

Research Article

Correlates of Hospital Admissions due to Non-Opportunistic Infections Including Attempted Suicide among HIV Patients at a Botswana Referral Hospital

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Summary

Background

Hospital admissions among people living with HIV (PLWH) are generally attributed to opportunistic infections (OIs), yet conditions other than OIs also account for a number of admissions among PLWH. Correlates of such admissions among PLWH have not been sufficiently investigated so the need for such an investigation is critical to inform health policies and priorities. This work highlights non-OIs conditions responsible for admission of PLWH at Princess Marina Hospital (PMH), one of the two main referral hospitals for HIV patients in Botswana, and identifies correlates of the admissions to inform health policies and priorities.

Methods

One hundred and seventy nine hospital records of HIV-positive patients admitted at PMH from April to June 2014 were reviewed. Biomedical and socio-demographic data was collected from them. Further socio-demographic and economic variables were collected in face-to-face interviews. Data was analyzed and potential correlates of non-OIs admissions were investigated in two regression sub-models. Odds ratios adjusted (AOR) for patients' biomedical, socio-demographic and economic variables and their 95% confidence intervals were estimated.

Results

Four Hundred and Eighty individuals per 1000 admissions among HIV-infected patients at PMH were due to non-OIs. Leading non-OIs were attempted suicide (67.0 cases per 1000 admissions), seizures (17.0 cases per 1000 admissions), sepsis and diabetes had each 11.2 cases per 1000 admissions. Gender and Age were major correlates of admissions related to non-OIs and to attempted suicide (AOR 2.41, 95%CI 1.29 – 4.53; AOR 27.26, 95%CI 3 – 40). Patients' CD4+ cells < 350 / μ L and not being on Combination Antiretroviral Therapy (cART) did not predict admissions due to non-OIs or attempted suicide

(AOR 0.55, 95%CI 0.29 – 1.40; AOR 0.49, 95%CI 0.22 – 1.06).

Conclusion

These results have provided evidence that hospital admissions among PLWH do not solely depend on morbidities triggered by CD4+ cells below the threshold < 350 / μ L or to non-use of cART; other factors such as attempted suicide also lead PLWH to hospitalization and thus need different approaches for control and prevention.

Keywords: Botswana; People Living with HIV; Non-Opportunistic Infections; Attempted Suicide

Background

People living with HIV (PLWH) are constantly challenged by a variety of health conditions including both opportunistic infections and other causes of hospitalization. We previously found that admission to PMH, one of the main referral hospitals for HIV patients in Botswana, was almost equally split between OIs and non-OIs. A great deal is therefore known about factors associated and leading to hospital admission for OIs [1, 2]. However, much less is known about factors associated and possibly leading to hospital admissions for non-OIs among PLWH [3]. Knowing about these factors could inform health policies and priorities. To address these gaps we investigated data on HIV admissions at PMH in order to (i) highlight non-OIs conditions responsible for these admissions at medical wards, and (ii) identify major correlates of such admissions to inform policy on control and prevention of morbidities among PLWH.

Methods

Details on the study design, site and methodology were previously outlined by Tlhakanelo and co-workers [1]. Briefly, the study was conducted at PMH, the hospital has a bed capacity of 567 and staffed by 200 doctors and over 400 registered nurses. Participants were identified from hospital admission lists between April and June 2014. The lists were used as the sampling frame from which participants were selected using computer-generated random numbers. Selected numbers falling to HIV-negative patients or to those with unknown HIV status were replaced by new numbers so as to enroll only HIV infected patients in the study. Prospective participants were approached in the hospital ward and enrolled in the study after obtaining written consent from them. Their medical records were then reviewed and biomedical and socio-demographic data were collected. Subsequent face-to-face interviews with patients were conducted and further socio-demographic and economic data that were missing from their records were collected. Patients aged less than 18 years were excluded from the study.

Data analysis

IBM SPSS Statistics for Window, version 21.0 (Armonk, NY:

IBM Corp) was used for data analysis. Frequency distributions (%) of patients by age group, gender and reason for admission were computed. Proportions of admissions attributable to non-OIs were computed by dividing the number of admissions due to any form of non-OIs by the total number of admissions times 1000. Also estimated was the proportion of admissions due to specific non-OI conditions by dividing the number of each of them by the total number of admissions times 1000. Comparisons were made among sub-groups using Chi Square analysis or Fisher exact test to identify leading types of non-OI admissions. Associations between age and (i) admissions due to non-OIs, (ii) admissions related to CD4+ cells < 350 / μ L were assessed through correlation analysis and regression lines drawn. This is considering CD4+ count of <350 as the threshold for starting cART that ensures a favorable risk-benefit to PLWH as recommended by WHO to start cART in Stage III disease if the CD4 count is <350 cells/ μ L or if the CD4 count is < 200 cells/ μ L irrespective of clinical stage in sub-Saharan Africa [4].

Crude associations of PLWH admissions with biomedical, socio-demographic and economic characteristics of patients were investigated. All potential correlates of non-OIs admissions were further investigated in two logistic regression sub-models: (i) sub-model A with aggregated non-OIs conditions as dependent variable, and (ii) sub-model B with attempted suicide as dependent variable. Odds ratios adjusted (AOR) for patients' biomedical, socio-demographic and economic variables and their 95% confidence intervals (CIs) were estimated for every factor retained in final sub-models. Variance inflation factor (VIF) diagnostic was performed for redundancy and multi-collinearity of covariates. How well the model fits the data was estimated using the Hosmer-Lemeshow test of goodness-of-fit. The level of significance in the final sub-models was set at $P < 0.05$.

Results

In total, 179 patients agreed to participate in the study. Of these participants 82 (45.8%) were males and 97 (54.2%) were female. The mean age \pm (SE) was 38.23 \pm 0.92 years. The youngest patient was 18 years old while the oldest was 67 years old. A proportion of 480 patients per 1000 HIV positive admissions were due to non-OI conditions of which the following were the leading ones: attempted suicide accounted for 67.0 cases per 1000 HIV positive admissions, seizure accounted for 17 cases per 1000, sepsis and diabetes were each responsible for 11.2 cases per 1000 HIV positive admissions.

Bivariate analyses of admissions due to aggregated non-OIs as dependent variable and patients' biomedical, socio-demographic and economic characteristics as exposure variables showed significant ($P < 0.05$) associations with participants' CD4+ cells < 350 / μ L, not being on cART, female gender and age. Similar analyses using attempted suicide as dependent variable showed significant ($P < 0.05$) association with age and

gender only. CD4 or cART did not yield significant ($P > 0.05$) associations with non-OIs nor with attempted suicide. Further analyses in two multivariate sub-models gave results which are presented in Table 1 and Table 2 below.

Table 1. Sub model Aψ: Factors independently associated with admission for non-OIs (attempted suicide, seizures, sepsis, diabetes and others) among people living with HIV at Princess Marina Hospital, Gaborone (N = 179).

Dependent variable: Aggregated non-OIs admissions

Independent variables	Proportion (%)	Unadjusted		Adjusted	
		OR	95%CI	OR	95%CI
CD4					
< 350	41.8	0.45*	0.25 – 0.84	0.55	0.29 – 1.40
> 350	58.2	1	-	1	-
cART					
Not on cART	16.5	0.44*	0.21 – 0.91	0.49	0.22 – 1.06
On cART	83.5	1	-	1	-
Gender					
Female	65.8	2.15*	1.28 – 4.33	2.41*	1.29 – 4.53
Male	34.2	1	-	1	-

Legend: *P < 0.05; Hosmer-Lemeshow test of goodness-of-fit $\psi P = 0.83$

Table 2. Sub-model Bψ: Factors independently associated with admission at Princess Marina Hospital for attempted suicide among people living with HIV, Gaborone (N = 179) .

Dependent variable: Admission due to attempted suicide

Independent variables	Proportion (%)	Unadjusted		Adjusted	
		OR	95%CI	OR	95%CI
Age					
18 – 33 years old	35.2	24*	3 – 38	27.26*	3 – 40
≥ 34 years	64.8	1	-	1	-
Sex					
Male	41.7	0.58	0.17 – 1.90	0.24 [®]	0.06 – 1.01
Female	58.3	1	-	1	-

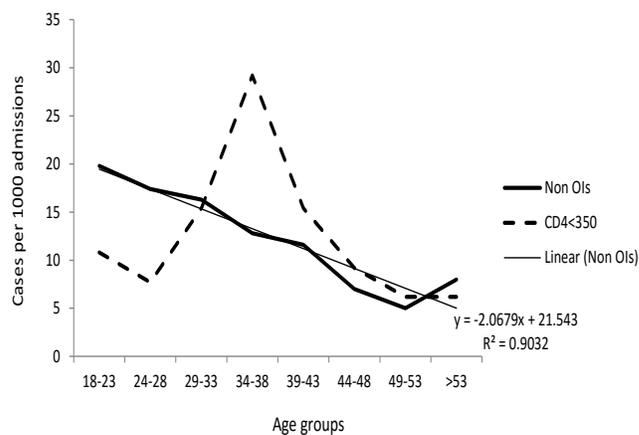
Legend: [®]P = 0.05; *P < 0.05; Hosmer-Lemeshow test of

goodness-of-fit $\psi P = 0.95$

The risk of being admitted for non-OIs did not show significant ($P < 0.05$) association with CD4+ < 350 /μL nor with patients who were not on cART (AOR 0.55, 95%CI 0.29 – 1.40; AOR 0.49, 95%CI 0.22 – 1.06). Female patients had 2.41 times the risk of being admitted for non-OIs compared to their male counterparts (AOR 2.41, 95%CI 1.29 – 4.53). Results in Table 2 reveal that patients aged 18 – 33 years had 27.3 times the risk of being admitted for attempted suicide compared to patients aged ≥ 34 years (AOR 27.26, 95%CI 3 – 40). Male HIV patients had 24% less the risk of being admitted for attempted suicide compared to their female counterparts (AOR 0.24, 0.06 – 1.01).

In Figure 1, results show a correlation between the number of cases per 1000 non-OIs related admissions and age among PLWH ($r = - 0.95$, $P < 0.01$) ($R^2 = 0.90$). Teenagers had the highest number of non-OIs related admissions compared to any other age groups while admissions associated with CD4+ < 350 /μL increased progressively with age to reach the peak around age 34 – 38 years, before declining to the lowest level among patients aged 49 years or more.

Figure 1. Admissions related to non-OIs including attempted suicide (N = 86) and to CD4+ < 350 /μL (N= 93) by age among HIV patients in Princess Marina hospital, Gaborone, Botswana, 2014.



Legend: non-OIs = admission due to non-opportunistic infections and attempted suicide, CD4+ < 350 /μL = CD4 level below 350 /μL among patients, linear (non-OIs) = linear regression line fitted in admissions due to non-OIs, $y =$ linear equation for non-OIs showing a slope of -2.06 and $R^2 = 0.90$.

Discussion

Reasons for hospital admission for PLWH at PMH between April and June 2014 for non-OIs and attempted suicide were investigated and their correlates assessed. Attempted suicide, seizures, sepsis, and diabetes were the leading causes for these admissions. CD4+ level < 350 /μL and not being on cART were not independently associated with admission at PMH for non-OIs among PLWH. Gender was the only correlate of non-OIs

admission as females were found to be more at risk of being admitted for non-OIs than men. These findings confirm the existence of different mechanisms that incite morbidities related to non-OIs among PLWH [5-9], in contrast with the role played by CD4+ T lymphocytes reduction in prompting morbidities related to OIs among PLWH [5-8]. Why female HIV patients were more at risk of admission related to non-OIs compared to males is somewhat difficult to explain here by our data. This observation is consistent with data in Table 2 where males were less likely to be admitted at PMH for attempted suicide than females. Perhaps the facts that attempted suicide was the leading cause of non-OI related admissions, and that women were more at risk of attempted suicide than men, may explain why women predominate in both sub-models. These findings are supported by studies conducted in Uganda where female HIV patients had three-fold increased risk for attempted suicide than male [3] as well as by other studies [10, 11]. Older age had less risk of attempted suicide than teenagers which also corroborates results presented in Fig 1 and agrees with data showing that teenager HIV patients were more at risk of committing suicide than their adult counterparts [3, 8]. All these advocate for special counseling services to assess issues that lead young HIV patients to suicide. The data in Fig 1 also confirms that deficiency in (or CD4+ < 350 / μ L) has nothing to do with morbidities related to non-OI conditions such as attempted suicide.

Study limitations

Psychiatric/psychological care and counseling are common procedures used to minimize depressive and hopelessness emotions leading to attempted suicide and hospital admissions. Not addressing these issues in this study may be a limitation. Other possible limitations may relate to not addressing variables related to previous attempted suicide e.g. lipodystrophy associated-symptoms that lead to physical disfigurement that may lead to stereotyping, depression, hopelessness and suicide.

In summary, the major finding in this study was: 480 per 1000 HIV positive admissions at PMH were due to non-OIs of which the most important were attempted suicide, seizures, sepsis and diabetes. Age and gender were major correlates of admissions related to non-OIs and attempted suicide. In contrast, CD4+ < 350 / μ L and not being on cART did not predict admissions due to non-OIs or to attempted suicide. These results provide evidence that morbidities among PLWH do not solely depend on patients' CD4 status or to cART, but also on other independent factors such as attempted suicide and thus needing different approaches for control and prevention. We hope this work has provided groundwork for more research on morbidities among PLWH.

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Contributors

All the authors sufficiently participated in the conception, planning and the design of this work as well as in data analysis, interpretation and the writing of the manuscript.

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Competing interests

The authors declare that they have no competing interests.

Ethical issues

Ethical clearance was obtained from the University of Botswana Institutional Review Board and the Ministry of Health of Botswana. Permission to access patients' files and records was sought from PMH Institutional Review Board. To ensure confidentiality, an identification number was assigned to every participant in lieu of patient names or any direct identifier.

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