less patients attending the ED during the Holiday Period who arrived via ambulance (3.2% vs. 7.2%). Conversely there were proportionally more patients attending the ED during the Holiday Period who arrived in a private vehicle (96.8% vs. 92.8%). Refer to Figure 4.14 below. This also supports the view that during the Holiday Period there is an increase in low acuity or “GP type” patients.

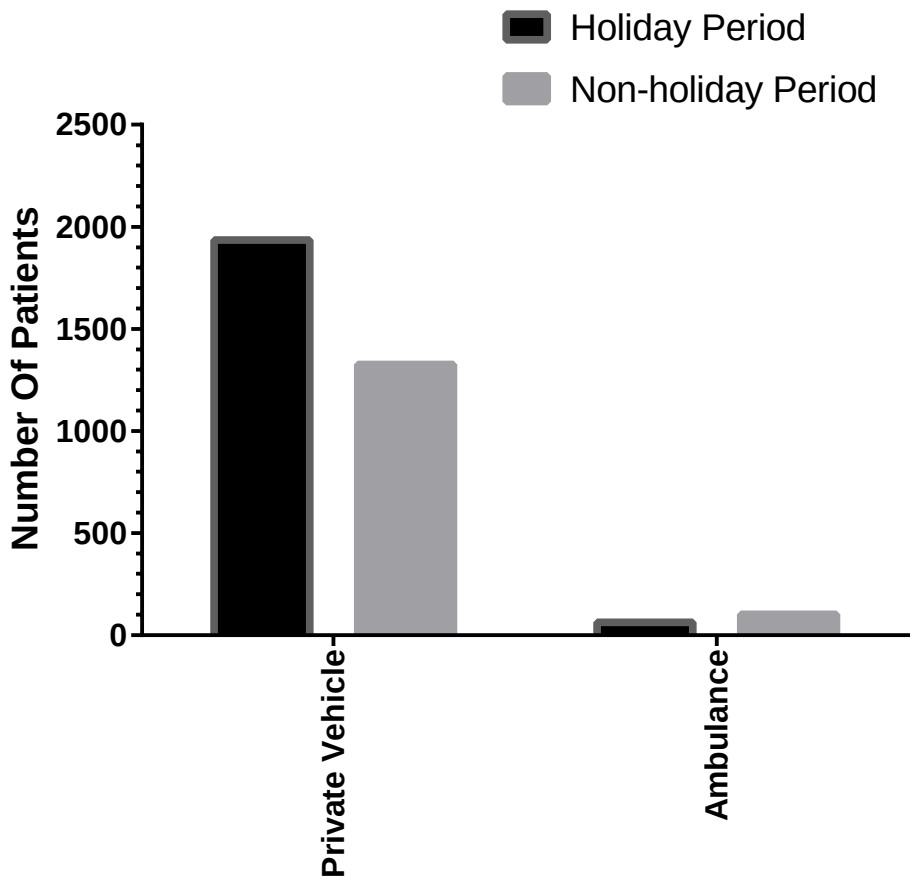


Figure 4.14 Comparison of the Mode of Arrival of patients attending the ED during the Holiday and Non-holiday Periods.

4.3. DISPOSITION OF PATIENTS

Of the 1999 patients attended to in the ED during the holiday period, there was no data as regards the disposition of 131 (6.5%) patients. A further 11 patients refused hospital

treatment. Of the remaining 1857 patients, the vast majority [1670 (90%)] were discharged home. There were two (0.1%) deaths in the ED and the remaining 185 (10%) were admitted. Of these 185 patients, 176 were admitted at the Study Hospital with 27 (14.6%) being admitted to the high care/intensive care unit and the remaining 149 (80.5%) being admitted to a general ward. A further nine patients were transferred and admitted at another hospital. The data does not document the reasons for the transfer or the type of ward the patient was admitted to at the receiving hospital.

During November 2011, of the 1429 patients attending the ED, there was no data as regards the disposition of 50 (3.5%) patients, with a further five patients refusing hospital treatment. Of the remaining 1374 patients, the vast majority [1131 (82.3%)] were discharged home. There were two deaths (0.1%) in the ED and the remaining 241 (17.5%) were admitted. Of these 241 patients, 229 were admitted at the Study Hospital with 35 (14.5%) being admitted to the high care/intensive care unit and the remaining 194 (80.4%) were admitted to a general ward. A further 12 patients were transferred and admitted at another hospital.

There was a significant difference ($p < 0.0001$) in the disposition of patients between the Holiday and Non-holiday Periods. A smaller proportion of the patients were admitted during the Holiday Period compared to the Non-holiday Period (10% vs. 17.5%). Conversely a greater proportion of patients were discharged during the Holiday Period

(90% vs. 82.3%). Refer to Figure 4.15 below. There were only a total of four deaths in the ED during the entire study period and thus further analysis of this variable is futile.

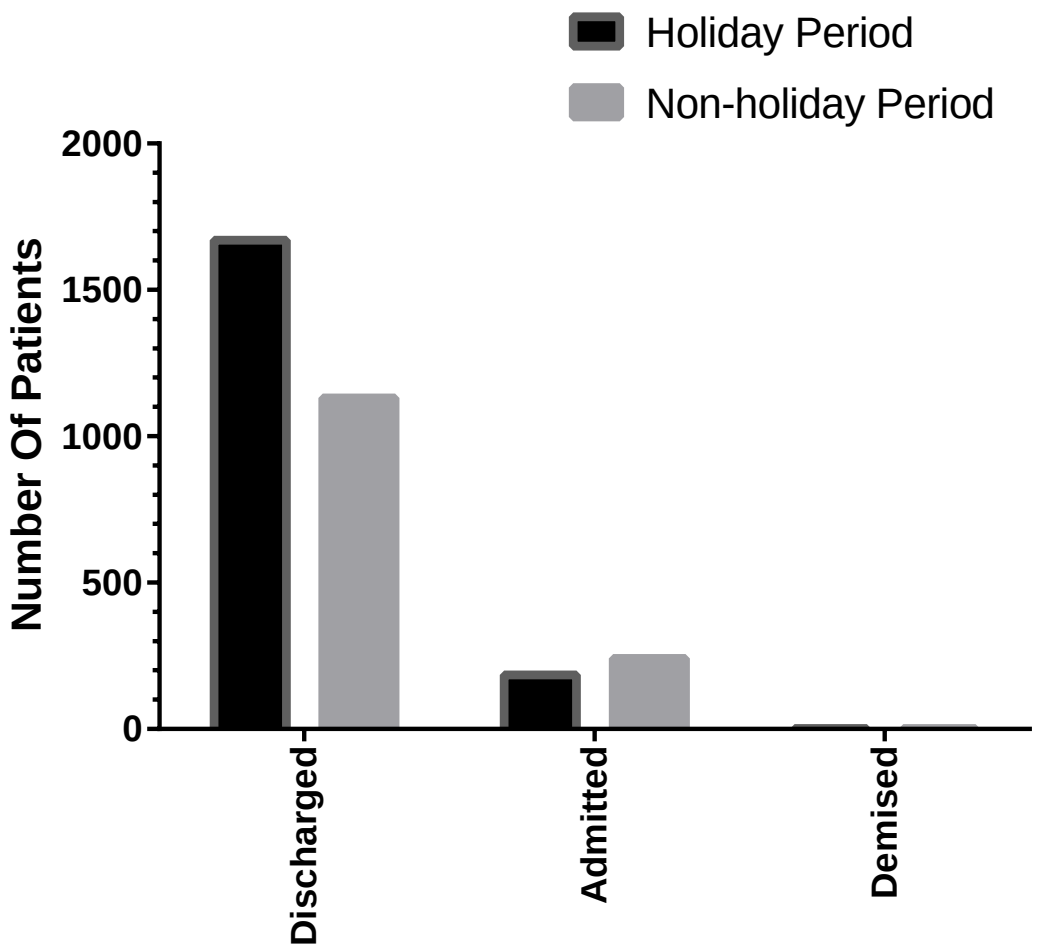
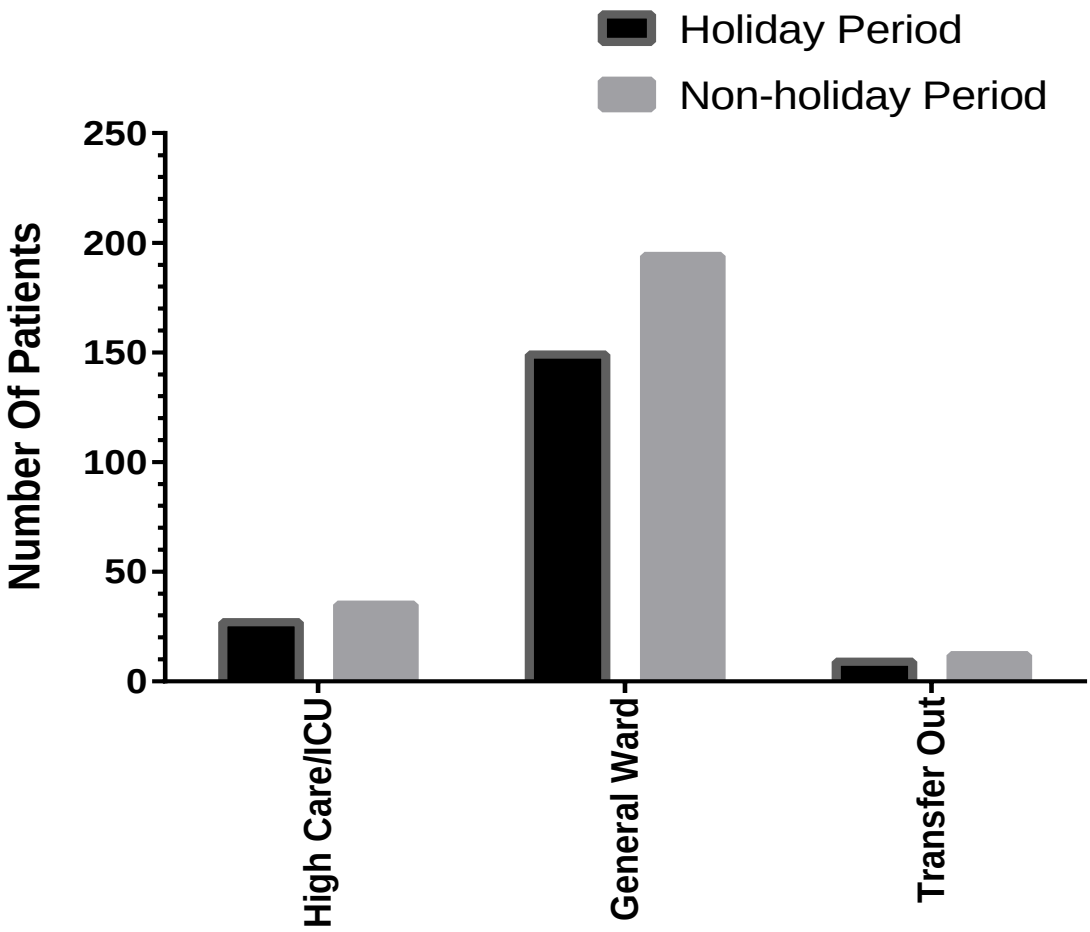


Figure 4.15 Comparison of the Disposition of the Patients during the Holiday and Non-holiday Periods.

Further analysis of the admission of patients during the Holiday and Non-holiday Periods showed no significant difference (p 0.99). Thus the proportion of patients admitted to High Care/ICU, General Ward and transferred out to other hospitals were similar for both periods. Refer to Figure 4.16 below.



(ICU - Intensive Care Unit)

Figure 4.16 Comparison of the Admissions during the Holiday and Non-holiday Periods.

Thus when the data collected from the Study Hospital ED during the specified Holiday and Non-holiday Periods was compared; it was observed that while the majority of the demographic data was similar, there were marked differences in the residential address, payer information, clinical parameters and disposition of the patients between the two periods. These differences will be discussed in further detail in the next chapter.

CHAPTER 5 : DISCUSSION

This study was undertaken at a Private Hospital ED between November 2011 and January 2012. The study comprised two groups of patients viz. those attending the ED during November 2011 (Non-holiday Period) and those attending the ED between the 10th December 2011 and the 8th January 2012 (representing the Holiday Period).

It has been hypothesized that the ED is busier during the school holidays as compared to the school term. It has been further hypothesized that this increase in utilization during the school holidays is due to an increase in the incidence of motor vehicle accidents (MVA) and fall related trauma.

Analysis of the data from the Holiday and Non-holiday Periods has revealed a marked similarity in the age, gender and racial profile of the two groups of patients. However there were marked differences in the residential area, payer information, clinical parameters and disposition of the patients between the two groups.

In this study, it was observed that there was an average of 66.6 patients per day attending the Netcare Umhlanga Hospital ED during the Holiday Period compared with an average of 47.6 patients per day during the Non-holiday Period. Thus there was an increase of 19 patients per day (39.9%) during the Holiday Period. This confirms the hypothesis that the ED is busier during the school holidays. These findings are consistent with the findings of Zheng et al (4) who observed an increase of 2555 visits

per week to EDs in New South Wales during the Christmas and New Year holiday period (4). It is also supported by the findings of Schoenfeld and McKay (5) who found a substantial increase in ED utilization in the state of Nebraska, United States of America (USA) on weekends compared with weekdays (5).

The mean age of patients attending the ED was 31.5 years (standard deviation of 21.7 years) during the Holiday Period and 32.2 years (standard deviation 21.1 years) during the Non-holiday Period. This is similar to observations in the USA were the majority of patients (between 40.1% and 41.2% based on various data bases) attending the ED were found to be between the ages of 18 and 44 years (63). This differs from the findings in a study based at the St. Olav's University Hospital in Trondheim in Norway were it was found that almost 50% of the patients attending the ED were older than 65 years (17). However this difference is probably due to the Health Care System in Norway, whereby patients are first attended to by their GP or at an Urgent Care Centre prior to being referred to the ED when necessary (17). Thus the GPs and the Urgent Care Centres in Norway act as gatekeepers for the ED and for specialist care (17) which is very different from private health care in SA whereby anybody who can afford it can walk in to the ED for treatment.

In this study the gender of patients attending the ED was similar during the Holiday and Non-holiday Periods with a slight preponderance for males (male to female ratio of 1.1 to1 and 1.2 to 1 during the Holiday and Non-holiday Periods respectively). This is different to the findings in the USA where there is a preponderance of females attending

the ED (63). In the USA females account for 53.9% to 55.8% of ED visits depending on the data source (63). Similar findings were observed in Norway with a slight female preponderance in terms of ED visits (17).

There was a marked reversal in the Indian and Caucasian patients attending the ED during the Holiday and Non-holiday Periods. There was a 6% decrease of Indian patients (33.4% vs. 39.4%) during the Holiday period compared to the Non-holiday Period which was matched by a 6.1% increase in Caucasian patients (44.2% vs. 38.1%). Thus there were a significant number of Caucasian families from the Highveld visiting the Umhlanga area during the Holiday Period. In comparison, in the USA patients attending the ED were categorized as 60.7% Non-Hispanic White; 23% Non-Hispanic Black; 12.7% Hispanic and 3.6% belonged to other race groups (64).
The Caucasian and Indian race groups account for 67% of the ED utilization during both the Holiday and Non-holiday Periods. This is probably a legacy of the Apartheid Group Areas Act with the majority of the residential areas surrounding the Study Hospital being categorized as Caucasian and Indian areas based on this Act prior to its abolishment in 1991. There has probably not been the integration of these established communities in the last 20 years since the abolishment of this Act. It may also be a reflection of socioeconomic class as private health care is expensive in SA and can largely only be afforded by those with a medical aid.

The current study also observed that there was an increase in the utilization of the ED by tourists during the Holiday Period confirming that Umhlanga is a popular tourist

destination. This together with the similarity in the age and gender distributions of the patients attending the ED during the Holiday and Non-holiday Periods suggests that the tourists to the Umhlanga area travel in family groups. There was a small increase in the utilization by International tourists during the Holiday Period (1.4% vs. 0.6%), which was statistically significant (p 0.04). However there was a substantial increase (p <0.0001) in ED utilization by domestic tourists during the Holiday Period. There were 29.9% of the patients attending the ED during the Holiday Period who resided outside of KZN as compared to 8.2% during the Non-holiday Period. The majority of these patients were from Gauteng. This is further substantiated by the significant increase (p <0.0001) of patients attending the ED during the Holiday Period who resided outside of the Umhlanga area which was defined as the area within a 15km radius from the Study Hospital based on Google® Maps (Refer to Figure 3.1). During the Holiday Period, 47.3% of the patients attending the ED resided outside the Umhlanga area compared with 38.6% during the Non-holiday Period. This is in keeping with the view of Krass (14) who postulated that tourists to an area are more likely to seek health care at an ED, even for low-acuity problems, due to its accessibility and availability together with the lack of availability of these patients' regular GP (14).

In terms of the payer information profile, there was a statistically significant difference (p <0.0001) between the Holiday and the Non-holiday periods. This was largely due to the smaller proportion of IOD patients (6.1% vs. 11.3%) as well as the larger proportion of Private patients (16.7% vs. 13.4%) who attended the ED during the Holiday Period. The proportion of Medical Aid patients during the Holiday and the Non-holiday Periods

was similar (77.2% vs. 75.3% respectively). The decrease in IOD patients during the Holiday Period is probably due to numerous businesses closing for at least a few weeks during the Holiday Period. The increase in Private Patients during the Holiday Period may be related to patient's medical aid being exhausted during December. The annual benefit period of most medical aids extend from the 1st of January to the 31st of December. Hence by December most patients have exhausted their medical aid savings and therefore have to fund their out of hospital medical treatment themselves.

This payer information profile with two-thirds of patients from both study periods belonging to a medical aid is comparable to the payer profile in EDs in the USA (63). In the USA about 35% of ED visits are billed to private insurance; about 24% are covered by Medicaid; about 20% is covered by Medicare and only about 17% of patients fund their ED visit by themselves (63). Medicaid is a United States government funded social program which covers the medical costs of low income citizens while Medicare is a similar type of social program for citizens older than 65 years (63).

The four commonest Medical Aid Schemes to which patients were contracted were Discovery Health, GEMS (Government Employees Medical Scheme), Momentum Health and Bonitas for both the study periods. However, it was observed that during the Holiday Period patients contracted to medical aids such as Goldfields Medical Scheme, Witbank Coalfields Medical Scheme and Xstrata Medical Scheme were attended to in the ED while no patients contracted to any of these schemes were attended to during the Non-holiday Period. This confirms that during the Holiday Period there is an influx of

tourists from the Highveld, were the above companies are located, to the Umhlanga area.

Analysis of the Triage Diagnosis indicated that nine out of the ten commonest Triage Diagnoses were the same for the Holiday and the Non-holiday Periods. The tenth most frequent Triage Diagnosis was Crush Injuries during the Holiday Period compared with Neurological (headaches) during the Non-holiday Period. The increase in Crush Injuries during the Holiday Period (2.1% vs. 1.2%) maybe explained by an increase in sport and outdoor activity and hence an increase in injuries. This is supported by Eray et al (16) who observed that the commonest reason for foreign tourists presenting to an ED in Antalya, Turkey was due to trauma (16). There was furthermore a marked decrease in the Review patients between the Holiday and Non-holiday Periods (7.2% vs. 14.0% respectively). This is due to fewer stable IOD patients being called back for review during the Holiday Period.

The spectrum of Triage Diagnoses among tourists from Gauteng for both the Holiday and Non-holiday Periods was similar to that in the total sample of patients. These findings contradict the Eray et al study but are similar to that observed by Krass (14). The current study also found that while the five most frequent discharge diagnoses of patients attending the ED during the Holiday and Non-holiday Periods were the same, the proportion of patients with each diagnosis differed between the two periods. The greatest difference was in the patients presenting with URTI and OM (13.3% vs. 10.4% respectively); Gastroenteritis (8.7% vs. 6.4% respectively) and for Review (7.7% vs.

12.8% respectively). A similar proportion of patients in the two groups presented with the other two diagnoses viz. Head and Neck Injuries (5.7% vs. 7.4% respectively); and Injury to the Hand or Wrist (5.3% vs. 5.8% respectively).

The increase in the proportion of patients attending the ED with URTI and OM and Gastroenteritis (GE) during the Holiday Period may be explained by the increased number of patients in the Umhlanga area due to an influx of tourists to the area who would also not have access to their regular GP. Also the decrease in the Review patients during the Holiday Period may be explained by numerous businesses closing for a few weeks during the Holidays and hence there will be fewer IOD patients attending the ED during this period. Furthermore as the Holiday Period is expected to be busier, most doctors working in the ED will often only review stable IOD patients after the holidays. This is supported by the significant difference ($p < 0.0001$) in the payer information profile between the Holiday and the Non-holiday periods which reflected a smaller proportion of IOD patients attending the ED during the Holiday Period (6.1% vs. 11.3%). Furthermore tourists attending the ED during the Holiday Period will generally follow up with their GP or an ED closer to home.

Furthermore in the Krass (14) study at the Greater Niagara General Hospital ED in 1974 the pattern of ailments among the patients was similar to that noted in the current study (14). Of the 20 most frequent diagnoses observed in the Krass study (14) only seven could not be amalgamated into the five most frequent diagnoses observed in the current study and these were Abdominal Pain; Foreign Body to Eye; Migraine Headache; Injury

to Lower Leg; Insect Bite and Superficial Injury of Foot and Toes (14). Refer to Appendix A for the full table.

The above differences between the Holiday and Non-holiday Periods are reflected in the increased incidence of “GP type visits” to the ED during the Holiday Period. “GP type visits” were classified based on a modified form of the Australasian College of Emergency Medicine (ACEM) criteria and included patients who were self-referred; assigned a SATS score of P3; did not arrive by ambulance; and were discharged from the ED (14). There were 5% more “GP type visits” to the ED during the Holiday Period compared to the Non-holiday Period which was statistically significant (p 0.001). This difference is in reality significantly greater as during the Non-holiday Period the commonest diagnosis was “Review” and the vast majority of these patients would fit the criteria for “GP type visits”. Thus the “Review” patients would have skewed the results of the Non-holiday Period to reflect a greater number of “GP type visits”. This supports the view that during the Holiday Period there is an influx of tourists to the Umhlanga area who do not have access to their GP. These findings also support the views of Krass (14) but contradict the observations of Sprivulis (20) who found that the vast majority of presentations to the Freemantle Hospital ED in Perth, Australia were appropriate presentations (20).

It should be noted that Eray et al (16) found that the two commonest discharge diagnoses among foreign tourists presenting to an ED in Antalya, Turkey were trauma (42%) and circulatory disorders (11%) which included acute coronary syndrome, chronic

heart failure, aneurysm and deep vein thrombosis (16). It was also noted that there was a 31% admission rate, 1.6% mortality rate and that 49 of the 961 study patients who were critically ill had to be transferred to their country of origin for further treatment (16). This supports the observations of Sprivulis (20) and contradicts the findings of the current study. However their study population included only foreign tourists attending the ED between August 2003 and September 2004 whereas the current study population included all patients (locals as well as local and foreign tourists) attending the ED during specified periods of the year. It is probable that the relatively large number of local tourists (942 and 551 patients during the Holiday and Non-holiday Periods respectively) and relatively small number of foreign tourists (27 and 9 patients during the Holiday and Non-holiday Periods respectively) may account for the greater incidence of low acuity patients in the current study.

This study has also found a small decrease in the incidence of trauma during the Holiday Period compared to the Non-holiday Period (23.4% vs. 24.6% respectively) however this decrease did not reach statistical significance (p 0.058). The majority of this decrease was due to a decreased incidence of Occupational Trauma during the Holiday Period (10.3% vs.16.2%). In fact the incidence of Non-occupational Trauma was greater during the Holiday Period (89.7% vs. 83.8%). This is in keeping with numerous businesses closing for at least part of the Holiday Period and hence more people being on holiday with a consequent increase in travel and outdoor activity. In this study, the two commonest mechanisms of trauma during both the Holiday and Non-holiday Periods were a fall (42.7% and 43.7% respectively) and a transport accident

(8.7% and 11.9% respectively) and there was no significant difference (p 0.27) between the incidences of these mechanisms of injury. This is similar to a study at a tertiary care hospital in Antalya, Turkey where it was also observed that falling and transport accidents were the two commonest mechanisms of injury among tourists attending the ED (16). However the incidences of these mechanisms of injury were higher in the Turkish study with falls accounting for 57% of injuries and transport accidents accounting for 20% of injuries (16). However it should be noted that the Turkish study only considered the incidence in foreign tourists attending the ED (16). The current study does not support these findings but that may be because the study populations were different.

Furthermore the current study results do not appear to support the findings of a peak in traffic-related fatalities during the Christmas/New Year holiday period due to the higher traffic flows and increased alcohol consumption associated with the Christmas/New Year holiday period, which has been observed in SA, Australia and the USA (38, 65, 66). It also does not support the increase in fall-related injuries during the holiday season due to Christmas decorating which was observed by the Center for Disease Control and Prevention in the USA (22). The results from the current study, however, should be viewed with caution as they represent the patient profile of a single ED in a Private Hospital in KZN. The results may be different if data from both the Private and Government Hospitals in KZN were collected.

The current study also observed a significant decrease (p 0.001) in the incidence of P1 patients attending the ED during the Holiday Period (5.9% vs. 8.2%) with an associated significant increase in the incidence of P3 patients during the Holiday Period (30.4% vs. 25.8%). This indicates that there was an increase in lower acuity patients during the Holiday Period. This supports the findings of Zheng et al (4) who observed an increase in low acuity patients attending the ED during the Christmas/New Year holiday period (4). It also indirectly supports the findings of Schoenfeld and McKay (5) who observed an increase in the incidence of low acuity patients attending the ED during weekends compared to the weekdays (5).

A similar pattern was observed when the TEWS were compared for the Holiday and Non-holiday Periods. There was an increase in patients attending the ED with less serious illnesses (green code) during the Holiday Period (80.1% vs. 76.4%) and conversely there was a decrease in patients with serious illnesses [orange (0.9% vs. 1.5% during the Holiday and Non-holiday Periods respectively) and red code (0.2% vs. 0.8% during the Holiday and Non-holiday Periods respectively)].This was contrary to the observations by Bjornsen et al (17) at St Olav's hospital in Trondheim, Norway (17). The patients attending the ED at St Olav's Hospital can be categorized as 11% red level visits, 50% yellow level visits, 14% green level visits and less than 1% blue level visits (lowest priority) (17). There are thus more seriously ill patients attending the ED in Norway than was observed in our study. This can be explained by the differences in the Health Care Systems in Norway and SA. In Norway the GPs and Urgent Care Centres

act as “gatekeepers” to the ED whereas in SA anybody who can afford it can seek care at a Private Hospital ED (17).

The current study also found a significant difference ($p < 0.0001$) in the mode of arrival of patients between the Holiday and Non-holiday Periods. The majority of patients (96.8% and 92.8% during the Holiday and Non-holiday Periods respectively) arrived at the ED via private or public transport. However there were proportionally less patients attending the ED during the Holiday Period who arrived via ambulance (3.2% vs. 7.2%). This also supports the view that during the Holiday Period there is an increase in low acuity or “GP type” patients. This is similar to the findings at the Sahlgrenska University Hospital in Sweden were 50% of the patients presenting to the ED were walk-ins (17) but differs from the experience at St Olav’s Hospital in Norway where 35% of the patients attending the ED arrive via ambulance and a further 3% of patients arrive via air ambulance (17).

There was also a significant difference ($p < 0.0001$) in the disposition of patients between the Holiday and Non-holiday Periods. A smaller proportion of the patients were admitted during the Holiday Period compared to the Non-holiday Period (10% vs. 17.5% respectively). This may suggest that during the Holiday Period there were more patients of lower acuity attending the ED than during the Non-holiday Period. However it has also been noted that there was an increase in tourists attending the ED during the Holiday Period. These patients may prefer not to be admitted at a hospital so far from home. They may therefore choose to return home and seek definitive medical treatment

at a hospital closer to home. This conclusion is supported by Krass (14) who observed that there was a lower incidence of admission among tourists attending the Greater Niagara General Hospital ED despite a similar pattern of ailments among both locals and tourists presenting to the ED (14). The observed admission rate is similar to that in EDs in the USA where the admission rate varies from 12% to 15.3% depending on the source of the data (17, 63).

This is contradicted by a study by Eray et al (16) who observed a 31% admission rate and a 1.6% mortality rate amongst foreign tourists attending an ED in Antalya, Turkey (16). Even higher admission rates were observed at Sahlgrenska University Hospital in Sweden (35%) and at St Olav's University Hospital in Norway (89%) (17). This is significantly different from the pattern observed in the current study were the admission rate was 10% and 17.5% for the Holiday and Non-holiday Periods respectively and there were only 4 (0.1%) deaths during both study periods. It appears to confirm the preponderance of low acuity patients which are attended to at the Study Hospital ED.

Thus the current study contradicts the hypothesis that the increase in ED utilization during the school holidays is due to an increase in the incidence of motor vehicle accidents (MVA) and fall related trauma. The increase in ED utilization during the Holiday Period appears to be related to an increase in "GP type visits". This appears to be due to GPs being less readily available during the Holiday Period as their rooms are closed and due to patients being on holiday away from home and thus not having

access to their regular GP. These findings are supported by studies by Zheng et al (4); Schoenfeld and McKay (5); Boushy (13); Krass (14) and Schull et al (18).

The above results apply in particular to the Study Hospital ED which is a private health care facility situated in the urban resort town of Umhlanga. Further studies are necessary to analyse whether these results can be extrapolated to other private health care EDs in KZN and throughout SA. Further studies are also necessary to compare these results with the patient profile at EDs in Government health care facilities in KZN and throughout SA.

CHAPTER 6 : CONCLUSION

This study was undertaken at a Private Hospital ED in the urban resort town of Umhlanga in KZN on the east coast of SA. Data was collected retrospectively from the Study Hospital's Electronic Database and from the billing records of the doctor practice who manage the ED. Demographic and clinical data for patients attending the above ED during November 2011 (Non-holiday Period) and from the 10th December 2011 to the 8th January 2012 (Holiday Period) were collected and analysed.

This study has observed that while the age, gender and racial profiles of patients attending the above ED during both study periods were similar the ED was 39.9% busier during the school holidays. There was increased utilization of the ED by both foreign and especially domestic tourists from Gauteng during the Holiday Period. In terms of the payer information profile, two-thirds of the patients attending the ED during both study periods belonged to a medical aid. However during the Holiday Period there were patients belonging to medical aid schemes of companies based on the Highveld which was not the case during the Non-holiday Period. This confirms that there is an influx of domestic tourists to Umhlanga during the Holiday Period.

Furthermore this study noted that patients presenting to the ED during the Holiday Period tended to have lower acuity scores (both SATS and TEWS); were less likely to arrive via ambulance and less likely to be admitted. Thus while the commonest Triage

Diagnoses and Discharge Diagnoses for both the groups were similar the above supports the significant increase in “GP type visits” which was noted during the Holiday Period.

It is therefore concluded that there is increased utilization of the Study Hospital ED during the Holiday Period and that this is due to an increase in low acuity patients most likely as a result of these patients’ regular GP being unavailable. These findings mirror observations in First World Countries such as Canada (13, 14, 18), USA (5) and Australia (4).

Although I am a partner in the doctor practice that manages the Study Hospital ED, this did not contribute a significant bias in the collection and analysis of the data during this study.

There were however several limitations to the study. It was a retrospective study and hence dependent on the accuracy and availability of the data in the databases. The data in the Study Hospital Database was collected by the Triage Officer on duty who then captured the data when he or she was not busy with their primary duty of triaging patients. The consequence of not having a dedicated data capturer was that some patients were not recorded and some patients had incomplete records in the database. This was mitigated by using the doctor practice billing records to fill in some of the

missing demographic data. Furthermore in the doctor practice billing records the discharge diagnosis was captured by an administrative assistant based on his or her interpretation of the doctor's diagnosis which may have lead to a less specific diagnosis being recorded. This was probably not significant as during the interpretation of the results similar diagnoses were amalgamated.

An arbitrary radius of 15 km from the Study Hospital was utilized to represent the drainage area of the hospital and patients from outside this area were considered to be visitors to the area. However the findings of an increased number of visitors to the Umhlanga area attending the ED during the Holiday Period were confirmed by the increased number of foreign tourists as well as local tourists from outside the province of Kwazulu-Natal (KZN) attending the ED during this Period.

This study was also conducted at a single private hospital ED in KZN and the results may not apply to other private hospitals or to government hospitals either in the rest of KZN or in the rest of South Africa. Further studies are needed to investigate the similarities and differences between the patient profile at this ED and others throughout KZN and SA.

The findings of this study suggest that during the school holidays, the Study Hospital ED needs to have increased doctor and nursing staff. Furthermore this ED needs to be

equipped with more “quick look” cubicles and equipment such as otoscopes with disposable or reusable ear pieces and tongue depressors to allow more effective and efficient management of low acuity patients. It may also be useful to have a short stay ward attached to the ED in which patients could receive intravenous fluids, intravenous medication and be monitored while awaiting the results of investigations. This would free up “quick look” cubicles so that new patients could then be attended to by the doctor on duty.

The doctors and nurses also need to be trained how to manage these low acuity patients efficiently and effectively while ensuring that an adequate assessment of all patients is made and that no “warning signs and symptoms” are missed. The efficient and effective management of the busy ED is a skill that is often acquired only with experience. It is important that this experience is imparted by senior doctors to their more junior colleagues.

Furthermore, in this type of ED, it is important for the doctor on duty to make good judgments quickly as to which patients need to be admitted urgently and which patients can be safely discharged with the appropriate advice to seek definitive treatment closer to home. For example, patients with a lower leg fracture who will be undertaking a long haul flight prior to obtaining definitive fixation will need to be immobilized and given appropriate deep vein thrombosis prophylaxsis.

This study has therefore been useful in confirming the increased demand and understanding the patient profile at the Study Hospital ED during the school holidays. This will allow the ED to be adequately equipped to deal with this patient profile and with the increased influx of patients. It will further ensure that the ED has adequate and appropriately skilled staff during the school holidays.

REFERENCES

1. Martinez-Lopez E, Grajales IC. [A health promotion programme's effectiveness in reducing medical care costs].[Article in Spanish]. Rev Salud Publica (Bogota). 2010;12(6):938-49.

2. Canterbury District Health Board [Internet].The Newsletter of the Canterbury District Health Board. Emergency staff set for hectic holiday. [cited 2012 May 31]. Available from: http://www.cdhb.govt.nz/communications/healthline/issue60.pdf.

3. Statistics South Africa [Internet]. Road Traffic Accident Deaths in South Africa, 2001-2006: Evidence from death notification; 2009 [cited 2012 Dec 29]. Available from: http://www.statssa.gov.za/publications/Report-03-09-07/Report-03-09-07.pdf.

4. Zheng W, Muscatello DJ, Chan AC. Deck the halls with rows of trolleys...emergency departments are busiest over the Christmas holiday period. Med J Aust. 2007;187(11-12):630-3.

5. Schoenfeld EM, McKay MP. Weekend emergency department visits in Nebraska: higher utilization, lower acuity. J Emerg Med. 2010;38(4):542-5.

6. Davison AG, Hildrey AC, Floyer MA. Use and misuse of an accident and emergency department in the East End of London. J R Soc Med. 1983;76(1):37-40.

7. Driscoll PA, Vincent CA, Wilkinson M. The use of the accident and emergency department. Arch Emerg Med. 1987;4(2):77-82.

8. Green J, Dale J. Primary care in accident and emergency and general practice: a comparison. Soc Sci Med (1982). 1992;35(8):987-95.

9. Prince M, Worth C. A study of 'inappropriate' attendances to a paediatric Accident and Emergency Department. J Public Health Med. 1992;14(2):177-82.

10. Hallam L. Primary medical care outside normal working hours: review of published work. BMJ. 1994;308(6923):249-53.

11. Rouse A. GP surgeries were hard to contact over Christmas. BMJ. 1999;318(7195):1422.

12. Houghton PG. Contacting GP surgeries over Christmas. Study seems more like investigative journalism than public health research. BMJ. 1999;319(7208):513; author reply 4.

13. Boushy D, Dubinsky I. Primary care physician and patient factors that result in patients seeking emergency care in a hospital setting: the patient's perspective. J Emerg Med. 1999;17(3):405-12.

14. Krass ME. Patterns of local and tourist use of an emergency department. CMAJ. 1976;115(12):1230-3.

15. Willems S, Peersman W, De Maeyer P, et al. The impact of neighborhood deprivation on patients' unscheduled out-of-hours healthcare seeking behavior: a cross-sectional study. BMC Fam Pract. 2013;14:136.

16. Eray O, Kartal M, Sikka N, et al. Characteristics of tourist patients in an emergency department in a Mediterranean destination. Eur J merg Med. 2008 Aug;15(4):214-7.

17. Bjornsen LP, Uleberg O, Dale J. Patient visits to the emergency department at a Norwegian university hospital: variations in patient gender and age, timing of visits, and patient acuity. Emerg Med J. 2013 Jun;30(6):462-6.

18. Schull MJ, Kiss A, Szalai JP. The effect of low-complexity patients on emergency department waiting times. Ann Emerg Med. 2007;49(3):257-64, 264.e1.

19. Bellis MA, Leckenby N, Hughes K, et al. Nighttime assaults: using a national emergency department monitoring system to predict occurrence, target prevention and plan services. BMC public health. 2012 Sep 6;12:746.

20. Sprivulis P. Estimation of the general practice workload of a metropolitan teaching hospital emergency department. Emerg Med (Fremantle). 2003;15(1):32-7.

21. Phillips DP, Jarvinen JR, Abramson IS, et al. Cardiac mortality is higher around Christmas and New Year's than at any other time: the holidays as a risk factor for death. Circulation. 2004;110(25):3781-8.

22. Fall-related injuries during the holiday season--United States, 2000-2003. MMWR Morb Mortal Wkly Rep. 2004 Dec 10;53(48):1127-9.

23. Tavakoli H, Khashayar P, Amoli HA, et al. Firework-related injuries in Tehran's Persian Wednesday Eve Festival (Chaharshanbe Soori). J Emerg Med. 2011 Mar;40(3):340-5.

24. Wang C, Zhao R, Du WL, et al. Firework injuries at a major trauma and burn center: A five-year prospective study. Burns. 2014;40(2):305-10.

25. Woodbridge TR, Weisfeld-Adams JD, Wilkins EC, et al. Epidemiology and severity of paediatric burn injuries occurring during camping and caravanning holidays. Burns. 2010;36(7):1096-100.

26. D'Ippolito A, Collins CL, Comstock RD. Epidemiology of pediatric holiday-related injuries presenting to US emergency departments. Pediatrics. 2010;125(5):931-7.

27. Kimia A, Lee L, Shannon M, et al. Holiday ornament-related injuries in children. Pediatr Emerg Care. 2009;25(12):819-22.

28. Amitai Y, Bentur Y, Lifshitz M, et al. Poison exposure in children before Passover. Isr Med Assoc J. 2000;2(2):142-4.

29. Peterson BS, Zhang H, Santa Lucia R, et al. Risk factors for presenting problems in child psychiatric emergencies. J Am Acad Child Adolesc Psychiatry. 1996;35(9):1162-73.

30. Hillard JR, Holland JM, Ramm D. Christmas and psychopathology. Data from a psychiatric emergency room population. Arch Gen Psychiatry. 1981;38(12):1377-81.

31. Halpern SD, Doraiswamy PM, Tupler LA, et al. Emergency department patterns in psychiatric visits during the holiday season. Ann Emerg Med. 1994;24(5):939-43.

32. Bergen H, Hawton K. Variation in deliberate self-harm around Christmas and New Year. Soc Sci Med. 2007;65(5):855-67.

33. Ajdacic-Gross V, Wang J, Bopp M, et al. Are seasonalities in suicide dependent on suicide methods? A reappraisal. Soc Sci Med. 2003;57(7):1173-81.

34. Carley S, Hamilton M. Best evidence topic report. Suicide at christmas. Emerg Med J. 2004;21(6):716-7.

35. Lloyd B, Matthews S, Livingston M, et al. Alcohol intoxication in the context of major public holidays, sporting and social events: a time-series analysis in Melbourne, Australia, 2000-2009. Addiction. 2013;108(4):701-9.

36. Phillips DP, Christenfeld N, Ryan NM. An increase in the number of deaths in the United States in the first week of the month--an association with substance abuse and other causes of death. N Engl J Med. 1999;341(2):93-8.

37. Annual and New Year's Day alcohol-related traffic fatalities--United States, 1982-1990. MMWR Morb Mortal Wkly Rep. 1991;40(48):821-5.

38. Sukhai A, Jones AP, Love BS, et al. Temporal variations in road traffic fatalities in South Africa. Accid Anal Prev. 2011;43(1):421-8.

39. Bradshaw D, Groenewald P, Laubscher R, et al. Initial burden of disease estimates for South Africa, 2000. S Afr Med J. 2003;93(9):682-8.

40. Wikipedia [Internet] List of countries by traffic-related death rate [updated 2015 Jan 23; cited 2015 Jan 24]. Available from: http://en.wikipedia.org/wiki/List_of_countries_by_traffic-related_death_rate

41. Abe T, Tokuda Y, Ohde S, et al. The influence of meteorological factors on the occurrence of trauma and motor vehicle collisions in Tokyo. Emerg Med J. 2008;25(11):769-72.

42. Sivarajasingam V, Corcoran J, Jones D, et al. Relations between violence, calendar events and ambient conditions. Injury. 2004;35(5):467-73.

43. O'Donnell JJ, Gleeson AP, Smith H. Edinburgh's Hogmanay celebrations: beyond a major disaster. J Accid Emerg Med. 1998;15(4):272-3.

44. Marchant B, Ranjadayalan K, Stevenson R, et al. Circadian and seasonal factors in the pathogenesis of acute myocardial infarction: the influence of environmental temperature. Br Heart J. 1993;69(5):385-7.

45. Spielberg C, Falkenhahn D, Willich SN, et al. Circadian, day-of-week, and seasonal variability in myocardial infarction: comparison between working and retired patients. Am Heart J. 1996;132(3):579-85.

46. Seretakis D, Lagiou P, Lipworth L, et al. Changing seasonality of mortality from coronary heart disease. JAMA. 1997;278(12):1012-4.

47. Kloner RA, Poole WK, Perritt RL. When throughout the year is coronary death most likely to occur? A 12-year population-based analysis of more than 220 000 cases. Circulation. 1999;100(15):1630-4.

48. Depasquale NP, Burch GE. The seasonal incidence of myocardial infarction in New Orleans. Am J Med Sci. 1961 Oct;242:468-74.

49. Smith FJ, Keyes JW, Denham RM. Myocardial infarction: a study of the acute phase in 920 patients. Am J Med Sci. 1951 May;221(5):508-21.

50. Heyer HE, Teng HC, Barris W. The increased frequency of acute myocardial infarction during summer months in a warm climate; a study of 1,386 cases from Dallas, Texas. Am Heart J. 1953;45(5):741-8.

51. Gnecchi-Ruscone T, Piccaluga E, Guzzetti S, et al. Morning and Monday: critical periods for the onset of acute myocardial infarction. The GISSI 2 Study experience. Eur Heart J. 1994;15(7):882-7.

52. Massing W, Angermeyer MC. Myocardial infarction on various days of the week. Psychol Med. 1985;15(4):851-7.

53. Thompson DR, Pohl JE, Sutton TW. Acute myocardial infarction and day of the week. Am J Cardiol. 1992;69(3):266-7.

54. Willich SN, Lowel H, Lewis M, et al. Weekly variation of acute myocardial infarction. Increased Monday risk in the working population. Circulation. 1994;90(1):87-93.

55. Reedman LA, Allegra JR, Cochrane DG. Increases in heart failure visits after Christmas and New Year's Day. Congest Heart Fail. 2008;14(6):307-9.

56. Somes J, Donatelli NS. Syndromes of "holiday heart". J Emerg Nurs. 2011;37(6):577-9.

57. Horsley SD, Smail PJ, Thould AK. Effects of influx of holidaymakers on an acute medical unit in Cornwall. Br Med J. 1975;4(5991):276-7.

58. Diehl AK, Morris MD, Mannis SA. Use of calendar and weather data to predict walk-in attendance. South Med J. 1981;74(6):709-12.

59. Kovats RS, Hajat S, Wilkinson P. Contrasting patterns of mortality and hospital admissions during hot weather and heat waves in Greater London, UK. Occup Environ Med. 2004;61(11):893-8.

60. World Weather and Climate Information [Internet]. South Africa:Umhlanga [cited 2012 Nov 22]. Available from: http://www.weather-and-climate.com/average-monthly-Rainfall-Temperature-Sunshine,umhlanga,South-Africa.

61. Phillips DP, King EW. Death takes a holiday: mortality surrounding major social occasions. Lancet. 1988;2(8613):728-32.

62. Brink HIL. Statistics for nurses. 3rd ed. Pretoria: Academica Publishers; 1987.

63. Owens PL, Barrett ML, Gibson TB, et al. Emergency department care in the United States: a profile of national data sources. Ann Emerg Med. 2010 Aug;56(2):150-65.

64. Honigman LS, Wiler JL, Rooks S, et al. National Study of Non-urgent Emergency Department Visits and Associated Resource Utilization. West J Emerg Med. 2013 Nov;14(6):609-16.

65. Arrivealive [Internet]. December 2010 Road Traffic Report. [updated 2011 Aug; cited 2011 Dec 28]. Available from: https://www.arrivealive.co.za/.../December%202010%20Road%20Traffic%20Report.Pdf.

66. US Department of Transportation [Internet] National Highway Traffic Safety Administration Technical Report DOT HS 807 115. Holiday Effect on Traffic Fatalities. [updated 1987 Apr; cited 2012 Oct 29]. Available from: http://ntl.bts.gov/lib/25000/25700/25731/DOT-HS-807-115.pdf .

APPENDICES

APPENDIX A

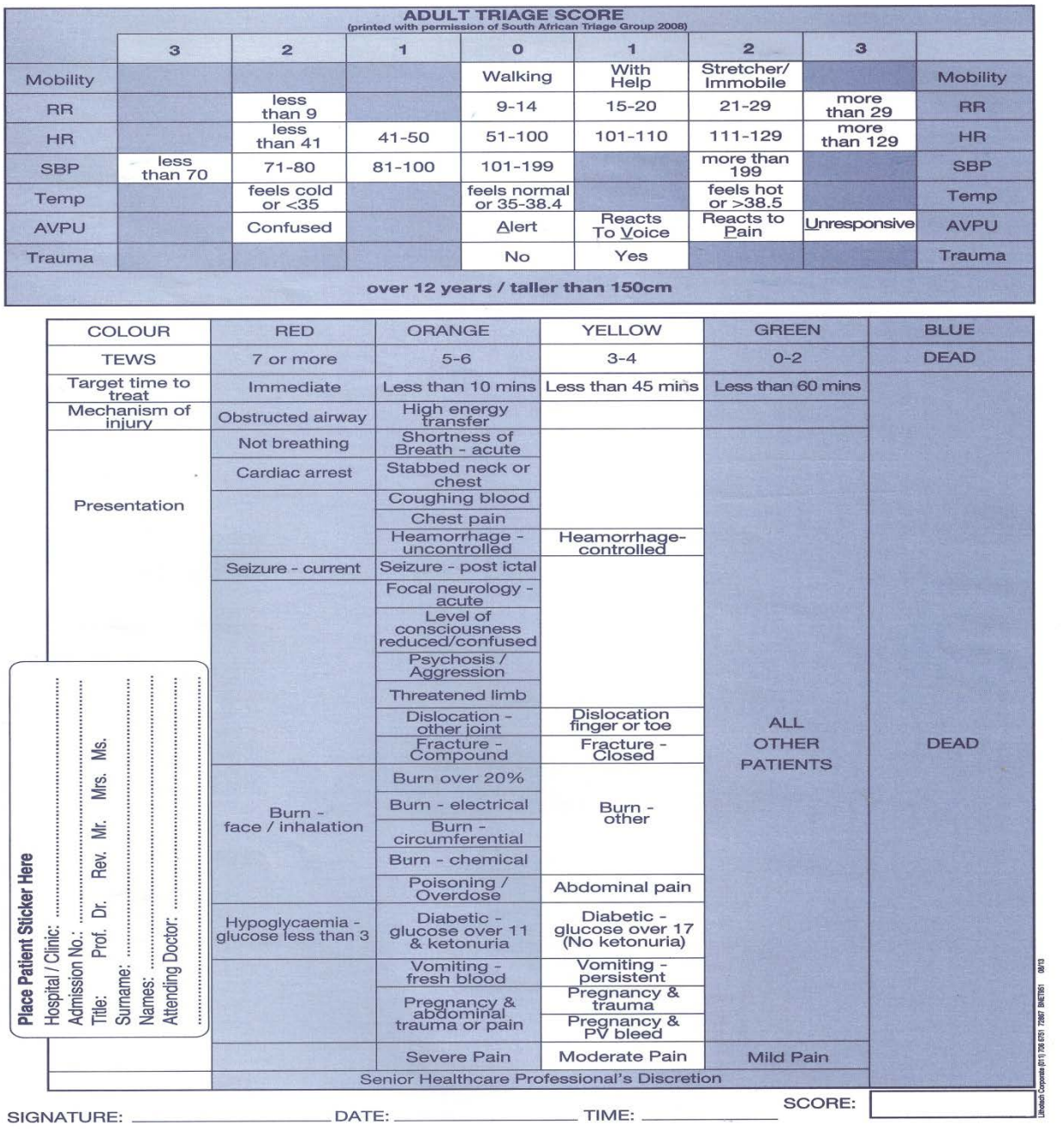
Table I—Frequency of the 20 commonest specific ailments* in local and tourist patients in a hospital emergency department, June through September 1974

Ailment	% of patients†	
	Local	Tourist
Open wound of finger	3.5	2.6
Laceration of face	2.9	3.6
Acute pharyngitis	2.6	3.1
Acute tonsillitis	2.5	3.2
Upper respiratory tract infection (unspecified)	2.4	3.3
Abdominal pain	2.1	1.2
Ankle strain	1.9	1.9
Gastroenteritis (unspecified)	1.4	2.5
Open wound of lower leg	1.3	1.2
Otitis media (unspecified)	1.2	1.5
Laceration of scalp	1.2	1.5
Superficial injury of face, neck or scalp	1.1	1.0
Foreign body in eye	1.1	1.5
Contusion of leg	1.1	0.7
Contusion of face	1.0	1.2
Migraine headache	1.0	0.5
Open wound of elbow, forearm or wrist	1.0	0.9
Injury to lower leg (unspecified)	1.0	0.5
Insect bite	1.0	1.7
Superficial injury of foot or toes	1.0	0.5

*As defined by the International Classification of Diseases, Adapted (ICDA) system.[11]
†Differences were tested by chi-square analysis.[12] The following analysis is taken from the full table, of which the above is a partial extract: confidence limits = 95%; degrees of freedom = 91; $X^2 = 111.5$. Therefore the hypothesis that local and tourist patients are equally susceptible to illness is accepted.

Taken from : Krass ME. Patterns of local and tourist use of an emergency department. Canadian Medical Association journal. 1976;115(12):1230-3.

APPENDIX B1



ADULT TRIAGE SCORE
(printed with permission of South African Triage Group 2008)

	3	2	1	0	1	2	3	
Mobility				Walking	With Help	Stretcher/ Immobile		Mobility
RR		less than 9		9-14	15-20	21-29	more than 29	RR
HR		less than 41	41-50	51-100	101-110	111-129	more than 129	HR
SBP	less than 70	71-80	81-100	101-199		more than 199		SBP
Temp		feels cold or <35		feels normal or 35-38.4		feels hot or >38.5		Temp
AVPU		Confused		Alert	Reacts To Voice	Reacts to Pain	Unresponsive	AVPU
Trauma				No	Yes			Trauma

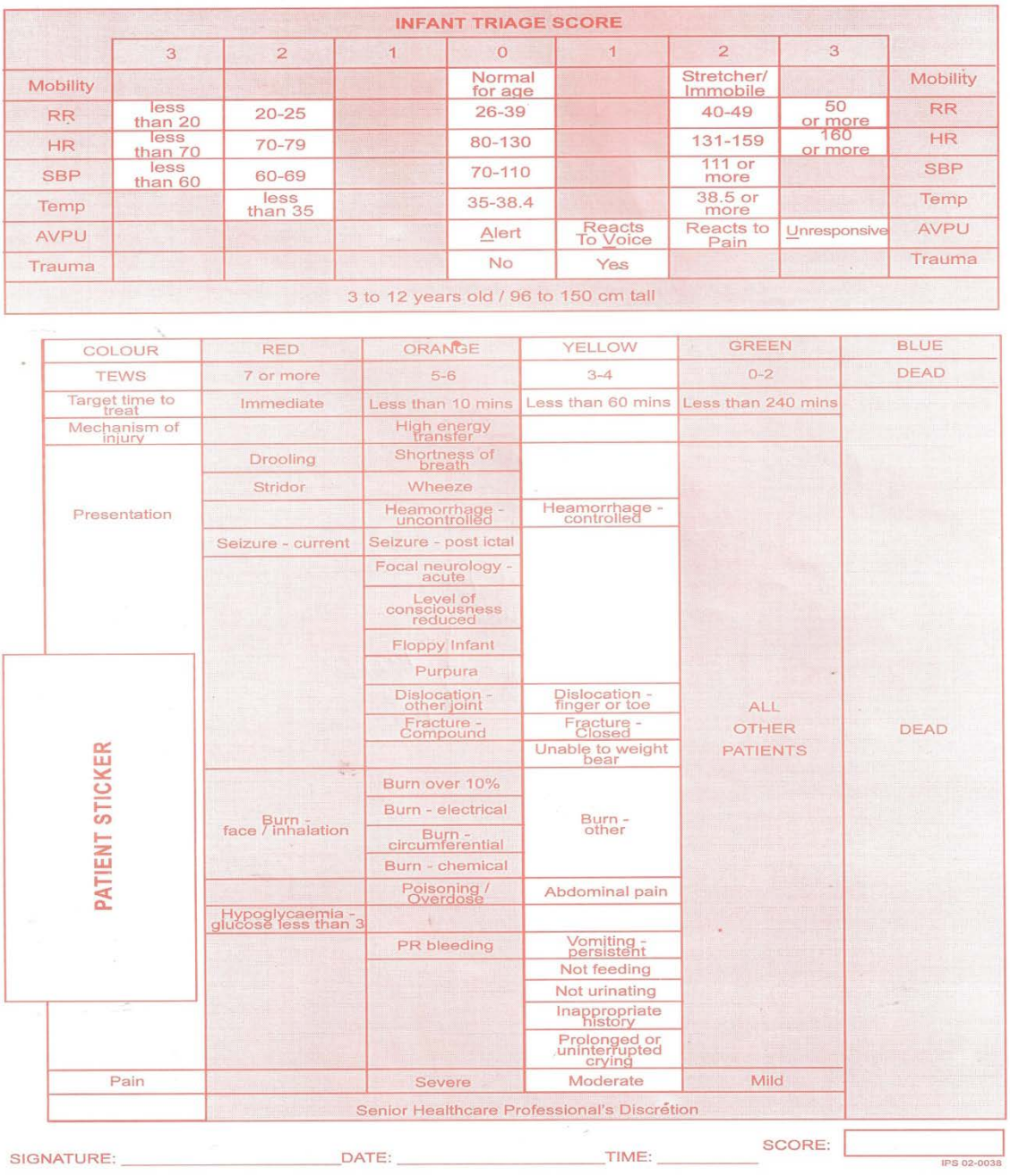
over 12 years / taller than 150cm

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	Less than 10 mins	Less than 45 mins	Less than 60 mins	
Mechanism of injury	Obstructed airway	High energy transfer			
Presentation	Not breathing	Shortness of Breath - acute		ALL OTHER PATIENTS	DEAD
	Cardiac arrest	Stabbed neck or chest			
		Coughing blood			
		Chest pain			
		Heamorrhage - uncontrolled	Heamorrhage- controlled		
	Seizure - current	Seizure - post ictal			
		Focal neurology - acute			
		Level of consciousness reduced/confused			
		Psychosis / Aggression			
		Threatened limb			
		Dislocation - other joint	Dislocation finger or toe		
		Fracture - Compound	Fracture - Closed		
	Burn - face / inhalation	Burn over 20%	Burn - other		
		Burn - electrical			
		Burn - circumferential			
		Burn - chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia - glucose less than 3	Diabetic - glucose over 11 & ketonuria	Diabetic - glucose over 17 (No ketonuria)		
		Vomiting - fresh blood	Vomiting - persistent		
		Pregnancy & abdominal trauma or pain	Pregnancy & trauma		
			Pregnancy & PV bleed		
		Severe Pain	Moderate Pain	Mild Pain	
	Senior Healthcare Professional's Discretion				

Place Patient Sticker Here
Hospital / Clinic: .....
Admission No.: .....
Title: Prof. Dr. Rev. Mr. Mrs. Ms.
Surname: .....
Names: .....
Attending Doctor: .....

SIGNATURE: _____ DATE: _____ TIME: _____ SCORE: _____

APPENDIX B2



INFANT TRIAGE SCORE								
	3	2	1	0	1	2	3	
Mobility				Normal for age		Stretcher/ Immobile		Mobility
RR	less than 20	20-25		26-39		40-49	50 or more	RR
HR	less than 70	70-79		80-130		131-159	160 or more	HR
SBP	less than 60	60-69		70-110		111 or more		SBP
Temp		less than 35		35-38.4		38.5 or more		Temp
AVPU				Alert	Reacts To Voice	Reacts to Pain	Unresponsive	AVPU
Trauma				No	Yes			Trauma
3 to 12 years old / 96 to 150 cm tall								

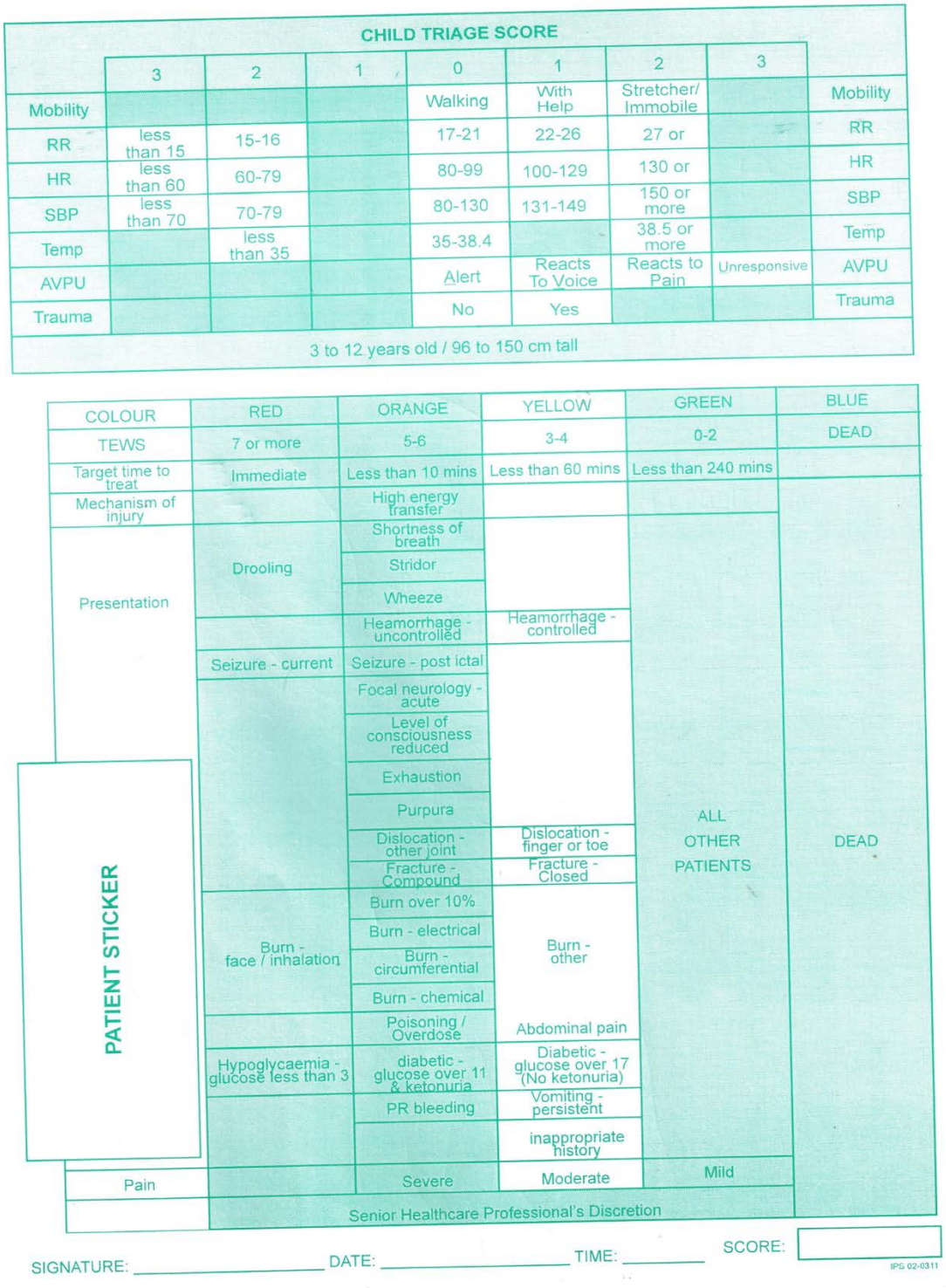
COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	Less than 10 mins	Less than 60 mins	Less than 240 mins	
Mechanism of injury		High energy transfer			
Presentation	Drooling	Shortness of breath		ALL OTHER PATIENTS	DEAD
	Stridor	Wheeze			
		Heamorrhage - uncontrolled	Heamorrhage - controlled		
	Seizure - current	Seizure - post ictal			
		Focal neurology - acute			
		Level of consciousness reduced			
		Floppy Infant			
		Purpura			
		Dislocation - other joint	Dislocation - finger or toe		
		Fracture - Compound	Fracture - Closed		
			Unable to weight bear		
	Burn - face / inhalation	Burn over 10%	Burn - other		
		Burn - electrical			
		Burn - circumferential			
		Burn - chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia - glucose less than 3				
		PR bleeding	Vomiting - persistent		
			Not feeding		
			Not urinating		
			Inappropriate history		
			Prolonged or uninterrupted crying		
Pain		Severe	Moderate	Mild	
	Senior Healthcare Professional's Discrétion				

PATIENT STICKER

SIGNATURE: _____ DATE: _____ TIME: _____ SCORE: _____

IPS 02-0038

APPENDIX B3



CHILD TRIAGE SCORE

	3	2	1	0	1	2	3	
Mobility				Walking	With Help	Stretcher/ Immobile		Mobility
RR	less than 15	15-16		17-21	22-26	27 or		RR
HR	less than 60	60-79		80-99	100-129	130 or		HR
SBP	less than 70	70-79		80-130	131-149	150 or more		SBP
Temp		less than 35		35-38.4		38.5 or more		Temp
AVPU				Alert	Reacts To Voice	Reacts to Pain	Unresponsive	AVPU
Trauma				No	Yes			Trauma

3 to 12 years old / 96 to 150 cm tall

COLOUR	RED	ORANGE	YELLOW	GREEN	BLUE
TEWS	7 or more	5-6	3-4	0-2	DEAD
Target time to treat	Immediate	Less than 10 mins	Less than 60 mins	Less than 240 mins	
Mechanism of injury		High energy transfer			
Presentation	Drooling	Shortness of breath		ALL OTHER PATIENTS	DEAD
		Stridor			
		Wheeze			
		Heamorrhage - uncontrolled	Heamorrhage - controlled		
	Seizure - current	Seizure - post ictal			
		Focal neurology - acute			
		Level of consciousness reduced			
		Exhaustion			
		Purpura			
		Dislocation - other joint	Dislocation - finger or toe		
		Fracture - Compound	Fracture - Closed		
	Burn - face / inhalation	Burn over 10%	Burn - other		
		Burn - electrical			
		Burn - circumferential			
		Burn - chemical			
		Poisoning / Overdose	Abdominal pain		
	Hypoglycaemia - glucose less than 3	diabetic - glucose over 11 & ketonuria	Diabetic - glucose over 17 (No ketonuria)		
		PR bleeding	Vomiting - persistent		
			inappropriate history		
Pain		Severe	Moderate	Mild	
	Senior Healthcare Professional's Discretion				

PATIENT STICKER

SIGNATURE: _____ DATE: _____ TIME: _____ SCORE: _____

IPS 02-0311

APPENDIX C

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Dr Mukun M Dayaram

CLEARANCE CERTIFICATE	**M120655**
PROJECT	An analysis of the Patients Presenting to a Private Hospital Emergency Department in the Ethekwini Metropolitan Area during Holiday and Non-Holiday Periods
INVESTIGATORS	Dr Mukun M Dayaram.
DEPARTMENT	Department of Emergency Medicine
DATE CONSIDERED	29/06/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

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

DATE 29/06/2012 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof Efraim Kramer

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...