THE SENTINEL SURVEILLANCE OF SUBSTANCE ABUSE AND TRAUMA

1999-2000

FINAL REPORT

January 2001

A DACST Innovation Fund Project

Acknowledgements

We gratefully acknowledge the support of the staff and management at the following hospitals:

Livingstone Hospital
Dr F Rank, Medical Superintendent
Dr Parbhoo, Head of Trauma
Mrs ET Ntlabezo, NSM
Miss E Heynsen, Sr-in-charge of Trauma

Provincial Hospital
Dr RM May, Medical Superintendent
Sr HE Siebbert, Sr-in-charge of Trauma

GF Jooste Hospital
Dr Maharaj, Medical Superintendent
Dr Naidoo , Head of Trauma
Sr H Abass, NSM
Sr M Qaqoba, Sr-in-charge of Trauma

Groote Schuur Hospital
Dr B. Schmitz, Medical Superintendent
Dr A Nichols, Head of Trauma
Mrs Patton, NSM
Sr Plaatjies, Sr-in-charge of Trauma

Addington Hospital
Dr J. Hurst, Medical Superintendent
Dr Geyer, Head of Trauma

Project Team

Christine Harris
Anesh Sukhai
Hilton Donson
Mzimkhulu Maziko
Nomhle Kawa
Nozulu Mtotywa
William Nose
Margie Peden (Project Leader)

Report Compiled by:
Margie Peden
January 2001

For further information please contact:
Hilton Donson
Medical Research Council
PO Box 19070
Tygerberg
Ph (021) 938 0344
Email : hilton.donson@mrc.ac.za

CONTENTS

Page

Acknowledgements

1. INTRODUCTION 1
2. AIM OF THE STUDY 1
3. METHODS 2
   - 3.1 Study Design 2
   - 3.2 Sampling 2
     - 3.2.1 Study Population 2
     - 3.2.2 Study Framework 3
     - 3.2.3 Inclusion/Exclusion Criteria 3
     - 3.2.4 Sample Size 3
   - 3.3 Instrumentation 4
   - 3.4 Field Workers 4
   - 3.5 Ethics 4
   - 3.6 Analysis 5
4. AGGREGATED DATA
   - 4.1 An Overview 5
   - 4.2 Detail of Injury 5
   - 4.3 Alcohol Usage 8
     - 4.3.1 Alcohol-relatedness 8
     - 4.3.2 Breath Alcohol Analysis 8
     - 4.3.3 Chronic Alcohol Usage 10
   - 4.4 Illicit Drug Usage 11
     - 4.4.1 Self-reported Drug Usage 11
     - 4.4.2 Multidrug Screen Results 11
     - 4.4.3 Pharmacological Analysis 13
     - 4.4.4 Multidrug Screen Kit vs Pharmacological Analysis 14
   - 4.5 Association between injuries and substance usage 14
     - 4.5.1 Cause of injury by substance usage 14
       - 4.5.1.1 Violence 15
       - 4.5.1.2 Traffic 16
       - 4.5.1.3 Accidents 16
     - 4.5.2 Gender by substance usage 17
     - 4.5.3 Severity of injuries by substance usage 17
     - 4.5.4 Placement of Patients by substance usage 18
     - 4.5.5 Estimated Disability of Patients by substance usage 19
5. CITY SPECIFIC INFORMATION
   - 5.1 Cape Town 19
     - 5.1.1 An overview of study 19
     - 5.1.2 Selected results 19
   - 5.2 Durban 21
     - 5.2.1 An overview of study 21
     - 5.2.2 Selected results 21
   - 5.3 Port Elizabeth 23
     - 5.3.1 An overview of study 23
     - 5.3.2 Selected results 23
6. CONCLUSIONS 25
7. RECOMMENDATIONS 25
8. REFERENCES 26

1. INTRODUCTION

According to Tim Ryan (1999), the international doors opened in South Africa in 1994, bringing with this many opportunities for growth and prosperity but also the 'ugly face' of the illegal drugs trade. Consequently, in 1997 we began monitoring the incidence and prevalence of both alcohol and illicit drugs among trauma patients in order to assess and identify emerging trends which will drive prevention programmes (Peden & Sidzumo, 1997).

In 1997, a pilot study was conducted at Groote Schuur Hospital (GSH) to monitor substance abuse among trauma patients. The results confirmed that alcohol was still the most commonly misused substance among trauma patients but that almost one-third of the patients had smoked cannabis prior to their injury. Other street drugs such as cocaine and opiates did not appear to appear to be a problem among Cape Town trauma patients but a high incidence of 'white pipe' smoking was found, almost exclusively among victims of violence (Peden, van der Spuy, Smith, et al., 2000).

After the pilot study in 1997, a sentinel substance abuse and trauma system was developed in four cities in South Africa, viz. Cape Town, Port Elizabeth, Durban and Umtata. This system formed part of the National Violence and Injury Surveillance Initiative currently being undertaken by a consortium of research partners including the MRC, UNISA and the CSIR and funded by the Department of Arts, Culture, Science and Technology Innovation Fund.

Annual studies such as these will provide trend data which will drive decision-making processes and assist with the development of prevention and training programmes.

2. AIM OF THE STUDY

The aim of the project was to monitor substance abuse and establish trends among trauma patients by:

- assessing the proportion of patients with fresh trauma who were alcohol positive at the time of their injury;

- assessing the proportion of patients with fresh trauma who had used an illicit drug

prior to their injury; and

- assessing, by means of the CAGE questionnaire, what proportion of trauma patients were chronic alcoholics.

Two of the major objectives of this study were:

- to monitor substance abuse and trauma trends in a number of cities in South Africa, viz. Cape Town, Port Elizabeth, Umtata and Durban; and
- to include the results in the South African Community Epidemiology Network on Alcohol, Tobacco and Other Drug Use study (SACENDU) which monitors substance abuse trends (in general) at sentinel sites in South Africa.

3 METHODS

3.1 Study Design

The study is essentially an annual cross-sectional, descriptive study of the incidence of alcohol (and alcohol dependence) and illicit substance abuse among patients presenting with fresh trauma to the sentinel hospitals.

3.2 Sampling

3.2.1 Study Population

Patients who attended the following trauma units in the four cities were included in the sample:

Cape Town	:	Groote Schuur Hospital
		GF Jooste Hospital
Port Elizabeth	:	Livingstone Hospital
		Provincial Hospital
Durban	:	Addington Hospital
Umtata	:	Umtata General Hospital

Unfortunately the data obtained from the Umtata general hospital could not be used in the final analysis because of technical and field work problems. Urine samples could not be

adequately refrigerated at this facility and consequently the results obtained were not reliable. Furthermore, some field worker bias was introduced during the data capture phase. Consequently, the study was not repeated at Umtata General Hospital in 2000 because the logistical problems could not be solved.

3.2.2 Sampling Framework

The concept of an 'ideal week' was used at the trauma unit. Each day was divided into four six-hour shifts and one shift was randomly selected per day, i.e. over four weeks the 24-hour period for each day was covered. All patients with fresh trauma attending during these times were included provided they gave written consent.

3.2.3 Inclusion/Exclusion Criteria

The following inclusion and exclusion criteria applied to patients.

- Only patients with fresh physical trauma were included, i.e. reattenders were excluded.
- The injury-to-presentation time was set at a maximum of six hours.
- Referrals were included provided they did not obtain significant treatment at the first facility they attended and that their presentation to the study facility was within six hours.
- Only children, 12 years and over were included because of ethical problems related to taking urine and breath specimens from children.
- All patients had to give written, informed consent prior to inclusion in the study. Those patients who refused were excluded but the reason for their refusal was documented. For those less than 18 years of age, permission was requested from a parent or guardian.
- All types of poisoning and non-traumatic attempted suicide (e.g. drug overdoses) were excluded.

3.2.4 Sample Size

A total of 1354 patients were included in the study from the five hospitals in the three cities over the two-year period, viz. 1999 and 2000.

3.3 Instrumentation

- Each patient was interviewed by a field worker using a specially constructed interview sheet
- Alcohol usage was assessed using self-report, a breath alcohol test and the CAGE questionnaire.
  - Self-report was conducted by either asking the patient whether he/she had consumed alcohol prior to their injury or by using clinical judgement in unconscious or uncooperative patients.
  - Breath alcohol was assessed using the Lion Alcolmeter SD2 - the use of which has previously been validated in a study in Cape Town (Peden, 1997).
  - The CAGE questionnaire was included to assess chronic alcohol usage (Ewing, 1984).
- Three methods of assessing for drug usage were also employed.
  - Self-report was also used to assess drug usage among patients.
  - A urine specimen was also taken from the patient, a portion of which was used to screen for five drugs namely amphetamine, cannabis (THC), morphine, cocaine and methamphetamine, using a Multidrug kit.
  - Formal chemical analysis (to test for dagga and methaqualone [Mandrax]) was conducted on the rest of the urine specimen by the Department of Pharmacology, UCT.

3.4 Field Workers

The principal investigator (PI) was Margie Peden, Senior Specialist Scientist in Trauma Research at the Medical Research Council (MRC). She was assisted by a Chief and Senior Research Technologists from the MRC in Cape Town, Port Elizabeth and Durban.

3.5 Ethics

- Ethical approval for the study was obtained from the appropriate Ethics committee.

Furthermore, permission was obtained from each Medical Superintendent of the sentinel hospitals.

- The data was anonymous but linked to demographic/self report data. All data was kept in the strictest confidence by the primary researcher. No alcohol or drug results were documented in the patient's hospital folder. There was no way of cross-referencing research results to actual patient records.
- Informed, written consent was taken from the patients.

3.6 Analysis

The data was checked and coded by the research team and cleaned before entering into Epi Info version 6.02 (Shareware, Center for Disease Control, 1994) by a dedicated data puncher. Epi Info was used to do the basic statistical analysis presented in this report.

4. AGGREGATE DATA

4.1 An Overview

A total of 1354 patients were seen in the three cities over the two year period. 37.4% of these patients were seen in Port Elizabeth; 34.3% in Cape Town and 28.4% in Durban. Numbers of patients for the two years assessed, viz. 1999 and 2000, were similar.

The following section presents aggregated data for the three cities. The results cannot be generalised to the whole of South Africa, but give some indication of the problem in three large cities in the country.

4.2 Detail of Injury

Nearly 60% of all injuries were the result of violence. There were no significant changes in the leading causes of injuries over the two years (Table I).

Table I : Overall Cause of Injury 1999 versus 2000

	1999 n (%)	2000 n (%)	All n(%)
Violence	415 (58.3)	378 (58.9)	793 (58.6)
Traffic	159 (22.3)	122 (19.0)	281 (20.8)
Non-traffic 'Accidents'	138 (19.4)	142 (22.1)	280 (20.7)

Nearly 50% of the violence seen in the three centres was perpetrated with a sharp object. There were interesting inter-city differences in this regard. As can be seen in Table II, significantly more firearm-related violence was seen in Cape Town, whereas the incidence of blunt force violence was highest in Durban.

Table II : Mechanism of violence by city injured 1999 versus 2000

	PE n(%)	DBN n(%)	CT n(%)	ALL n(%)
Sharp	175 (54.7)	108 (54.6)	112 (40.7)[1]	395 (49.8)
Blunt	58 (18.1)	44 (22.2)[2]	35 (12.7)	137 (17.3)
Firearm	11 (3.4)	12 (6.1)	55 (20.0)[3]	78 (9.8)
Other	76 (23.8)	34 (17.2)	73 (26.5)	183 (23.1)

[1] ChiSq = 13.9, p < 0.0001 [2] ChiSq = 7.53, p = 0.02 [3] ChiSq = 49.99, p < 0.0001

Overall, passengers accounted for more than 40% of injured traffic users and pedestrians made up another 40%. But there were interesting differences observed between cities with regard to the category of traffic user injured (Table III). In both Durban and Port Elizabeth, passengers predominated while in Cape Town significantly more pedestrians were injured. In fact, pedestrians in Cape Town accounted for more than half of all the traffic cases.

Table III : Traffic user by city injured 1999 versus 2000

	PE n(%)	DBN n(%)	CT n(%)	ALL n(%)
Driver	20 (20.6)	10 (10.9)	14 (15.2)	44 (15.7)
Passenger	45 (46.4)	49 (53.3)	29 (31.5)[1]	123 (43.8)
Pedestrian	32 (33.0)	33 (35.9)	49 (53.3)[2]	114 (40.6)

[1] ChiSq = 9.3, p = 0.009 [2] ChiSq = 9.3, p = 0.010

71.4% of all injuries occurred in males. Slightly more males (75.4%) were involved in violence than accidents (64.3%) or traffic collisions (67.3%). There were no significant inter-city differences in this pattern.

On average injured patients were 32.3 (±13.2) years and ranged in age from 12 to 99 years old.

41.7% of patients were in the 25 to 35 year age range, while a further 30.2% were in the 35 to 44 year age range. There were no significant inter-city differences in age (Figure 1).

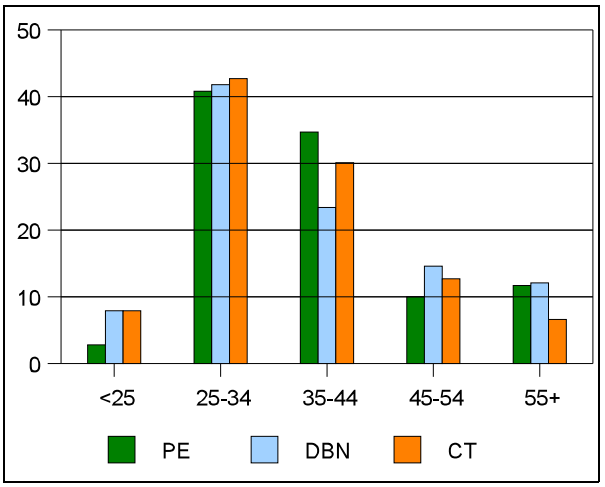

Figure 1 : Ages of patients in three cities

Table IV : Mechanism of injury by age

<15*	15-24	25-34	35-44	45-54	55-64	65+
Viol : sharp 9 (29.0%)	Viol : sharp 169 (38.8%)	Viol : sharp 174 (40.0%)	Viol : sharp 100 (36.2%)	Viol : sharp 28 (25.4%)	Fall 18 (32.7%)	Fall 20 (50.0%)
Fall 6 (19.4)	Viol : blunt 48 (11.0%)	Passenger 45 (10.3%)	Pedestrian 32 (11.6%)	Pedestrian 18 (16.4%)	Viol : sharp 11 (20.2%)	Viol : sharp 5 (12.5%)
Cyclist 4 (12.9%)	Passenger 37 (8.5%)	Viol : blunt 40 (9.2%)	Viol : blunt 31 (11.2%)	Fall 18 (16.4%)	Viol : blunt 4 (7.3%)	Pedestrian 4 (10.0%)
Caught btwn objects 3 (9.7%)	Viol : firearm 33 (7.6%)	Fall 34 (7.8%)	Passenger 25 (9.1%)	Viol : blunt 13 (11.8%)	Pedestrian 3 (5.5%)	Passenger 3 (7.5%)
Pedestrian 2 (6.5%)	Fall 32 (7.8%)	Viol : firearm 31 (7.1%)	Fall 21 (7.6%)	Passenger 10 (9.1%)	Passenger 3 (5.5%)	Viol : firearm 2 (5.0%)
Burn 2 (6.5%)	Pedestrian 29 (6.7%)	Pedestrian 30 (6.9%)	Viol : fist/feet 13 (4.7%)	Driver 6 (5.5%)	Viol : fist/feet 3 (5.5%)	Acc : sharp 2 (5.0%)

* only children 12 years and older were included in the study

As can be seen in Table IV above, unintentional injuries predominate in the younger and older age groups, while violence, particularly that perpetuated with a sharp instrument is the leading cause of injuries between 15 and 54 years old. In contrast to fatal injuries, where firearm violence is the leading cause of non-natural death in most economically active ages (NIMSS Annual Report, 1999), this is not the case in non-fatal injuries probably due to the lethality of the mechanism. Falls are the leading cause of injuries in people aged 55 years and older. Traffic injuries, predominantly those involving passengers and pedestrians,

occur among the leading causes of non-fatal injuries in all age groups. Cyclist injuries are the third leading cause of injuries in children aged between 12 and 15 years.

4.3 Alcohol Usage

Three methods were used to assess alcohol use and abuse among the injured patients. Firstly, patients were asked whether they had consumed alcohol in the six hours prior to their injury or before presenting to hospital. Secondly, a specimen of breath was taken from each consenting patient and this was analysed using a Lion Alcolmeter SD2. Finally, patients who were able were interviewed using the four-question CAGE questionnaire which assesses problem drinking or possible alcohol dependence (chronic alcoholism).

4.3.1 Alcohol-relatedness

Seventy-four patients could not be interviewed because of the severity of their injuries. Among the remaining 1280, 52.8% of patients acknowledged that they had been drinking prior to their injury.

Using breath alcohol results as the gold standard, self-reported alcohol usage by the injured patients was found to be relatively reliable. The sensitivity of self report (the fraction of those who had consumed alcohol correctly identified as positive on self report) was found to be 91.9%; while the specificity (the fraction of those who had not consumed alcohol correctly identified as negative on self report) was found to be 84.6%. The predictive value positive (the fraction of people with positive tests who actually have the condition) was found to be 86.9%.

4.3.2 Breath Alcohol Analysis

1332 patients could be assess for breath alcohol. 22 patients were excluded from this analysis. The most common reasons for exclusion were the following:

- too intoxicated to blow into Alcolmeter
- too severely injured, e.g. ventilated
- facial or head injuries

Of the 1332 patients tested, 44.1% had zero alcohol levels. Of the 55.9% with positive levels, 13% had levels at or above 0.15g/100ml (Figure 2).

For those with positive alcohol levels, the mean BrAC was found to be 0.101 (±0.08) g/100ml. Levels ranged from a low of 0.01 to 0.50 g/100ml.

Significantly less patients were found to be alcohol positive in 2000 than in 1999 (59.4% versus 53.1%, ChiSq = 3.87, p=0.049). However, there were no significant differences in mean alcohol level between the two years (t=0.49, p=0.62).

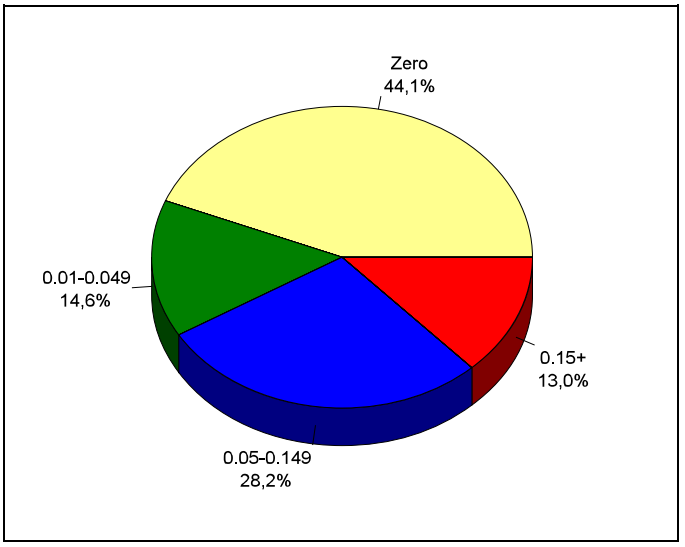

Figure 2 : Alcohol levels in injured patients

From Table V below it can be seen that 69.5% of patients who had been injured as a result of violence, 44.4% of those injured in traffic collisions and 28.9% of those injured in non-traffic accidents were alcohol positive at the time of their presentation to hospital. The proportion of patients who were alcohol positive and had been injured as a result of a traffic collision, decreased from 51% in 1999 to 36% in 2000. This was statistically significant.

Table V : Alcohol-relatedness of injuries 1999-2000

	Positive n		%		Mean BrAC (g/100ml) ± Std. Dev.	
	1999	2000	1999	2000	1999	2000
Violence	290	252	71.4	67.4	0.105 (0.08)	0.107 (0.07)
Traffic	78	44	51.0	36.1[1]	0.094 (0.08)	0.084 (0.08)
Non-traffic 'Accidents'	38	42	27.9	29.8	0.074 (0.07)	0.093 (0.09)

[1] ChiSq = 6.12, p = 0.013

There were significant inter-city differences with regard to the alcohol relatedness of all injuries. 71.9% of the injured patients in Port Elizabeth were alcohol positive, while only 43.5% of those in Durban and 48.3% of those in Cape Town had drunk alcohol prior to their injury (ChiSq = 86.1, p<0.001).

4.3.3 Chronic Alcohol Usage

1090 patients could be interviewed using the four-question CAGE questionnaire. The others were precluded because of the severity of their injuries or because they were too intoxicated to answer the questions.

Of these 1090 patients, 467 (42.8%) obtained CAGE scores of 2 or more (2 or more yes answers is used as the cutoff point internationally and suggests problem drinking or possible alcohol dependence).

In 1999, 47.8% of all injured patients were assessed to have CAGE scores of 2 or more. There was a significant drop in this proportion in 2000 down to 37.3% (ChiSq=12.1, p=0.0005). These differences were largely due to decreases in the proportion of patients with 2+ scores in the violence and traffic sub-categories as can been seen in the Table VI below.

Table VI : Problem drinking or alcohol dependence 1999-2000

	CAGE = zero		CAGE = 1		CAGE 2+	
	1999	**2000**	**1999**	**2000**	**1999**	**2000**
Violence	125 (36.0)	152 (48.6)	20 (5.8)	18 (5.8)	202 (58.2)	143 (45.7)[1]
Traffic	66 (56.9)	64 (71.9)	3 (2.6)	3 (3.4)	47 (40.5)	22 (24.7)[2]
Non-traffic 'Accidents'	88 (76.5)	77 (70.0)	8 (7.0)	7 (6.4)	27 (23.5)	26 (23.6)

[1] ChiSq=10.4, p=0.001 [2] ChiSq=5.6, p=0.017

Huge differences in problem drinking were seen between cities. In Port Elizabeth more than 70% of patients were assessed to be problem drinkers while this proportion was only 6% in Durban. Cape Town found that 30.4% of patients could be classified as problem

drinkers. These massive discrepancies could be the result of different interpretation of questions and also due to a language barrier. In Durban particularly, it was felt that language barriers could have accounted for the low result. Neither of the field workers in this region were proficient in Zulu, while in Cape Town and Port Elizabeth the field workers were proficient in three languages and administered the questionnaire in the patient's home language. The high levels of problem drinking in Port Elizabeth were discussed with members of SANCA who indicated that such high levels were not unexpected since they do have a major alcohol problem in the city.

4.4 Illicit Drug Usage

Illicit drug usage was assessed by three methods. Firstly, patients were asked whether they had used any illicit drug prior to their injury. Secondly, a specimen of urine was obtained from each patient and tested for five drugs (cannabis, methamphetamine, amphetamine, cocaine, opiates) by means of a multi-drug kit. Finally, a portion of the urine specimen was sent to the University of Cape Town, Department of Pharmacology, for immuno-assay analysis for methaqualone and cannabis. Cannabis was thus tested both with the kit and by conventional wet analysis. Consequently, the accuracy of the kit could be assessed by using the wet analysis as the gold standard.

4.4.1 Self-reported Drug Usage

1250 patients could be interviewed with regard to the use of illicit drugs prior to their injury. Only 9.4% acknowledged that they had used such a substance.

When compared with the results obtained on urine analysis, it was found that although self-report had a reasonable sensitivity (84.1%) and specificity (65.4%), its predictive positive value was only 22.1%, i.e. the fraction who had positive tests who had actually used a substance. The low reporting rate is probably because of the illicit nature of drugs and therefore hesitance on the part of the patient to divulge the truth.

4.4.2 Multidrug Screen Results

1156 patients could be tested using the multi-drug kit. As can be seen in Table VII, cannabis was the drug most commonly found in patient's urine.

Table VII : Analysis of urine for illicit drugs using the Multi-drug Kit 1999 versus 2000

	1999 n (%)	2000 n (%)	All n(%)
Amphetamine	0	3 (0.6)	3 (0.3)
Cannabis	220 (36.2)	156 (28.4)[1]	376 (32.5)
Opiates	23 (3.8)	44 (8.0)[2]	67 (5.8)
Cocaine	11 (1.8)	38 (6.9)[3]	49 (4.2)
Methamphetamine	1 (0.2)	2 (0.4)	3 (0.3)

[1] ChiSq=8.1, p=0.005 [2] ChiSq=9.43, p=0.002 [3] ChiSq=18.54, p<0.0001

There was a significant reduction in the number of patients using cannabis over the two year period, while there was a worrying increase in the number of cocaine users. Since the multi-drug kit tests for all opiates and not specifically for heroin the increase in this variable might not be significant. Pre-hospital analgesia such as morphine, pethidine or even paracetamol with codeine would give positive urine results for this substance.

Unfortunately, because of the long half life of substances such as cannabis, these results only indicate drug usage and can in no way can be associated with injury causation. In order to ascribe causality one would need to do blood results and conduct a case-control study. Blood analysis for drugs in the South African context is not feasible for two main reasons:

- drugs such as cannabis are highly fat soluble and so only stay in the blood for a short time, i.e. < 2 hours. Since the average time from injury to presentation at a hospital is generally more than 2 hours in South Africa, this test would not identify all those who had used the drug just before being injured.
- serum analysis for a spectrum of drugs is very expensive and under the present

circumstances cannot be justified in the country.

As can be seen in Figure 3 there were no significant differences in drug usage among the three cities. Methamphetamine and amphetamine were seen in Cape Town and Durban. This drug does not appear to have reached the population sampled in Port Elizabeth.

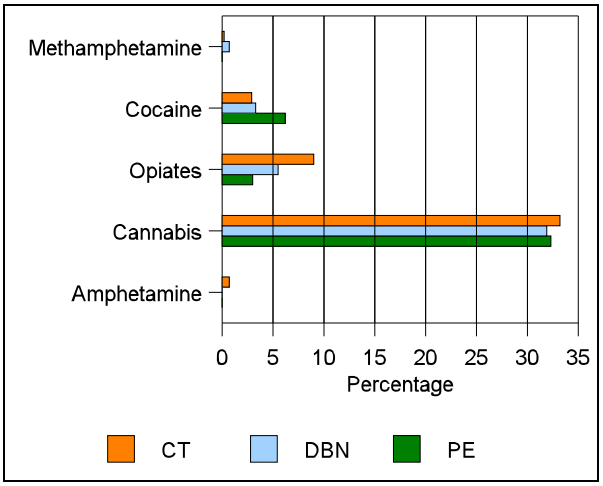

Figure 3 : Substances usage by City

4.4.3 Pharmacological Analysis

Cannabis and methaqualone were assessed by conventional wet analysis. Using these methods, 34.4% of patients were found to have cannabis in their urine, whereas only 14.5% had methaqualone metabolites.

There was a significant drop in the proportion of patients who were cannabis positive between 1999 and 2000, from 37% to 31.5% (Table VIII). There was also a slight drop in methaqualone users from 15.9% in 1999 to 13.1% in 2000, but this was not statistically significant (ChiSq=1.8, p=0.18).

Ninety-three percent of the methaqualone users had used cannabis concurrently, i.e. they had smoked a ‘white pipe’. This remained constant over the two years.

Table VIII : Analysis of urine for cannabis & methaqualone using conventional wet analysis 1999 versus 2000

	1999 n (%)	2000 n (%)	All n(%)
Cannabis	224 (37.0)	173 (31.5)[1]	397 (34.4)
Methaqualone	96 (15.9)	72 (13.1)	168 (14.5)
White pipe (cannabis + methaqualone)	92 (12.9)	65 (10.1)	157 (11.6)

[1] ChiSq=3.96, p=0.047

There were no inter-city differences with respect to cannabis usage (Figure 4). However, methaqualone usage was significantly more common in Cape Town (ChiSq=20.5, p=0.00004) than in the other two cities. Likewise, white pipe smoking was also more common in Cape Town (ChiSq=22.3, p=0.000014).

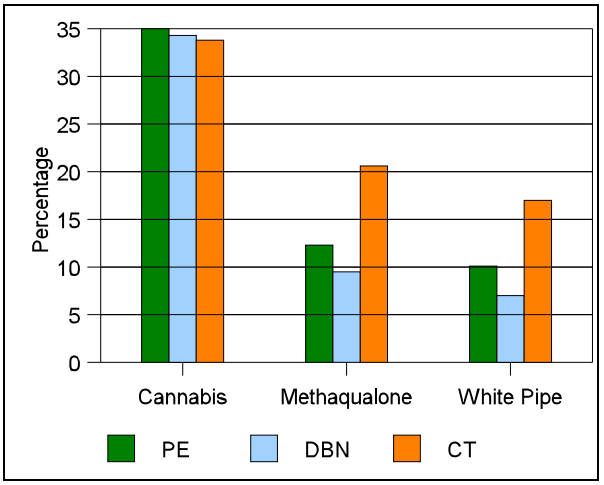

Figure 4 : Cannabis & methaqualone usage by City

4.4.4 Multidrug Screen Kit vs Pharmacological Analysis

The multi drug screening kit was compared with conventional pharmacological analysis (the gold standard) with regard to cannabis metabolites. The sensitivity of the kit was found to be 90.4% (the fraction of those who tested positive using the gold standard who also tested positive using the multi drug kit) while the sensitivity was found to be 98% (the fraction of those who tested negative using the gold standard who also tested negative using the multi drug kit). The predictive value positive was 96%. This kit therefore, can safely be recommended for use in hospitals to screen patients for substance abuse.

4.5 Association between injuries and substance usage

4.5.1 Cause of injury by substance usage

The relationship between alcohol usage and overall cause of injury was briefly presented in section 4.2.3. This analysis revealed that patients injured as a result of violence were more likely to have consumed alcohol and other drugs prior to their injury than those who were injured in traffic collisions or other unintentional injuries (Table IX).

Table IX : Substance abuse by cause of injury 1999 - 2000

	Any substance %	Any drug %	Cannabis %	White Pipe %	Alcohol %
Violence	81.2[1]	44.1	37.1	14.0	69.5
Traffic collisions	55.1	36.5	30.6	7.5	44.4
Other 'accidents'	46.0	34.6	22.6	8.9	28.9

[1] ChiSq=146.5, p<0.0001

4.5.1.1 Violence

As can be seen from Figure 5, when one analyses the mechanism of violence one sees that patients who were injured as a result of a sharp instrument (69.3%), e.g. knife stab, were more likely to be alcohol positive than those who had been injured either by blunt assault (62.0%) or those who had been shot (55.7%), but this did not reach a level of statistical significance.

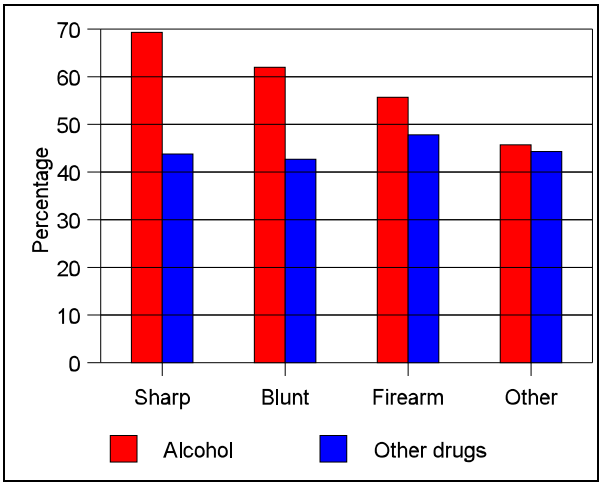

Figure 5 : Substance usage by mechanism of violence

In contrast, patients injured in firearm-related violence were more likely to have used a drug (other than alcohol) prior to their injury (47.8%) compared with those injured by sharp objects (43.8%), blunt force (42.7%) or other mechanism (44.3%).

52% of the patients who were violently injured as a result of 'other' mechanisms such as strangling, fist/feet, etc. were more likely to be classified as problem drinkers than where those injured as a result of firearms (23.1%), blunt force (39.4%) or even sharp objects (45.1%). This difference was statistically significant (ChiSq=20.5, p<0.0001).

4.5.1.2 Traffic

Among patients injured in traffic collisions, more than half of all the drivers and pedestrians had positive blood alcohol levels compared with just over one-third of passengers (Figure 6). Furthermore, drivers and pedestrians had higher blood alcohol levels (0.095 g/100ml and 0.092 g/100ml) than passengers (0.08 g/100ml) but this was not statistically significant. Of concern was that 63.6% of the drivers who were alcohol positive were legally over the alcohol limit for driving, viz. 0.05 g/100ml.

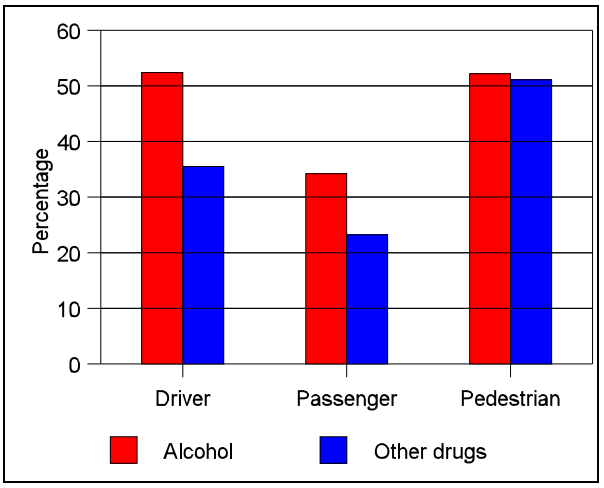

Figure 6 : Substance usage by traffic user

More then half of the pedestrians had used a drug (either in combination with alcohol or alone) prior to their injury. This was significantly higher than the 23.2% of passengers and 35.5% of drivers who had used such a substance (ChiSq=15.98, p=0.0003).

Overall, one-quarter of the traffic victims could be classified as problem drinkers but pedestrians were significantly more likely to be chronic alcoholics (ChiSq=6.9, p=0.03). One-third of pedestrians, 22.7% of drivers and 18.7% of passengers had drinking problems.

4.5.1.3 Accidents

Falls accounted for half of all the non-traffic accidents(or unintentional injuries). One-quarter of these fall patients were alcohol positive at the time of their presentation to hospital. Furthermore, 28% had used a substance other than alcohol prior to their fall,

however, this was significantly less than those patients injured in other types of accidents such as burns, drowning, bites, etc. (ChiSq=4.3, p=0.038). Unfortunately the sample sizes of the other types of accidental injuries were too small to make accurate comparisons. Approximately 18% of all the patients injured unintentionally (excluding traffic collisions) were assessed to be problem drinkers.

4.5.2 Gender by substance usage

From Table X it can be seen that men were significantly more likely to be alcohol positive than women, however, among those who were alcohol positive there was no significant difference in the amount of alcohol that they had consumed (t=0.25, p=0.79). Men were two and a half times more likely to have used a drug (other than alcohol) than women.

Table X : Substance abuse by gender 1999 - 2000

	Males	Females
Alcohol positive (%)	61.1[1]	42.8
Mean alcohol level (g/100ml ±SD)	0.100±0.08	0.099±0.075
Other substances (%)	48.8[2]	19.1

[1] ChiSq=36.99, p<0.0001

[2] ChiSq=83.8, p<0.0001

4.5.3 Severity of injuries by substance usage

Patients who were alcohol positive had significantly more severe injuries than those who were alcohol negative

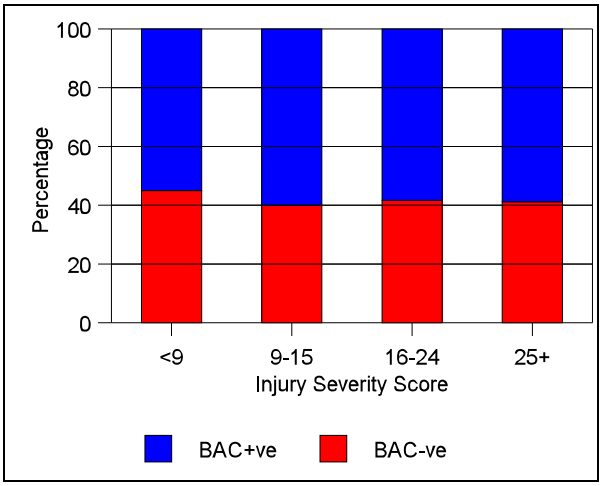

Figure 7 : Injury Severity by Alcohol Usage

(ChiSq=14.1, p=0.0002) (Figure 7).

However, no direct association between the level of alcohol intoxication and injury severity could be proved (Figure 8).

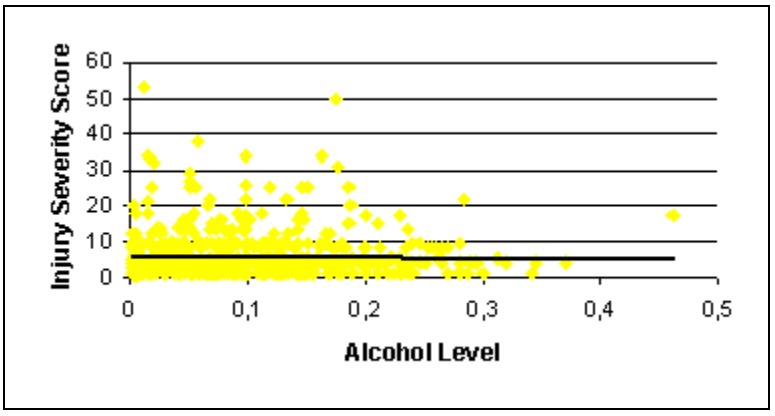

Figure 8 : Relationship between injury severity and alcohol levels

There was a strong relationship between the use of other drugs and injury severity (ChiSq=22.5, p<0.0001). However, since two-thirds of patients had used a combination of alcohol and other drugs it was thought that it was possible that the alcohol was the associated factor. However, when we analysed the results in patients who had used drugs only (no alcohol) there was still as significant relationship between injury severity and drug usage (ChiSq=18.19, p=0.0004).

4.5.4 Placement of Patients by substance usage

Slightly more patients who were alcohol positive required admission to hospital but this was not statistically significant (Table XI). Alcohol positive patients did not, however, require longer hospitalisations than those who were alcohol negative.

Table XI : Placement by substance usage
1999 - 2000

	BAC -ve n(%)	BAC +ve n(%)	Drug -ve n(%)	Drug +ve n(%)
Discharged	447 (76.0)	540 (72.6)	240 (79.2)	122 (71.3)
Admitted	120 (20.5)	179 (24.1)	57 (19.8)	43 (25.1)[1]
Died	5 (0.9)	6 (0.8)	3 (1.0)	0
Transferred	12 (2.0)	14 (1.9)	2 (0.7)	5 (2.9)
Absconded	4 (0.7)	5 (0.7)	1 (0.3)	1 (0.6)

[1]ChiSq=14.4, p=0.01

Si

gnificantly more patients who had used a substance (but where alcohol negative at the time of their presentation) required admission to hospital (ChiSq=14.49, p=0.01). These patients required slightly longer average hospital stays (9.17 days vs 8.89 days) but this was not statistically significant.

4.5.5 Estimated Disability of Patients by substance usage

There was no relationship between alcohol intoxication and the estimated disability as a result of the injury sustained. There was, however, a significant relationship between drug usage and estimated disability. Patients who had used drugs (but were alcohol negative at the time of admission) were more likely to sustain moderate, serious or total disabilities (ChiSq=4.79, p=0.028) than those who had not used any substances at all.

5. CITY SPECIFIC INFORMATION

5.1 Cape Town

5.1.1 Overview of study

In Cape Town, sampling was conducted at Groote Schuur Hospital and GF Jooste Hospital. The former hospital is a tertiary facility attached to the University of Cape Town, while the latter is a secondary hospital in Manenberg. GF Jooste only recently (1997) opened a 24

hour trauma unit in order to drain some of the minor and moderately injured patients.

The study was conducted in February 1999 and 2000 at Groote Schuur Hospital and in March/April 1999 and 2000 at GF Jooste Hospital

Over the two-year time period, a total of 464 patients were assessed in Cape Town, viz. 233 in 1999 and 231 in 2000.

5.1.2 Selected results

A full report has been written for each facility. This is available on request from the Medical Research Council. However, below are outlined some of the highlights from these studies:

Table XII : Cape Town - Alcohol-relatedness of injuries 1999-2000

	Positive n		%		Mean BrAC (g/100ml) ± Std. Dev.	
	1999	2000	1999	2000	1999	2000
Violence	82	87	59.0	64.9	0.111 (0.09)	0.076 (0.05)
Traffic	17	17	32.7	42.5	0.100 (0.05)	0.071 (0.06)
Non-traffic 'Accidents'	4	16	10.0	28.1	0.125 (0.12)	0.081 (0.07)

Percentages are of the patients tested per cause category

- nearly 75% of all injured patients were males and on average patients were 31.9 ±12.9 years old
- 60% of injuries were the result of violence
- 40% of the violence was perpetrated with a sharp object
- firearms accounted for 20% of all violent injuries - this was constant between the two years
- more than half (53.3%) of the patients involved in traffic collisions were pedestrians
- nearly 60% of patients sustained their injuries over the weekend (17h00 on Friday to 07h59 on Monday morning)
- most patients sustained injuries which were relatively minor and few were left with

long-term disabilities

- 48% of all injured patients were intoxicated with alcohol when they presented to the trauma unit
- 62% of patients injured violently were alcohol positive at the time of their presentation to hospital (Table XII)
- more than one-quarter of patients (27.4%) could be classified as problem drinkers or chronic alcoholics - this was stable between the two years
- 41% of patients had used a substance prior to their injury
- cannabis and mandrax use was strongly associated with violent injuries
- there was no increase in drug usage over the two years (Table XIII).

Table XIII : Cape Town - Drug usage among injured patients 1999 - 2000

	1999 n (%)	2000 n (%)
Amphetamine	0 (0.0)	3 (1.5)
THC	70 (32.9)	71 (34.8)
Morphine	16 (7.5)	21 (10.6)
Cocaine	7 (3.3)	5 (2.5)
Methamphetamine	0 (0.0)	1 (0.5)
Methaqualone	47 (22.1)	39 (19.1)

5.2 Durban

5.2.1 Overview of study

In Durban, sampling was conducted at Addington Hospital. This hospital is a secondary/tertiary facility attached to the University of Durban, and drains the Durban central business district and surroundings.

The study was conducted in June/July 1999 and 2000.

Over the two-year time period, a total of 384 patients were assessed in Durban, viz. 205 in 1999 and 179 in 2000.

5.2.2 Selected results

A full report has been written for each facility. This is available on request from the Medical Research Council (Durban). However, below are outlined some of the highlights from this study:

Table XIV : Durban - Alcohol-relatedness of injuries 1999-2000

	Positive n		%		Mean BrAC (g/100ml) ± Std. Dev.	
	1999	2000	1999	2000	1999	2000
Violence	58	49	58.0	56.3	0.077 (0.09)	0.081 (0.07)
Traffic	16	10	41.0	19.6	0.051 (0.10)	0.044 (0.04)
Non-traffic 'Accidents'	16	11	29.1	30.6	0.031 (0.05)	0.062 (0.09)

Percentages are of the patients tested per cause category

- patients were predominantly young males (69.3% were males, average age was 31.4 ±13.5 years)
- most injuries (52%) were the result of violence
- sharp objects (55%) are still the major cause of violence, however, the proportion of firearm violence doubled between1999 and 2000 (3.7% to 8.8%), but due to the small numbers this was not statistically significant
- most of the patients who were involved in traffic collisions were passengers (53%), however, the proportion of pedestrian cases almost doubled in 2000 (26.8% to 43.1%), but this was also not statistically significant
- two-thirds of injuries occurred at night (between 17h00 and 08h00)
- nearly 50% of all injuries occurred between 17h00 on a Friday and 07.59 on a Monday morning
- most patients sustained injuries which were relatively minor and few were left with long-term disabilities

- just under half the patients seen at Addington's trauma unit were alcohol-positive for both study periods, however, the alcohol levels recorded in 2000 were higher
- 60% of patients injured violently were alcohol positive at the time of their presentation to hospital
- nearly 50% of patients injured violently were drug-positive - most had used cannabis prior to their injury (Table XIV)
- very low levels of chronic alcohol abuse were found among the patients
- although most drugs have shown a slight increase in usage, there was a slight decrease in mandrax and white pipe smokers in 2000 (Table XV).

Table XV : Durban - Drug usage among injured patients 1999 - 2000

	1999 n (%)	2000 n (%)
Amphetamine	0 (0.0)	0 (0.0)
THC	54 (34.4	51 (34.5)
Morphine	7 (4.5)	10 (6.7)
Cocaine	4 (2.5)	6 (4.0)
Methamphetamine	1 (0.6)	1(0.7)
Methaqualone	16 (10.2)	11 (7.4)

5.3 Port Elizabeth

5.3.1 Overview of study

In Port Elizabeth, sampling was conducted at Livingstone Hospital and Provincial Hospital. These two state hospitals drain the majority of the Port Elizabeth area.

The study was conducted in August/September 1999 and 2000.

Over the two-year time period, a total of 506 patients were assessed in Port Elizabeth, viz. 274 in 1999 and 232 in 2000.

5.3.2 Selected results

A full report has been written for each facility. This is available on request from the Medical Research Council. However, below are outlined some of the highlights from these studies:

- patients were predominantly males (70.4%) and an average age of 33.3 ±13.2 years
- nearly two-thirds of injuries (63.2%) were the result of violence
- more than half of the violence (54.7%) was perpetrated with a sharp object while only 3.4% of these injuries were caused by a firearm
- 46% of the injured traffic users were passengers and a further one-third were pedestrians
- nearly 60% of all injuries occurred between 17h00 on a Friday and 07.59 on a Monday morning
- most patients sustained injuries which were relatively minor and few were left with long-term disabilities
- a staggering 72% of all injured patients seen in Port Elizabeth were alcohol positive at the time of their presentation to hospital
- 83% of patients injured violently were alcohol positive at the time of their presentation to hospital (Table XVI)

Table XVI : Port Elizabeth - Alcohol-relatedness of injuries 1999-2000

	Positive n		%		Mean BrAC (g/100ml) ± Std. Dev.	
	1999	2000	1999	2000	1999	2000
Violence	150	116	89.8	75.8	0.115 (0.06)	0.142 (0.08)
Traffic	45	17	72.6	54.8	0.102 (0.07)	0.124 (0.10)
Non-traffic 'Accidents'	18	15	37.1	31.3	0.118 (0.07)	0.133 (0.09)

Percentages are of the patients tested per cause category

- a staggering two-thirds of injured patients could be classified as problem drinkers or chronic alcoholics
- 42% of injured patients had used an illicit substance prior to their injury - predominantly cannabis and/or mandrax

- cannabis usage seemed to decrease over the year, but 'harder' drugs became evident

Table XVII : Port Elizabeth : Drug usage among injured patients 1999 - 2000

	1999 n (%)	2000 n (%)
Amphetamine	0 (0.0)	0 (0.0)
THC	100 (42.7)	51 (25.8)
Morphine	0 (0.0)	13 (6.5)
Cocaine	0 (0.0)	27 (13.4)
Methamphetamine	0 (0.0)	0 (0.0)
Methaqualone	31 (13.2)	22 (11.1)

6. CONCLUSIONS

This multi-city substance abuse and trauma study highlights the problem of both alcohol and drug usage among injured patients. Alcohol remains the substance most commonly abused, and it is strongly associated with all types of injuries most notably those due to violence and traffic collisions. There are an alarming number of patients who can be categorised as problem drinkers or potential chronic alcoholics particularly among injured pedestrians and those as a result of interpersonal violence.

The proportion of patients who have used a substance other than alcohol prior to their injury is alarming. One-third of injured patients appear to use drugs such as cannabis and methaqualone on a regular basis. Harder drugs such as methamphetamine, amphetamine and cocaine appear to becoming more common, particularly in the larger cities like Durban and Cape Town.

7. RECOMMENDATIONS

Annual cross-sectional studies in multi-centric sites should be continued in order to assess trends and identify emerging problems. Furthermore, all patients should be routinely assessed for both alcohol and other drugs. In the absence of sophisticated analysis

equipment, self-report should be used as a first step combined with clinical judgement.

All injured patients should be assessed for possible alcohol dependence. The four question CAGE questionnaire is simple to administer and takes no more than five minutes to conduct. Patients who score 2 or more on the CAGE questionnaire should be offered counselling or referred to an appropriate organisation such as SANCA. Treating a patients wounds without dealing with the possible underlying cause will do little to reduce the levels of injury and violence in the country.

8. REFERENCES

Ryan R. *Drugs Violence and Governability in the Future South Africa : Crime and Policy Project*. Pretoria: Institute for Security Studies, Occasional paper No 22, May 1997.

Peden MM. Substance Abuse Surveillance among Trauma Patients. *Trauma Review* 1997;**5**(3):7-8.

Peden MM, van der Spuy J, Smith P & Bautz P. Substance Abuse and Trauma in Cape Town. *SAMJ* 2000; **90**:251-255.

Maziko M & Peden MM. 1999. *Sentinel Surveillance of Substance and Trauma at Livingstone & Provincial Hospitals , Port Elizabeth, 1999 Provisional Report.* Cape Town: MRC, National Trauma Research Programme.