Frequency and correlates of comorbid psychiatric illness in patients with heroin use disorder admitted to Stikland Opioid Detoxification Unit, South Africa

L Dannatt,[1] MB ChB; **K J Cloete**,[1] PhD; **M Kidd**,[2] PhD; **L Weich**,[1] MB ChB, MRCPsych, FCPsych

[1] *Department of Psychiatry, Faculty of Medicine and Health Sciences, Stellenbosch University, Tygerberg, Cape Town, South Africa*
[2] *Centre for Statistical Consultation, Stellenbosch University, Cape Town, South Africa*

Corresponding author: *L Weich (lizew@sun.ac.za)*

Background. There is a lack of studies addressing the frequency and correlates of comorbidities among heroin users admitted for treatment in South Africa (SA).
Objective. To assess the frequency and correlates of psychiatric comorbidity among patients with heroin use disorder admitted to the Opioid Detoxification Unit at Stikland Hospital in the Western Cape, SA.
Method. Participants (*N*=141) were assessed for psychiatric illness (Mini International Neuropsychiatric Interview), comorbid substance use disorders (World Health Organization's Alcohol Smoking Substance Involvement Screening Tool), and legal and social problems (Maudsley Addiction Profile). Demographic, personal, psychiatric and substance-use history, in addition to mental state examination on admission, were collected from the case notes.
Results. The largest group of patients (*n*=56, 40%) had not been abstinent from heroin use since drug debut, and most had been arrested for drug-related activities (*n*=117, 83%) and had family conflicts related to use (*n*=135, 96%). Nicotine was the most common comorbid substance of dependence (*n*=137, 97%) and methamphetamine was the most common comorbid substance abused (*n*=73, 52%). The most common comorbid psychiatric illness was previous substance-induced psychosis (*n*=42, 30%) and current major depressive disorder (*n*=37, 26%). Current major depressive disorder was significantly associated with females (*p*=0.03), intravenous drug use (*p*=0.03), alcohol use (*p*=0.02), and a higher number of previous rehabilitation attempts (*p*=0.008).
Conclusion. Patients with heroin use disorders present with high rates of psychiatric comorbidities, which underscores the need for substance treatment services with the capacity to diagnose and manage these comorbidities.

S Afr J Psych 2014;20(3):77-82. DOI:10.7196/SAJP.540

Over the past decade, the number of people using illicit substances has increased to around 230 million worldwide, with an estimated prevalence of opioid use of between 0.6% and 0.8% in the adult population. [1] In South Africa (SA), heroin is the most common illicit opioid used, with trend statistics across all geographical areas showing an increase in the number of patients with heroin use disorders presenting for treatment.[2] At the provincial level, trend statistics also show an increase in heroin addicts presenting for substance treatment, from 1% in Cape Town in 1997 to 17% in the Western Cape Province by 2011.

Heroin use leads to euphoria and relaxation[3] as well as alleviation of stress, pain and aggression.[4] Ongoing use further leads to pervasive and longstanding medical and physical complications, as well as social and legal complications.[3] Medical complications of heroin use are heterogeneous and may be related to route of use. These include: bacterial infections such as infective endocarditis and tetanus; viral infections such as HIV and hepatitis B and C;[5] talcum pneumonitis due to adulterants; renal complications;[6] and accidental overdose and its associated complications.[7] Social and legal complications of heroin use are also diverse and may include unemployment and interpersonal breakdowns, criminal activity and associated legal difficulties,[3] poor living standards and exposure to violence.[5]

In addition to the complications discussed above, heroin addicts have a high rate of psychiatric comorbidity.[7] An Australian study showed that heroin users had a high prevalence of major depressive disorder (28%), post-traumatic stress disorder (42%), and personality disorders, namely anti-social personality disorder (72%) and borderline personality disorder (47%).[7] Similarly, data from the Australian Treatment Outcome Study showed that those admitted to residential rehabilitation programmes had poor mental health, with depression (47%) and social phobia (38%) being particularly prevalent in their female sample.[8] A study in Barcelona, Spain, showed that heroin users had a high prevalence of personality disorders (40%) and found that mood disorders (25.5%) were the most common psychiatric comorbidity, followed by anxiety, psychotic disorders and eating disorders.[9] In addition to these comorbidities, heroin users met criteria for substance abuse or dependence on other drugs;[8] Rodriguez-Llera *et al.*[9] found comorbid use of cocaine

(1.3%), alcohol (65.8%), benzodiazepines (55%), cannabis (46.9%), other stimulants (49.7%) and hallucinogens (39.6%).

The high rates of psychiatric comorbidity in heroin addicts are a major cause for concern.[7] Comorbid psychiatric disorders such as personality disorders – specifically borderline personality disorder – increase the risk for major depression,[9] which increases the risk for high-risk behaviour including overdose and needle sharing.[7] Comorbid psychiatric illness or substance abuse is further compounded by polysubstance dependence.[9] Of far greater concern is that psychiatric comorbidities lead to difficulties in treatment and high relapse rates.[7,8]

In SA, opioid substitution treatment is not considered the mainstay of treatment in the public sector; at the time of submission there were no state-funded opioid substitution programmes, and only a minority of patients are able to self-fund maintenance treatment. The Department of Social Development coordinates and funds psychosocial treatment for heroin addicts while detoxification is provided for by the Department of Health. The Opioid Detoxification Unit at Stikland Hospital in Cape Town, SA, is a 10-bed ward, and is the only dedicated unit for this purpose in the Western Cape. Patients are assessed by a medical practitioner on admission and are prescribed an individualised reducing regimen of buprenorphine/naloxone or methadone. Patients attend a ward programme that includes motivational interviewing groups, educational groups and leisure activities. The programme's duration is flexible, with the majority of patients admitted for 1 week. After detoxification, patients are expected to attend pre-arranged in- and outpatient rehabilitation programmes, which employ a wide variety of psychosocial treatment methods.

Studies on the frequency and correlates of comorbidities in heroin addicts are imperative in planning effective treatment services for patients with heroin use disorders, with specific focus on capacitating staff to detect and manage comorbidity among this population. However, SA studies addressing the frequency and correlates of comorbidities among heroin users admitted for treatment are lacking. Local data for those with heroin use disorders may also differ from that of international reports based on the changing trends of use, mode of administration, comorbid drug use, rate of illegal drug activity, and unique sociodemographic patient profile and treatment options.

Objective

The objective of this study was to assess the frequency and correlates of psychiatric comorbidity among patients with heroin use disorder admitted to the Opioid Detoxification Unit at Stikland Hospital. Specific objectives included: (*i*) assessing the frequency and nature of previous and current comorbid substance use disorders and comorbid psychiatric illness, including mood, anxiety, psychosis, eating disorders and antisocial personality disorder; and (*ii*) assessing the correlates of current psychiatric comorbidities in terms of demographic data (age, gender and level of education) and substance use history (amount of heroin used per day, intravenous drug use, number of previous rehabilitation attempts, longest period abstinent from heroin and use of other drugs).

Methods

Study design and setting

This was a prospective, descriptive study conducted from 1 April 2012 to 30 September 2012 at the Opioid Detoxification Unit at Stikland Hospital.

Participants

During the study period, 220 patients (170 male and 50 female) were admitted to the unit. All patients admitted for heroin detoxification and willing to participate in the study were included (N=141).

Data collection

Patients were interviewed by the investigator prior to discharge when the withdrawal symptoms had resolved, using three different screening tools. In addition, demographic and personal information, and information on psychiatric history and substance use history was collected from the case notes. The investigator who conducted the interviews was trained in administering the screening tools and was blinded to the patients' mental state on admission.

Screening tools

The Mini International Neuropsychiatric Interview (MINI) was used to detect previous and current psychiatric illnesses, including mood, anxiety, and psychotic, eating and anti-social personality disorders. The MINI is a diagnostic, structured interview developed to detect 17 disorders described by the *Diagnostic and Statistical Manual for Mental Disorders, 4th edition (text revision)*.[10] Sensitivity and specificity have been found to be good with most disorders, except generalised anxiety disorder, agoraphobia and bulimia.[11]

The World Health Organization's Alcohol Smoking Substance Involvement Screening Tool was used to detect comorbid substance use disorders.[12] This is a simple, easy-to-administer tool used to assess use, abuse and dependence across a wide range of substances. It is a valid screening tool with suitable sensitivities (54 - 97%) and specificities (50 - 96%) across most substances.[12]

The specific subscales of the Maudsley Addiction Profile (sections C and E) were used to measure health risk behaviours, health problems, and personal and social functioning. The Maudsley Addiction Profile was formulated in the UK to assess treatment outcome for individuals with drug and/or alcohol problems. It is a valid tool with good test-retest reliability.[13] As only subsets were used to highlight negative social and legal repercussions by answering 'yes' and 'no' to specific questions, no scoring was done.

Data analysis

Standard data analysis was performed using the Statistica 10 software package (StatSoft Incorporation, USA). Descriptive statistics were used to describe demographic data, frequency and type of comorbidities. Associations between psychiatric comorbidity and demographic data (age, gender and level of education) as well as substance use history (amount of heroin used per day, intravenous drug use, number of previous rehabilitation attempts, longest period abstinent from heroin and use of other drugs) were assessed using the Mann Whitney U-test and χ^2 test. The level of statistical significance was set at $p<0.05$.

Ethical considerations

The Health Research Ethics Committee of Stellenbosch University and the Ethics Committee of Stikland Hospital approved the study. All participants signed informed consent, while patient anonymity was assured by assigning a number to each patient.

Results

Participants

Of the 220 patients admitted, 141 were included in the final sample. A total of 66 patients (13 females, 53 males) refused to participate, while 8 patients (5 females and 3 males) were excluded for the following reasons: (*i*) 4 were admitted for stabilisation of their opioid substitution treatment and not detoxification; (*ii*) 3 were dependent on opioids other than heroin; and (*iii*) 1 was excluded following aggressive behaviour towards the investigator. Over the 6-month study period, 5 patients were readmitted but were included only once in the study.

Demographic data

The mean (SD) age of participants was 26.5 (5.4) years (Table 1). Most participants were male (*n*=112, 79%), single (*n*=80, 57%) and were unemployed (*n*=123, 87%). A Grade 10 level of education had been achieved by the highest proportion (*n*=42, 30%). Four (14%) of the female patients were pregnant, while many participants had children as dependents (*n*=65, 46%). Most participants also reported being HIV-negative (*n*=130, 92%).

Table 1. Demographic data of the sample (*N*=141)

Age, years (mean (SD))	26.5 (5.4)
Sex, *n* (%)	
Male	112 (79)
Female	29 (21)
Marital status, *n* (%)	
Single	80 (57)
Married	13 (9)
Divorced	5 (4)
Separated	4 (3)
In a relationship with a partner	39 (28)
Highest level of education, *n* (%)	
Grade 3	1 (1)
Grade 6	1 (1)
Grade 7	6 (4)
Grade 8	12 (9)
Grade 9	28 (20)
Grade 10	42 (30)
Grade 11	11 (8)
Grade 12	30 (21)
Tertiary	10 (7)
Employment, *n* (%)	
Employed	18 (13)
Unemployed	123 (87)
Dependents, *n* (%)	
Children	65 (46)
Partner	27 (19)
Parents	1 (1)
Pregnant, *n* (%)	
Yes	4 (14)
No	25 (86)
HIV-positive, *n* (%)	
Yes	4 (3)
No	130 (92)
Not tested	7 (5)

SD = standard deviation.

Substance use history and comorbid substance disorders

The mean (SD) age of drug debut was 14.7 (2.4) years (range 7 - 26) (Table 2). Most patients (*n*=97, 69%) used cannabis as drug of debut. The mean (SD) age of heroin debut was 19.6 (4.5) years (range 14 - 50). Most patients chose to smoke ('chase') heroin (*n*=128, 91%) and many (*n*=60, 43%) used one to five units of heroin per day, bought as bags or quarters of a gram ('beats'). The majority of participants supported their heroin use by theft (*n*=109, 77%). Those admitted for detoxification and rehabilitation for the first time amounted to 50 (36%). A high proportion of participants (*n*=56, 40%) had never been abstinent since their heroin debut and the majority (*n*=78, 55%) had five or fewer prior rehabilitation attempts.

The most frequent (*n*=73, 52%) substance of abuse was crystal methamphetamine (colloquially referred to as tik), while the most frequent (*n*=137, 97%) substance of dependence other than heroin was nicotine (Table 3).

Previous and current psychiatric comorbidities

There were unexpectedly high rates of previous substance-induced psychosis (*n*=42, 30%) (Table 4). This was the most prevalent previous comorbid disorder and was found in patients abusing methamphetamine (*n*=26, 36%), cannabis (*n*=13, 45%) and methaqualone (*n*=38, 27%) (methaqualone is usually used with cannabis as 'white pipe'). Many patients used more than one drug and in patients with a past history of using multiple illicit drugs simultaneously, it was difficult to identify the causative agent.

The most common current comorbidity was major depressive disorder, with more than one in four patients meeting criteria for this disorder (*n*=37, 26%). Rates of anxiety disorders were also high (*n*=28, 20%), with post-traumatic stress disorder being the most frequent previous (*n*=13, 9%) and current (*n*=11, 8%) comorbidity in the group.

Anti-social personality disorder was found in 83 (59%) of patients. This is the only axis II disorder screened for by the MINI.

Legal and social repercussions

Most participants (*n*=117, 83%) had been arrested for drug-related activities, with fewer who had been sentenced (*n*=44, 31%) or had pending court dates (*n*=23, 16%) (Table 5).

The most common social problem was addiction-related family conflict (*n*=135, 96%). Only one patient denied social difficulties and it is notable that he had only been using for a few months.

Correlates of current psychiatric comorbidity

Major depressive disorder was significantly associated with females (p=0.03), intravenous drug use (p=0.03), alcohol use (p=0.02), and a high number of previous rehabilitation attempts (p=0.008). Post-

Table 2. Substance use history of participants (*N*=141)

Age of drug debut, years (mean, (SD))	14.7 (2.4)
First drug used, *n* (%)	
Nicotine	27 (19)
Cannabis	97 (69)
Alcohol	13 (9)
Psychedelics	3 (2)
Sedatives	0 (0)
Volatile substances	0 (0)
Cocaine	6 (4)
Methamphetamine	31 (22)
Heroin	9 (6)
Methaqualone	16 (11)
Age of heroin debut, years (mean, (SD))	19.6 (4.5)
Units of heroin used, *n* (%)	
1 - 5	60 (43)
6 - 10	58 (41)
11 - 15	19 (13)
16 - 20	4 (2)
26 - 30	2 (1)
Route of heroin administration, *n* (%)	
Smoked/chased	128 (91)
Injected	17 (12)
Snorted	4 (3)
Previous rehab attempts, *n* (%)	
None	50 (36)
1 - 5	78 (55)
6 - 10	5 (4)
11 - 15	2 (1)
26 - 30	1 (0.7)
31 - 35	1 (0.7)
Longest time clean since dependent, months (*n*, (%))	
Never	56 (40)
1 - 5	34 (24)
6 - 10	24 (17)
11 - 15	4 (3)
16 - 20	9 (6)
21 - 25	7 (5)
36 - 40	4 (3)
46 - 50	1 (0.7)
51 - 55	1 (0.7)
55 - 60	1 (0.7)
Theft	109 (77)
Family	38 (27)
Drug dealing	35 (25)
Hustling/conning ('skarreling')	18 (13)

Continued...

Table 2 (continued). Substance use history of participants (*N*=141)

Means of funding drug habit, *n* (%)	
Employment	17 (12)
Violent crime	17 (12)
Fraud	10 (7)
Prostitution	6 (4)
Providing a safe place ('suikerhuisie') for others to use in exchange for drugs	4 (3)

SD = standard deviation.

Table 3. Frequency of current comorbid substance use disorders in the sample (*N*=141)

Substance	Substance abuse, *n* (%)	Substance dependence, *n* (%)
Heroin	0 (0)	141 (100)
Nicotine	3 (2)	137 (97)
Cannabis	30 (21)	13 (9)
Alcohol	34 (24)	2 (1)
Methaqualone	30 (21)	2 (1)
Cocaine	6 (4)	4 (3)
Methamphetamine	73 (52)	13 (9)
Psychedelics	2 (1)	0 (0)
Sedatives	4 (3)	9 (6)
Volatile substances	0 (0)	0 (0)

Table 4. Frequency of previous and current psychiatric comorbidities in the sample (*N*=141)

Comorbidity	Past, *n* (%)	Current, *n* (%)
Major depressive disorder	30 (21)	37 (26)
Bipolar disorder 1	1 (1)	1 (1)
Bipolar disorder 2	0 (0)	1 (1)
Panic disorder with agoraphobia	0 (0)	6 (4)
Panic disorder without agoraphobia	0 (0)	1 (1)
Generalised anxiety disorder	0 (0)	1 (1)
Social phobia	1 (1)	8 (6)
Post-traumatic stress disorder	13 (9)	11 (8)
Obsessive compulsive disorder	0 (0)	1 (1)
Substance-induced psychosis	42 (30)	0 (0)
Bulimia	1 (1)	0 (0)
Anorexia	1 (1)	0 (0)

traumatic stress disorder was significantly associated with female gender (p=0.0009), while panic disorders plus agoraphobia were significantly associated with a lower level of education (p=0.03).

Discussion

This study is the first to focus on frequency and correlates of psychiatric comorbidity in patients with heroin use disorder presenting for treatment at the Opioid Detoxification Unit at Stikland Hospital. Of the 141

Table 5. Frequency of legal and social repercussions in the sample (*N*=141)

Variable	*n* (%)
Legal problems	
Arrests	117 (83)
Sentences	44 (31)
Pending	23 (16)
None	20 (14)
Social problems	
Conflict at home	135 (96)
Loss of contact with family	94 (67)
Violence	18 (13)
Partner using	16 (11)
Needle sharing	11 (8)
Multiple partners	11 (8)
Homelessness	8 (6)
Prostitution	6 (4)
None	1 (1)

patients who participated in his study, the majority were male, single and were unemployed. The highest proportion of participants had a Grade 10 level of education. Of the female participants, 14% were pregnant, while most patients were HIV-negative (based on self-reports). Furthermore, most participants smoked rather than injected heroin, in contrast to reports by other studies.[7,9] This finding for mode of heroin administration holds true for the current pattern of heroin use in SA.[14]

The average age of patients with heroin use disorders presenting for treatment at this facility correlated with findings from the SA Community Epidemiology Network on Drug Use project, a surveillance project that monitors substance use trends in substance treatment programmes, reporting a mean age of 23 - 27 years for patients using heroin in the Western Cape.[2] However, the age of heroin debut was younger, at 19 years, with only nine participants using heroin as their debut drug; most used cannabis followed by methamphetamine as drug of debut. Similarly, the Australian Treatment Outcome Study reported an average age of 19 years for first heroin use.[7] Drug debut in the adolescent years could possibly be explained by the imbalance between developing prefrontal regions and more-matured limbic regions, which increases vulnerability to reward mechanisms such as substances.[15]

With regard to comorbid substance use, nearly all participants were dependent on nicotine, which has not been reported in other studies. Other studies have shown a high rate of alcohol, sedative, cocaine and psychedelic abuse.[8,9] The most common substance of abuse was crystal methamphetamine ('tik'), which is not surprising, as methamphetamine is the most common primary drug of abuse among patients in substance treatment programmes in the Western Cape.[14] Other substances most commonly abused included alcohol, followed by cannabis and methaqualone (a tablet that is sold on the street, which is crushed and mixed with cannabis, and smoked in the broken-off neck of a bottle; called 'mandrax', 'buttons' or 'white pipe'). This is consistent with the findings of the SA Stress and Health study, a household survey which showed that alcohol was the most commonly used addictive substance in SA, followed by nicotine and cannabis.[16] Participants may have been using these depressive substances to manage heroin withdrawal symptoms as they are relatively inexpensive and readily available.

Previous and current psychiatric comorbidities were particularly frequent in this sample, which is also reflected in other reports.[7,9] The most common current comorbidity in this study was major depressive disorder, followed by post-traumatic stress disorder, social phobia and panic disorder, while previous psychiatric comorbidities included a similar spectrum comprising major depressive disorder, post-traumatic stress disorder and panic disorder. An unexpected finding was that many patients reported previous psychotic episodes. Heroin use disorder is rarely associated with psychosis, as confirmed by other studies,[8,9] and most patients linked methamphetamine and cannabis use with psychosis. Cannabis is well described to cause transient psychotic symptoms or exacerbate underlying psychoses,[17] while methamphetamine is strongly associated with transient psychosis.[18] However, none of the patients in this study were treated for psychosis or were psychotic during evaluation. The aforementioned psychiatric comorbidities could be a complication related to pre-existing psychiatric illnesses that led to heroin use in order to self-medicate symptoms, or due to an underlying social factor that the participant was struggling to escape (even metaphorically), for example homelessness, isolation, abuse or prostitution.

In terms of the correlates of psychiatric comorbidity, female gender was a significant correlate for major depressive disorder and post-traumatic stress disorder. Previous international studies report contradicting data, with some studies showing a female predominance for major depressive disorder and post-traumatic stress disorder,[7,8] while others show no gender differences.[9] Alcohol use was also a significant correlate for major depressive disorder, which may be a cause-or-effect association. High rates of alcohol use can induce depression, as shown by a study completed in New Zealand.[19] Alternatively, alcohol as a sedating agent can be used to self-medicate depression.

With specific emphasis on the social and legal complications of heroin use in this sample, most participants had high levels of isolation and family conflict. Furthermore, drug-related criminal activity and arrests were particularly common as most participants funded their substance use disorder with theft, drug dealing and hustling (locally referred to as 'skarreling'). Although diversion programmes are suggested as management of substance-dependent offenders, this is not yet national policy.[20] However, some patients reported being offered rehabilitation instead of a sentence.

Just over half of the participants had attempted previous rehabilitation, while the Australian Treatment Outcome Study reported >90% of patients having attended rehabilitation programmes.[7] The low rate of participants with previous rehabilitation attempts highlights the many barriers to accessing substance treatment services within the Western Cape,[21] or possibly a new, emerging epidemic in this province.[22] Furthermore, most participants who attended rehabilitation programmes were either abstinent for only a short period or started using immediately following treatment. This could be either ascribed to the efficacy of the current treatment regimens or the pervasive and unrelenting nature of heroin addiction.[22]

Study limitations

This prospective study included a relatively small sample size. All tools relied on self-reporting of symptoms. Furthermore, the

population of patients admitted to Stikland Hospital may not be truly representative of the SA population.

Conclusion

Patients with heroin use disorders present with high rates of psychiatric comorbidities that underscore the need for substance treatment services aimed at diagnosing and managing these comorbidities.

References

1. United Nations Office for Drugs and Crime. World Drug Report. Vienna: United Nations Office on Drugs and Crime, 2012.
2. Dada S, Plüddeman A, Parry C, et al. Monitoring Alcohol and Drug Abuse Trends in Southern Africa (July 1996 to Dec 2011), Phase 31, South African Community Epidemiology Network on Drug Use Research Brief. South Africa: Medical Research Council, 2012.
3. Veilleux JC, Colvin PJ, Anderson J, York C, Heinz AJ. A review of opioid dependence treatment: Pharmacological and psychosocial interventions to treat opioid addiction. Clin Psychol Rev 2010;30(2):155-166. [http://dx.doi.org/10.1111/j.1556-4029.2012.02234.x]
4. Khatzian EJ. The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. Am J Psychiatry 1985;142(11):1259-1264.
5. Hulse GK, English DR, Milne E, Holman CD. The quantification of mortality resulting from the regular use of illicit opiates. Addiction 1999;94(2):221-229. [http://dx.doi.org/10.1046/j.1360-0443.1999.9422216.x]
6. Dettmeyer RB, Preuss J, Wollersen H, Madea B. Heroin-associated nephropathy. Expert Opin Drug Saf 2005;4(1):19-28. [http://dx.doi.org/10.1517/14740338.4.1.19]
7. Ross J, Teesson M, Darke S, et al. The characteristics of heroin users entering treatment: Findings from the Australian Treatment Outcome Study (ATOS). Drug Alcohol Rev 2005;24(5):411-418. [http://dx.doi.org/10.1080/09595230500286039]
8. Darke S, Ross J. Polydrug dependence and psychiatric comorbidity among heroin injectors. Drug Alcohol Depend 1997;48(2):135-141.
9. Rodriguez-Llera MC, Domingo-Salvany A, Brugal MT, et al. Psychiatric comorbidity in young heroin users. Drug Alcohol Depend 2006;84(1):48-55. [http://dx.doi.org/10.1016/j.drugalcdep.2005.11.025]
10. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (text revision) (DSM-IV-TR). Washington: American Psychiatric Association, 2000.
11. Lecrubier Y, Sheehan DV, Weiller E, et al. The Mini Neuropsychiatric Interview (MINI). A short diagnostic structured interview: Reliability and validity according to the CIDI. Eur Psychiatry 1997;12(5):224-331. [http://dx.doi.org/10.1016/S0924-9338(97)83296-8]
12. Humeniuk R, Ali R, Babor TF, et al. Validation of the alcohol, smoking, and substance involvement screening test (ASSIST). Addiction 2008;103(6):1039-1047. [http://dx.doi.org/10.1111/j.1360-0443.2007.02114.x]
13. Marsden J, Gossop M, Stewart D, et al. The Maudsley Addiction Profile (MAP): A brief instrument for assessing treatment outcome. Addiction 1998;93(12):1857-1867. [http://dx.doi.org/10.1046/j.1360-0443.1998.9312185711.x]
14. Dada S, Burnhams NH, Parry C, Bhana A, Rule C, Fourie D. Alcohol and drug abuse trends (July - December 2012), Phase 33, South African Community Epidemiology Network on Drug Use Research Update. South Africa: Medical Research Council, 2013.
15. Casey BJ, Jones RM. Neurobiology of the adolescent brain and behavior: Implications for substance use disorders. J Am Acad Child Adolesc Psychiatry 2010;49(12):1189-1201. [http://dx.doi.org/10.1016/j.jaac.2010.08.017]
16. Van Heerden MS, Grimsrud AT, Seedat S, Myer L, Williams DR, Stein DJ. Patterns of substance us in South Africa: Results from the South African Stress and Health study. S Afr Med J 2009;99(5 Pt 2):358-366.
17. D'Souza DC, Perry E, MacDougall L, et al. The psychomimetic effects of intravenous delta-9-tetrahydrocannabinol in healthy individuals: Implications for psychosis. Neuropsychopharmacology 2004;29(8):1558-1572. [http://dx.doi.org/10.1038/sj.npp.1300496]
18. Maxwell JC. Emerging research on methamphetamine. Curr Opin Psychiatry 2005;18(3):235-242. [http://dx.doi.org/10.1097/01.yco.0000165592.52811.84]
19. Fergusson DM, Boden JM, Horwood LJ. Tests of causal links between alcohol abuse or dependence and major depression. Arch Gen Psychiatry 2009;66(3):260-266. [http://dx.doi.org/10.1001/archgenpsychiatry.2008.543]
20. Leggett T, Louw A, Parry CDH. Drugs and Crime in South Africa: A Study in 3 Cities. ISS monograph series no. 69. Pretoria: Institute for Security Studies, 2011.
21. Myers B, Louw J, Fakier N. Alcohol and drug abuse: Removing structural barriers to treatment for historically disadvantaged communities in Cape Town. Int J Soc Welf 2008;17(2):156-165. [http://dx.doi.org/10.1111/j.1468-2397.2007.00546.x]
22. Weich L. 'Defeating the dragon'- can we afford not to treat patients with heroin dependence? S Afr J Psychiatry 2010;16(3):75-79.