Reviewer’s report

Title: Retention in care and virological failure among adult HIV+ patients on second-line ART in Rwanda: A national representative study

Version: 1 Date: 20 Jun 2018

Reviewer: Jose Moreira

Reviewer's report:

Dear Editor

I have reviewed the manuscript by Nsanzimana and colleagues entitled "Retention in care and virological failure among adult HIV+ patients on second-line ART in Rwanda: A national representative study," which was submitted for consideration for publication in your esteemed Journal.

As antiretroviral treatment programs in resource-limited settings mature, more patients experience virological treatment failure, and thus, switch to second-line ART schemes. The consequences of switching in Sub-Saharan Africa remains unclear, and outcomes as well as the predictors of viral suppression after switching to second-line ART schemes is a question that deserves further exploration. Herein, the authors described their experience based on Rwanda HIV program, utilizing a nationwide representative sample of adult HIV-infected patients who switched to a second-line regimen and whom treatment was offered in 49 of the 340 eligible clinics with electronic medical record system available. The primary outcomes were virological failure and retention in care. Secondarily, the authors evaluated the predictors associated with the primary endpoints.

They found that 92.5% (1562/1688) of the patients retained in care; 83% were virologically suppressed at last follow-up. Additionally, they found that the predictors associated with defaulting from care were the year of ART initiation, CD4 at initiation, PI-base regimen, HIV VL, and marital status. For virological failure, the main risk factors were age, CD4 at ART initiation, WHO stage at program enrollment, PI-base scheme on second-line, and type of health center attended.

Overall, the manuscript is well written and good structured. However, some points merit further clarification. The majority of the issues are related to the methodology of the manuscript per se.
1#. Could the authors clarify the study design in the methods section? Was it a retrospective cohort with prospectively collected clinic data from EMR from patients attending the 49 HIV clinics?

2#. It is unclear to me the start and the final time points for the observations. Do you start the evaluation after the 31st December 2016 and follow after that? What was the last time of follow-up for the cohort?

3#. Page 5 (line 46). The authors define virological failure as having a viral load > 1000 copies/mL after at least 12 months on first-line ART with self-reported good adherence to medication. However, as was elucidated before, the authors are interested in second-line virological failure, instead of the first-line scheme efficacy. Could the authors elaborate more on that? Was viral load ascertained considering the measurement at 12-months after the initiation of a second-line scheme?

3#. Could the authors describe the frequency of HIV viral load/CD4 monitoring in Rwanda setting? Is it 6-monthly? Alternatively, more frequently in high-risk patients?

4#. Page 6 (line 7). It is unclear to me if covariates collected at the initiation of first-line ART could explain the outcomes related to the second-line ART. For instance, variables collected at the time of the switch should be included besides those at the enrollment (i.e., CD4/VL, WHO stage, etc.). If those variables at the time of switching are not available, please include this as a limitation at least.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Yes
Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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Please indicate the quality of language in the manuscript:

Acceptable

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