HHS Public Access

Author manuscript

Psychiatric and Substance Abuse Comorbidity among HIV Seropositive and HIV Seronegative Prisoners in Malaysia

Muhammad Muhsin Zahari, M.D. and
University of Malaya, Centre of Excellence for Research in AIDS, Malaya, Malaysia

Woong Hwan Bae, B.A.
Yale University School of Medicine, Section of Infectious Diseases, New Haven, Connecticut, USA

Nor Zuraida Zainal, M.D., **Hussain Habil, M.D.**, and **Adeeba Kamarulzaman, M.D.**
University of Malaya, Centre of Excellence for Research in AIDS, Malaya, Malaysia

Frederick L. Altice, M.D.
Yale University School of Medicine, Section of Infectious Diseases, New Haven, Connecticut, USA

Abstract

Objective—To examine the association between HIV infection and psychiatric disorders among prisoners, where mental illness, substance abuse, and HIV are disproportionately represented.

Design—Cross-sectional study.

Methods—Using a sequential randomization scheme, 200 HIV-seropositive and 200 HIV-seronegative prisoners were selected for evaluation of psychiatric illnesses with the Structured Clinical Interview for Diagnostic Statistical Manual of Mental Disorders-IV (SCID-I).

Results—The prevalence of mental illness and substance use disorders, particularly opioid dependence, was extremely high. HIV infection was significantly correlated with age, ethnicity, marital status, history of injection drug use, lifetime duration of incarceration, substance abuse, and polysubstance drug use. After controlling for potential confounders, HIV infection was significantly associated with non-substance-induced psychiatric disorders (AOR 1.92; 95% CI: 1.03–3.59). While prisoners with a triple diagnosis (psychiatric disorders, substance use disorders, and HIV) spent 46.7 more cumulative lifetime months in prison than those with only a psychiatric diagnosis ($p < .01$), those with a dual diagnosis (psychiatric plus substance use disorders) were comparable to those with one psychiatric diagnosis only. Neither HIV infection nor triple diagnosis was associated with violent offenses.

Conclusion—These findings suggest that a public health approach that simultaneously addresses psychiatric illnesses, substance abuse, and HIV infection is needed in both the correctional and the

Address correspondence to Frederick L. Altice, M.D., AIDS Program, 135 College Street, Suite 323, New Haven, CT 06510-2283, USA. frederick.altice@yale.edu.

community settings in order to provide adequate care for triply-diagnosed patients and prevent them from returning to prison.

INTRODUCTION

Psychiatric disorders, such as depression and schizophrenia, and HIV infection are more prevalent among prisoners compared to the general population (1–3). In both the correctional and community settings, psychiatric diagnosis has been cited as a risk factor for HIV infection (4–6). Studies have also demonstrated that HIV infection may be a risk factor for a psychiatric disorder via the virus' effect on the central nervous system (7, 8), psychosocial factors (9), and/or antiretroviral-related adverse effects (10). This association, however, has not been examined solely within the correctional setting.

Illicit drug use is also common among this population, and is often the main reason for incarceration (11, 12). A high proportion of prisoners are dually diagnosed with both psychiatric and substance use disorders (13–15). Dual diagnosis and triple diagnosis—dual diagnosis plus HIV infection—complicate clinical management and thus necessitate more medical expertise and attention. Although psychiatric and substance use disorders have been independently associated with an increased risk for incarceration and re-incarceration, this association is not well-established among individuals with a dual or triple diagnosis (13, 16, 17).

In Malaysia, during the past two decades, the number of drug users increased dramatically and it is estimated that 4% of the population use illicit drugs (18, 19). Criminalization of drug use resulted in one of the highest national imprisonment rates in Southeast Asia; by 2007, Malaysia's national prison system housed over 50,000 inmates (20). In addition to increases in drug use, a delayed public health response exacerbated the growing HIV epidemic. The prevalence of HIV in Malaysian prisons, where HIV testing is mandatory, is approximately 6%, which is fifteen times greater than found in the general adult population where the prevalence is 0.4% (21, 22). As a consequence, a great number of Malaysian prisoners are diagnosed with both substance use disorders (SUD) and HIV. The objectives of this study were to assess the association between HIV and substance use and psychiatric disorders, and examine the differences in those with dual and triple diagnosis on cumulative length of incarceration in Malaysia.

METHODS

In Malaysia, all sentenced prisoners undergo mandatory HIV testing upon incarceration. The average daily prison census is approximately 40,000, of which 2,500 (6.25%) are confirmed to be HIV-seropositive. HIV-seropositive prisoners are housed separately in dedicated HIV units. At the time of this study, Kajang Prison, the country's largest prison, had an average daily census of 4,435 prisoners, of which 412 (9.3%) were HIV-seropositive. Additionally,

no HIV or psychiatric services were available onsite; acutely ill patients are transferred to a local hospital for treatment. One physician and a medical assistant provided all the medical care. To compare the psychiatric comorbidity among HIV-seropositive and HIV-seronegative prisoners among, a cross-sectional study of 400 prisoners was conducted daily over an 8-week period from October 4 to November 30, 2004. Prisoners who had been incarcerated for less than one month and those sentenced to capital punishment were excluded. Sequential selection was used to randomly select study subjects from alphabetically-sorted lists of HIV-seropositive and HIV-seronegative inmates. Among the 412 known HIV-seropositive inmates, every other inmate was selected until 200 were identified. Similarly, a comparison group of 200 HIV-seronegative inmates were selected from 4,023 HIV seronegative prisoners by selecting every 20th prisoner on the list. Written consent was obtained and the University of Malaya Ethical Review Board approved the study. No incentives were provided and participation was optional. Individuals diagnosed with unstable Axis I disorders were referred for subsequent psychiatric treatment. A single psychiatrist (M.M.Z.), trained in the administration of the Bahasa Malaysia -translated version of the Structured Clinical Interview for Diagnostic Statistical Manual of Mental Disorders-IV (SCID-I), administered and scored all interviews.

Interviews included baseline demographic characteristics, brief HIV assessment, and previous involvement with criminal justice and psychiatric care, drug use history and the SCID-I. The SCID-I included: type 1 bipolar disorder, type 2 bipolar disorder, major depression, dysthymia, psychotic disorder, adjustment disorder, obsessive compulsive disorder, panic disorder, substance-induced mood disorder, and substance-induced psychotic disorder. Personality disorders were not assessed.

Several groupings were operationally defined for this analysis. First, type 1 and type 2 bipolar disorder were grouped as bipolar disorder; major depression and dysthymia were grouped as depressive disorder; obsessive-compulsive disorder and panic disorder were grouped as anxiety disorder; substance use disorders, substance-induced mood disorder and substance-induced psychotic disorder were grouped into substance-induced psychiatric disorder; and bipolar disorder and depressive disorder were grouped into mood disorder. Psychiatric illness was assessed as having any SCID-defined psychiatric disorder. Due to the large number of individuals with substance use disorders, having any psychiatric diagnosis was defined both with and without having a substance-induced psychiatric disorder.

In analysis of the relationship between cumulative time served in prison and comorbidities associated with a psychiatric disorder, prisoners with a psychiatric disorder were further categorized into the following groups: "single diagnosis" if they had no comorbidity, "dual diagnosis" if also diagnosed with a SUD, and "triple diagnosis" if diagnosed with a SUD and HIV infection.

All statistical analyses were performed using Stata SE (version 10.0, Stata Corp, TX, USA). Bivariate comparisons between the HIV-seropositive and HIV-seronegative groups were assessed using the Pearson χ^2 test or the Fisher's exact test as appropriate. Odds ratios were calculated using logistic regression. Univariate variables with a p-value < .10 were included

in multivariate logistic regression modeling, which were used to calculate adjusted odds ratios. A p-value < .05 was considered statistically significant.

RESULTS

The baseline characteristics of the study population are summarized in Table 1. Compared to the HIV-seronegative prisoners, those with HIV were older (median ages 37 vs. 33; p < .01), married (66.0% vs. 53.5%; p < .001), injection drug users (94.5% vs. 26.5%; p < .01), diagnosed with a substance use disorder (99.0% vs. 66.5%; p < .01), and polysubstance drug users (78.5% vs. 42.0%; p < .01). HIV-seropositive prisoners were less likely to be incarcerated for violent offenses (1% vs. 10.5%, p < .01) and more likely to have spent more cumulative time in prison (47 vs. 17 months; p < .01) and be of Malay ethnicity (69.0% vs. 61.0%) than the seronegatives.

Psychiatric disorders were common in both HIV-seropositive and HIV-seronegative groups (Table 2). Overall, the prevalence of having one or more psychiatric conditions was 44.0% among the HIV-seropositives and 38.5% among the HIV-seronegatives (p = .27). These findings were robust after excluding substance-induced psychiatric disorders (36.5% vs. 33.0%; OR 1.17; p = .46). Mood disorders were the most common psychiatric disorder diagnosed, occurring in 18.0% of HIV-seropositives and 16.0% of HIV-seronegatives. Though not significant, there was a trend toward a higher proportion of bipolar disorder among HIV-seronegatives (6.0% vs. 2.5%, p = .08) and major depressive disorder among HIV-seropositives (15.5% vs. 10.0%, p = .10).

A significantly higher proportion of HIV-seropositives was diagnosed with psychotic disorders compared to the HIV-seronegative group (11.5% vs. 5.5%; OR 2.23; p = .04). Similar comparisons for prisoners with adjustment disorders, anxiety disorders, or substance-induced disorders were not significant.

After adjusting for potential confounders in the multiple logistic regression analysis, only having a non-substance-induced psychiatric disorder was significantly associated with HIV-seropositive status (AOR 1.92; p = .04). All other associations were not significant.

Prisoners with a psychiatric disorder were classified into single (mental illness only), dual (mental illness and substance use disorder), or triple diagnosis (dual diagnosis plus HIV). Baseline characteristics of these groups are summarized in Table 3. The three groups trended toward being significantly different with regard to median age and ethnic composition (p = .06 and .08, respectively).

The prevalence of injection drug use (IDU) varied significantly between the three groups (p < .01); none of the subjects with mental illness had a history of IDU, whereas 95.4% of those with a triple diagnosis did. The type of charge for the current incarceration also varied significantly between the groups (p < .01); drug-related crimes were prevalent among those with a dual or a triple diagnosis (49.0% and 58.0%, respectively) while only 1 subject (3.9%) in the single diagnosis group was incarcerated for the same reason.

Subjects with mental illness only were significantly more likely ($p < .01$) to be sentenced for longer durations (8.5 months) when compared to those with a dual or a triple diagnosis (7 and 5 months, respectively). The reverse was true for cumulative lifetime served in prison; prisoners with a triple diagnosis had been incarcerated for a median total of 46 months, while those with a single diagnosis had served a median of 10.5 months.

This relationship between total time (lifetime) served in prison and the magnitude of the psychiatric comorbidity was analyzed further in bivariate and multiple analyses (Table 4). While bivariate associations were correlated between an increased lifetime served in prison and triple diagnosis, this association remained significant ($p < .01$) after controlling for all potential confounders, including age. Substance use disorder alone did not contribute to longer durations of incarceration.

DISCUSSION

To our knowledge, this is the first study to examine the association between mental illness and HIV in Malaysia. One key finding is the increased association of HIV with having a non-substance-induced-psychiatric disorder. HIV-seropositive Malaysian prisoners are almost twice more likely to have a psychiatric disorder, confirming studies elsewhere demonstrating an increased association of other brain disorders (23), including development of dementia (24, 25) or having depression (26), anxiety disorder (26), and psychosis (27). Though this case-control study does not establish causality, it contributes to the literature suggesting an influence of HIV and its direct and indirect effects on multiple areas of the brain. Moreover, mentally ill patients are also at significantly higher risk for acquiring HIV via engagement in risky sexual or injection-related behaviors (28–30). Irrespective of the direction of causality, this suggests important implications for the provision of care for both those individuals with mental illness as well as for those with HIV infection, including enhanced screening and diagnosis and optimal treatment for both conditions.

High rates of lifetime psychiatric disorders were observed among both HIV-seropositive (44.0%) and HIV-seronegative (38.5%) male prisoners in Malaysia. Using differing methodologies for defining the presence of mental illness, these numbers fall well within the cited range of 9.9% to 88.4%. Percentages that fall well below those reported here do not include validated instruments to screen for mental illnesses, and those much higher include all Axis I disorders, including substance use disorders (16, 31). What remains concerning in this setting where over 40% of prisoners met the criteria for a primary psychiatric disorder is that very few had ever seen a psychiatrist and even fewer had been seen by one during their imprisonment. These findings suggest the need for increased screening and treatment of mental illnesses in this population in order to improve HIV treatment outcomes and curb the transmission of HIV after release.

Treatment for mental illness among prisoners is justified on many grounds. First, mentally ill HIV-infected patients are less likely to adhere to antiretroviral therapy (ART) (32, 33) and, therefore, are at an increased risk for developing resistance to medications. Second, these patients are more likely to engage in HIV-related risky behaviors (28–30) and, consequently, transmit or contract HIV. Third, untreated mental illness results in decreased retention in

substance abuse treatment and increased relapse to illicit drug use (34). Last, mentally ill patients are more likely to become incarcerated and re-incarcerated once released from prison (16) and may serve as a reservoir of drug-resistant HIV both in the community and the correctional settings. Correction of the enormous discrepancy between the high psychiatric morbidity and unavailability of psychiatric services in prison here and elsewhere is needed to reduce transmission of HIV both within and outside the correctional system.

The high prevalence of SUDs among prisoners has been previously reported (31, 35–37). The magnitude of SUDs among Malaysian prisoners with and without HIV is impressively high and higher than reported in most other international settings. These staggering high rates have important implications. First, it speaks to the legacy of draconian drug policies of Malaysia that promoted imprisonment over provision of evidence-based treatment, such as opioid substitution therapy. Second, it provides an important opportunity for intervening both with HIV-seronegative and HIV-seropositive prisoners to establish effective primary and secondary HIV prevention programs for those transitioning back to the community. Third, it confirms the need for developing effective prison-diversion programs in the community to foster drug treatment over incarceration. Based on recent data of the challenges facing released prisoners in Malaysia (38), the Malaysian government has recently recognized the role of the criminal justice system in the prevention of HIV and has begun to implement methadone maintenance as part of its transitional plan to the community.

This study is the first to establish the link between lifetime incarceration to a psychiatric disorder in the context of substance abuse and HIV. Compared to prisoners with only a psychiatric disorder, those with a triple diagnosis (psychiatric disorder, SUD, and HIV infection) were found to have served almost 4 years longer in prison. On the other hand, dual diagnosis was not significantly correlated with cumulative time served in prison. These findings have important implications. It suggests that interventions to address mental illness and SUD should be done early in the lives of criminals, before HIV transmission has occurred. As such, prison diversion programs could play an effective role for those who interface with the criminal justice system with psychiatric and substance use disorders. This also argues for routine effective screening and treatment for mental illness and SUD. Alternatively, rather than the forced abstinence rehabilitation programs that often precede imprisonment in Malaysia and elsewhere, evidence-based treatments for SUD, such as opioid substitution therapy should be implemented within these programs or offered as an alternative to incarceration. This will require a rethinking of the drug policy approaches in Malaysia such that treatment is preferentially available for nonviolent drug users.

The minimum prevalence of dual diagnosis (presence of both a psychiatric disorder and comorbid SUD with or without HIV) among Malaysian prisoners is high (34.8%) and higher than reported in other countries (20.9% and 26.3%) where injection drug use is common and the penalties for drug use are less stringent (15, 39). The presence of dual or triple diagnosis has been associated with an increased risk for both incarceration and repeat incarcerations (40, 41). These associations cannot be directly compared to these findings since the outcome of this study was measured as total time served in prison rather than number of previous incarcerations. Nonetheless, the lack of a statistically significant association between a dual

diagnosis and time served in prison may be attributable to a small sample size of the study that resulted in a reduced power to detect a small difference in time served in prison between the two groups. Additionally, the substance use profile of this study population, which includes a high prevalence of opioid use, may be significantly different from the substance use profile of subjects in other studies. Further investigation is needed to further clarify this relationship.

A significant association between time served in prison and triple diagnosis has important implications for both the clinical management of the individual as well as broadly for the health of society. Additionally, the long cumulative time served in prison yet the shortest current sentence duration among the triply-diagnosed patients suggest that this group of patients have been incarcerated numerous times. Multiple comorbidities in these triply-diagnosed patients complicate clinical management for the individual patient and requires medical expertise from fields of addiction medicine, psychiatry, and infectious diseases to sufficiently provide comprehensive care (42–44). Since access to adequate medical care is often limited in many correctional settings, long duration of incarceration among these patients with complex medical illnesses is likely to result in inadequate management and deterioration of health. A high rate of re-incarceration in this population is also problematic because even when appropriate medical care is available, poor coordination occurs between prison and community healthcare systems, and frequent transition between these two systems makes consistent and appropriate management of illnesses difficult (45, 46). Triply-diagnosed patients have poor adherence to antiretroviral therapy (47) and, therefore, are more likely to experience viro-logical failure and develop resistance to ARVs. These patients, with an underlying psychiatric disorder that is untreated, are at a high risk of transmitting drug-resistant ARVs in both the community and in the correctional setting. Thus, a multiprong public health approach that includes treatment of substance abuse, psychiatric service, and HIV care, and addresses community reentry challenges of HIV-infected prisoners is urgently needed in the Malaysian prison system. Furthermore, a community-based intervention that focuses on substance abuse and psychiatric illnesses may divert mentally ill substance abusers from the correctional system, and may reduce societal and governmental costs associated with incarceration. This is particularly salient as those with triple diagnoses were almost never violent offenders and as such, do not place significant risks to society and could be managed in community treatment programs.

This study had several limitations. Clinical data such as antiretroviral therapy, CD4 count, HIV-1 viral load were unavailable and these variables that the study did not control for in multivariate analysis may have had a confounding effect on the dependent variable. In addition, SCID was used for identification of psychiatric disorders, although validated and demonstrated reliable in many languages, SCID has not been validated in Bahasa Malaysia. On the other hand, a single, trained psychiatrist conducted all 400 interviews over an 8-week period, and therefore, experimenter variability is likely to be minimal in this study. In addition, in the analysis of the association between time served in prison and psychiatric diagnosis and other comorbidities, a relatively small sample size may have reduced the power to detect a significant difference between individuals with a single and a dual diagnosis. Finally, this study population had a high proportion of individuals with opioid use

as well as polysubstance drug use, and therefore, findings of this study may have reduced validity in another population with a different substance abuse profile.

CONCLUSION

The findings from this study confirm the high rate of undiagnosed and untreated psychiatric disorders in the prison setting. It also confirms the association between having an Axis I Psychiatric Disorder and HIV, and is the first to do so among prisoners. Furthermore, triple-diagnosed patients with HIV, substance abuse, and a psychiatric disorder are likely to have spent a longer time in prison compared to those with a psychiatric disorder alone. These results suggest that a multidisciplinary intervention to address HIV, substance abuse, and psychiatric disorder in both the correctional and the community settings are urgently needed to provide adequate care for individual patients as well as to curb development and transmission of drug-resistant HIV.

ACKNOWLEDGMENTS

REFERENCES

1. Teplin LA. The prevalence of severe mental disorder among male urban jail detainees: Comparison with the Epidemiologic Catchment Area Program. Am J Public Health. 1990; 80:663–669. [PubMed: 2343947]

2. Diamond PM, Wang EW, Holzer CE, Thomas C, des Anges C. The prevalence of mental illness in prison. Adm Policy Ment Health. 2001; 29:21–40. [PubMed: 11811770]

3. Spaulding A, Stephenson B, Macalino G, Ruby W, Clarke JG, Flanigan TP. Human immunodeficiency virus in correctional facilities: A review. Clin Infect Dis. 2002; 35:305–312. [PubMed: 12115097]

4. Otto-Salaj LL, Stevenson LY. Influence of psychiatric diagnoses and symptoms on HIV risk behavior in adults with serious mental illness. AIDS Read. 2001; 11:197–198. [PubMed: 11392677]

5. Altice FL, Mostashari F, Selwyn PA, Checko PJ, Singh R, Tanguay S, Blanchette EA. Predictors of HIV infection among newly sentenced male prisoners. J Acquir Immune Defic Syndr Hum Retrovirol. 1998; 18:444–453. [PubMed: 9715840]

6. Himelhoch S, McCarthy JF, Ganoczy D, Medoff D, Dixon LB, Blow FC. Understanding associations between serious mental illness and HIV among patients in the VA Health System. Psychiatr Serv. 2007; 58:1165–1172. [PubMed: 17766561]

7. Koutsilieri E, Scheller C, Sopper S, ter Meulen V, Riederer P. The pathogenesis of HIV-induced dementia. Mech Ageing Dev. 2002; 123:1047–1053. [PubMed: 12044954]

8. Kaul M, Lipton SA. Mechanisms of neuroimmunity and neurodegeneration associated with HIV-1 infection and AIDS. J Neuroimmune Pharmacol. 2006; 1:138–151. [PubMed: 18040780]

9. Judd F, Komiti A, Chua P, Mijch A, Hoy J, Grech P, et al. Nature of depression in patients with HIV/ AIDS. Aust N Z J Psychiatry. 2005; 39:826–832. [PubMed: 16168041]

10. Rihs TA, Begley K, Smith DE, Sarangapany J, Callaghan A, Kelly M, et al. Efavirenz and chronic neuropsychiatric symptoms: a cross-sectional case control study. HIV Med. 2006; 7:544–548. [PubMed: 17105514]

11. Teplin LA. Psychiatric and substance abuse disorders among male urban jail detainees. Am J Public Health. 1994; 84:290–293. [PubMed: 8296957]

12. Holmwood C, Marriott M, Humeniuk R. Substance use patterns in newly admitted male and female South Australian prisoners using the WHO-ASSIST (Alcohol, Smoking and Substance Involvement Screening Test). Int J Prison Health. 2008; 4:198–207. [PubMed: 19061062]

13. Buckley PF, Brown ES. Prevalence and consequences of dual diagnosis. J Clin Psychiatry. 2006; 67:e01–e01. [PubMed: 17107226]

14. Stoskopf CH, Kim YK, Glover SH. Dual diagnosis: HIV and mental illness, a population-based study. Community mental health journal. 2001; 37:469–479. [PubMed: 11504140]

15. Piselli M, Elisei S, Murgia N, Quartesan R, Abram KM. Co-occurring psychiatric and substance use disorders among male detainees in Italy. Int J Law Psychiatry. 2009; 32:101–107. [PubMed: 19237198]

16. Baillargeon J, Binswanger IA, Penn JV, Williams BA, Murray OJ. Psychiatric disorders and repeat incarcerations: the revolving prison door. Am J Psychiatry. 2009; 166:103–109. [PubMed: 19047321]

17. Warner TD, Kramer JH. Closing the Revolving Door?: Substance Abuse Treatment as an Alternative to Traditional Sentencing for Drug-Dependent Offenders. Crim Justice Behav. 2009; 36:89–109.

18. Mazlan M, Schottenfeld RS, Chawarski MC. New challenges and opportunities in managing substance abuse in Malaysia. Drug Alcohol Rev. 2006; 25:473–478. [PubMed: 16939945]

19. Malaysian Psychiatric Association. [Accessed September 1, 2009] Drug Addiction. Jul. 2006 Available at: http://www.psychiatry-malaysia.org/

20. Walmsley, R. World prison population list. 8th edition. International Centre for Prison Studies; King's College London: 2009.

21. Dolan K, Kite B, Black E, Aceijas C, Stimson GV, Reference Group on HIVAP. et al. HIV in prison in low-income and middle-income countries. Lancet Infect Dis. 2007; 7:32–41. [PubMed: 17182342]

22. The United Nation General Assembly Special Session on HIV/AIDS (UNGASS). UNGASS Country Progress Report. Malaysia, Geneva, Switzerland: 2008.

23. Baillargeon J, Ducate S, Pulvino J, Bradshaw P, Murray O, Olvera R. The association of psychiatric disorders and HIV infection in the correctional setting. Ann Epidemiol. 2003; 13:606–612. [PubMed: 14732299]

24. Navia BA, Jordan BD, Price RW. The AIDS dementia complex: I. Clinical features. 1986; 19:517–524.

25. Loewenstein RJ, Sharfstein SS. Neuropsychiatric aspects of acquired immune deficiency syndrome. Int J Psychiatry Med. 1983; 13:255–260. [PubMed: 6671858]

26. Hinkin CH, Castellon SA, Atkinson JH, Goodkin K. Neuropsychiatric aspects of HIV infection among older adults. J Clin Epidemiol. 2001; 54(Suppl 1):S44–S52. [PubMed: 11750209]

27. Sewell DD. Schizophrenia and HIV. Schizophr Bull. 1996; 22:465–473. [PubMed: 8873297]

28. Cournos F, McKinnon K, Meyer-Bahlburg H, Guido JR, Meyer I. HIV risk activity among persons with severe mental illness: preliminary findings. Hosp Community Psychiatry. 1993; 44:1104–1106. [PubMed: 8288184]

29. Volavka J, Convit A, O'Donnell J, Douyon R, Evangelista C, Czobor P. Assessment of risk behaviors for HIV infection among psychiatric inpatients. Hosp Community Psychiatry. 1992; 43:482–485. [PubMed: 1587512]

30. Kelly JA, Murphy DA, Bahr GR, Brasfield TL, Davis DR, Hauth AC, et al. AIDS/HIV risk behavior among the chronic mentally ill. Am J Psychiatry. 1992; 149:886–889. [PubMed: 1609866]

31. Assadi SM, Noroozian M, Pakravannejad M, Yahyazadeh O, Aghayan S, Shariat SV, Fazel S. Psychiatric morbidity among sentenced prisoners: prevalence study in Iran. Br J Psychiatry. 2006; 188:159–164. [PubMed: 16449704]

32. Holzemer WL, Corless IB, Nokes KM, Turner JG, Brown MA, Powell-Cope GM, et al. Predictors of self-reported adherence in persons living with HIV disease. AIDS Patient Care STDS. 1999; 13:185–197. [PubMed: 10375267]

33. Ingersoll K. The impact of psychiatric symptoms, drug use, and medication regimen on non-adherence to HIV treatment. AIDS Care. 2004; 16:199–211. [PubMed: 14676026]

34. Bradizza CM, Stasiewicz PR, Paas ND. Relapse to alcohol and drug use among individuals diagnosed with co-occurring mental health and substance use disorders: a review. Clin Psychol Rev. 2006; 26:162–178. [PubMed: 16406196]

35. Agbahowe SA, Ohaeri JU, Ogunlesi AO, Osahon R. Prevalence of psychiatric morbidity among convicted inmates in a Nigerian prison community. East Afr Med J. 1998; 75:19–26. [PubMed: 9604530]

36. Bulten E, Nijman H, Van Der Staak C. Psychiatric disorders and personality characteristics of prisoners at regular prison wards. Int J Law Psychiatry. 2009; 32:115–119. [PubMed: 19217664]

37. Rounds-Bryant JL, Baker L. Substance dependence and level of treatment need among recently-incarcerated prisoners. Am J Drug Alcohol Abuse. 2007; 33:557–561. [PubMed: 17668341]

38. Choi P, Kavasery R, Desai MM, Govindasamy S, Kamarulzaman A, Altice FL. Prevalence and Correlates of Community Re-Entry Challenges Faced by HIV-Infected Male Prisoners in Malaysia. Int J STD AIDS. 2010 In Press.

39. Lukasiewicz M, Blecha L, Falissard B, Neveu X, Benyamina A, Reynaud M, Gasquet I. Dual diagnosis: prevalence, risk factors, and relationship with suicide risk in a nationwide sample of French prisoners. 2009; 33:160–168.

40. Wallace C, Mullen PE, Burgess P. Criminal offending in schizophrenia over a 25-year period marked by deinstitutionalization and increasing prevalence of comorbid substance use disorders. Am J Psychiatry. 2004; 161:716–727. [PubMed: 15056519]

41. Elhaj, OYE.; Sakai, HE. The prevalence of bipolar and comorbid disorders in the Ottowa County Jail. the 157th annual meeting of the American Psychiatric Association; New York, NY. May 3, 2004;

42. Douaihy AB, Stowell KR, Kohnen S, Stoklosa JB, Breitbart WS. Psychiatric aspects of comorbid HIV/AIDS and pain, Part 2. AIDS Read. 2007; 17:350–352. 357–361. [PubMed: 17672014]

43. Bruce RD, Altice FL. Clinical Care of the HIV-Infected Drug User. Infect Dis Clin North Am. 2007; 21:149–179. [PubMed: 17502234]

44. Douaihy AB, Stowell KR, Kohnen S, Stoklosa JB, Breitbart WS. Psychiatric aspects of comorbid HIV/AIDS and pain, Part 1. AIDS Read. 2007; 17:310–314. [PubMed: 17632937]

45. Pollack H, Khoshnood K, Altice F. Health care delivery strategies for criminal offenders. J Health Care Finance. 1999; 26:63–77. [PubMed: 10497752]

46. Maru DS, Basu S, Altice FL. HIV control efforts should directly address incarceration. The Lancet Infectious Diseases. 2007; 7:568–569. [PubMed: 17714668]

47. Mellins CA, Havens JF, McDonnell C, Lichtenstein C, Uldall K, Chesney M, et al. Adherence to antiretroviral medications and medical care in HIV-infected adults diagnosed with mental and substance abuse disorders. AIDS Care. 2009; 21:168–177. [PubMed: 19229685]

TABLE 1

Baseline characteristics of the study population stratified by HIV status ($N = 400$).

Characteristic	HIV+ (n = 200)	HIV− (n = 200)	P
Median age, years (IQR) *	37 (31–43)	33 (27–42)	<.01
Ethnicity *			<.01
Malay	138 (69.0)	122 (61.0)	
Chinese	27 (13.5)	28 (14.0)	
Indian	35 (17.5)	29 (14.5)	
Other	0	21 (10.5)	
Religion (Muslim)	146 (73.0)	143 (71.9)	.997
Married *	132 (66.0)	107 (53.5)	<.01
Education level			.298
Primary or below	54 (27.0)	56 (28.0)	
Incomplete secondary	80 (40.0)	79 (39.5)	
Complete secondary or higher	66 (33.0)	65 (32.5)	
Employed at incarceration	75 (37.5)	84 (42.0)	.358
Income below poverty level (500RM)	24 (12.0)	25 (12.5)	.700
History of transfusion	26 (13.1)	19 (9.5)	.260
History of IDU *	188 (94.5)	53 (26.5)	<.01
Median duration of HIV diagnosis in months (IQR) *	48 (12–96)	—	
Cumulative lifetime served in prison, median months (IQR) *	47 (24.5–90)	17 (4.5–59.5)	<.01
Imprisonment Charge *			<.01
Violent offense	2 (1.0)	22 (11.0)	
Property offense	35 (17.5)	41 (20.5)	
Drug offense	118 (59.0)	73 (36.5)	
Public disorder offense	45 (22.5)	64 (32.0)	
Substance-related diagnosis *	198 (99.0)	133 (66.5)	<.01
Opioid use *	196 (98.0)	111 (55.5)	<.01
Amphetamine use *	88 (44.0)	59 (29.5)	<.01
Cannibis use *	125 (62.5)	75 (37.5)	<.01
Sedative use *	45 (22.5)	9 (4.5)	<.01
Polysubstance diagnosis *	157 (78.5)	84 (42.0)	<.01
Alcohol-related diagnosis	35 (17.5)	32 (16.0)	.688
History of psychiatric visit prior to incarceration	20 (10.0)	14 (7.0)	.282
History of psychiatric visit during incarceration	3 (1.5)	4 (2.0)	.703

*
These variables were included as controls in multivariate analysis.

TABLE 2

Bivariate and Adjusted Logistic Regression Results for Psychiatric Illnesses Stratified by HIV Status

Psychiatric disorder (n)	HIV+ (200)	HIV− (200)	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Any psychiatric disorder (165)	88 (44.0)	77 (38.5)	1.26 (.84–1.87)	1.50 (.82–2.73)
Any non-substance-induced psychiatric disorder (139)	73 (36.5)	66 (33.0)	1.17 (.77–1.76)	1.92 (1.03–3.59)[*]
Substance-induced psychiatric disorder (37)	22 (11.0)	15 (7.5)	1.54 (.77–3.04)	.86 (.33–2.22)
Mood disorder (68)	36 (18.0)	32 (16.0)	1.15 (.68–1.94)	1.44 (.68–3.06)
Bipolar disorder (17)	5 (2.5)	12 (6.0)	.40 (.14–1.16)	.55 (.11–2.82)
Major depressive disorder (51)	31 (15.5)	20 (10.0)	1.65 (.91–3.01)	1.74 (.76–3.98)
Psychotic disorder (34)	23 (11.5)	11 (5.5)	2.23 (1.06–4.72)[*]	1.46 (.59–3.64)
Adjustment disorder (38)	17 (8.5)	21 (10.5)	.79 (.40–1.55)	1.70 (.66–4.42)
Anxiety disorder (15)	7 (3.5)	8 (4.0)	.87 (.31–2.45)	1.13 (.19–6.81)

[*] P-value < .05.

Adjusted for age, ethnicity, marital status, history of injection drug use, lifetime years served in prison, presence of a substance-related diagnosis, opioid use, amphetamine use, cannibis use, sedative use, polysubstance diagnosis, and imprisonment charge.

TABLE 3

Baseline characteristics of study population stratified by diagnosis type.

	Psychiatric disorder only (*N* = 26)	Dual Diagnosis (*N* = 51)	Triple diagnosis (*N* = 88)	*P* Value
Median age, years (IQR)[*]	36.5 (28–45)	32 (26–40)	37 (30.5–42)	.06
Ethnicity[*]				.08
Malay	14 (53.9)	36 (70.6)	60 (68.2)	—
Chinese	5 (19.2)	7 (13.7)	12 (13.6)	—
Indian	4 (15.4)	8 (15.7)	16 (18.2)	—
Other	3 (11.5)	0	0	—
Religion (Muslim)	17 (65.4)	39 (76.5)	66 (75.0)	.55
Married[*]	6 (23.1)	31 (60.8)	55 (62.5)	<.01
Education level				.50
Primary or below	11 (42.3)	12 (23.5)	30 (34.1)	—
Incomplete secondary	7 (26.9)	21 (41.2)	29 (33.0)	—
Complete secondary or higher	8 (30.8)	18 (35.3)	29 (33.0)	—
Employed at incarceration	13 (50.0)	25 (49.0)	32 (36.4)	.26
Income below poverty level (500RM)	2 (7.7)	5 (9.8)	9 (10.2)	1.00
History of transfusion	5 (19.2)	4 (7.8)	14 (16.1)	.25
History of injection drug use[*]	0	18 (35.3)	83 (95.4)	<.01
Median duration of HIV diagnosis in months (IQR)			36 (12–96)	
Cumulative lifetime served in prison, median months (IQR)[*]	10.5 (2–48)	16 (7–84)	46 (28–88)	<.01
Sentence length for current imprisonment, median months (IQR)[*]	8.5 (3–12)	7 (3–12)	5 (2–16)	<.01
Imprisonment charge[*]				<.01
Violent offense	4 (15.4)	3 (5.9)	1 (1.1)	
Property offense	7 (26.9)	13 (25.5)	18 (20.5)	
Drug offense	1 (3.9)	25 (49.0)	51 (58.0)	
Public disorder offense	14 (53.9)	10 (19.6)	18 (20.5)	
Substance-related diagnosis	*None (0)*	*All (100)*	*All (100)*	N/A
Opioid use	0	42 (82.4)	88 (100)	N/A
Amphetamine use	0	31 (60.8)	51 (58.0)	N/A
Cannibis use	0	33 (64.7)	57 (64.8)	N/A
Sedative use	0	2 (3.9)	23 (26.1)	N/A
Polysubstance diagnosis	0	38 (74.5)	74 (84.1)	N/A
Alcohol-related diagnosis	6 (23.1)	11 (21.6)	18 (20.5)	.97
History of psychiatric consultation prior to incarceration	1 (3.9)	7 (13.7)	15 (17.1)	.24
History of psychiatric visit during incarceration	1 (3.9)	3 (5.9)	3 (3.4)	.87

[*] These variables were included as controls in multivariate analysis.

TABLE 4

Bivariate and multiple regression analyses of association between diagnosis type and cumulative lifetime served in prison.

	Psychiatric Diagnosis Only (*N* = 26)	Dual Diagnosis (*N* = 51)	Triple Diagnosis (*N* = 88)
Bivariate regression: coefficient (p)	Ref	18.8 (*p* = .14)	35.4 (*p* < .01)
Multiple regression: coefficient (p)	Ref	23.9 (*p* = .24)	46.7 (*p* < .01)

Age, ethnicity, marital status, history of injection drug use, sentence length for current imprisonment, and imprisonment charge were included as control variables in multiple regression.