

## Epidemiological and Clinical outcomes of moderate and severe forms of COVID-19 among HIV inpatients at the Armed Forces Training Hospital Omar BONGO ONDIMBA in Gabon

Berthe Amélie Iroungou<sup>2\*</sup>, Enoch Kiatti<sup>1</sup>, Jean Raymond Nzenze<sup>1</sup>, Laurette Guignali Mangouka<sup>1</sup>

<sup>1</sup>Service de Médecine Interne, Hôpital d'Instruction des Armées Omar Bongo Ondimba, Libreville, Gabon

<sup>2</sup>Unité Mixte de Recherche CIRMF-SSM, Libreville, Gabon

---

**Citation:** Berthe Amélie Iroungou, Enoch Kiatti, Jean Raymond Nzenze, Laurette Guignali Mangouka. *Epidemiological and Clinical outcomes of moderate and severe forms of COVID-19 among HIV inpatients at the Armed Forces Training Hospital Omar BONGO ONDIMBA in Gabon. Int Clin Med Case Rep Jour.* 2023;2(6):1-9.

**Received Date:** 06 February, 2023; **Accepted Date:** 11 February, 2023; **Published Date:** 13 February, 2023

\***Corresponding author:** Berthe Amélie Iroungou. Unité Mixte de Recherche CIRMF-SSM, Libreville, Gabon

**Copyright:** © Berthe Amélie Iroungou, Open Access 2023. This article, published in Int Clin Med Case Rep Jour (ICMCRJ) (Attribution 4.0 International), as described by <http://creativecommons.org/licenses/by/4.0/>.

---

### ABSTRACT

**Introduction:** The first case of COVID-19 in Gabon was reported in March 2020. The public health situation in the country is challenging, including the fight against HIV. Currently, 22,253 people living with HIV (adults and children) are being monitored, and only 9,976 are receiving antiretroviral treatment. In 2017, the estimated HIV prevalence was 4.2%. The aim of this study was to analyze the epidemiological aspects and clinical forms of COVID-19 in PLHIV, determine their WHO clinical stages, and evaluate the impact of ART before admission.

**Methods:** This study was a descriptive and retrospective investigation of medical records from HIV-positive patients hospitalized for COVID-19 in the internal medicine department, from January 1 to December 31, 2021.

**Results:** The study analyzed 15 PLWHIV who presented with moderate and severe forms of COVID-19, with a median age of 34 years old. The most common lung lesions found were ground-glass multifocal opacities, followed by subpleural consolidations. Among the severe forms, 50% had discontinued or stopped ART treatment.

**Conclusion:** Our study found that PLHIV are prone to developing moderate forms of COVID-19, with a younger age group affected. Males appear to be more likely to have severe forms of the disease.

**Keywords:** COVID-19, Clinical Forms, PLHIV, Gabon.

### INTRODUCTION

COVID-19 (Coronavirus Disease 2019) is a systemic viral illness caused by SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2), first discovered in Wuhan, China in late December 2019. The rapid

spread of the virus led to its declaration as a pandemic on March 11, 2020, due to a significant increase in cases worldwide.<sup>[1-4]</sup>

Respiratory symptoms are the main clinical signs in COVID-19, but in severe forms, some patients may experience multisystem involvement leading to organ failure.<sup>[5-7]</sup>

The international community defined vulnerable groups to guide health policy planning and aid in countries.<sup>[8]</sup>

Several studies and reviews suggest that people living with HIV have an increased risk of hospitalization due to COVID-19. However, the presence of HIV does not appear to increase the likelihood of having a severe form of the disease.<sup>[9-13]</sup>

Gabon is one of the countries in sub-Saharan Africa with a high prevalence of HIV infection, estimated at 4.2% in 2017. As of 2020, 46,000 people living with HIV (adults and children) are being monitored, and 24,208 are receiving antiretroviral (ARV) treatment.<sup>[14]</sup>

Limited data is currently available in Gabon on COVID-19 among people living with HIV (PLHIV). To contribute to the existing literature, we conducted a retrospective, single-center study on PLHIV patients with moderate and severe forms of COVID-19. The study aimed to analyze the epidemiological and clinical aspects of COVID-19 in PLHIV, including the determination of their WHO clinical stages, as well as evaluating the impact of ART prior to admission.

## **METHODS**

### **Study Design and Patient Selection**

All adult PLHIV (age > 18 years) who tested positive for SARS-CoV-2 by using a polymerase chain reaction (RT-PCR) test on a nasopharyngeal swab were enrolled in the study and were divided into two groups: moderate and severe forms, based on the degree of COVID-19 as per World Health Organization (WHO) recommendations.

Chest CT scans without the use of iodinated contrast medium were performed using a 64-slice scanner (Philips Brilliance CT 64; Philips) on confirmed cases of COVID-19.

The antiretroviral therapy (ART) regimen used in this study, as per Gabonese national guidelines, consisted of two nucleoside/nucleotide reverse transcriptase inhibitors, Tenofovir and Lamivudine (NRTIs), and an integrase inhibitor, Dolutegravir.

### **Data Collection**

Sociodemographic data, clinical characteristics, and imaging results were collected using the medical records of PLHIV hospitalized with COVID-19.

### **Data Processing and Analysis**

Data was entered using EpiData 3.1 software and analyzed using EpiData Analysis V2.2.2.182.

### **Ethical Provisions**

To carry out this study, we obtained the authorization of the head of the department of Internal Medicine at Omar Bongo Ondimba Army Training Hospital (HIA OBO) and consent forms from all patients.

## RESULTS

### Epidemiological Characteristics:

During the study period, 15 cases of PLHIV were identified among 136 hospitalized patients with COVID-19, representing an HIV prevalence of 11%. Of the 15 cases, 11 (73.3%) presented with moderate forms of COVID-19 and 7 (26.7%) presented with severe forms. The age group of 30 to 39 years was the most represented in patients with moderate forms and a median age of 34 years (ranging from 29 to 35 years). The age group of 40 to 49 years was the most frequent among patients with severe forms, and a median age of 45 years (ranging from 19 to 56 years). 46.7% (n=7) of patients were male and 53.3% (n=8) were female, with a male to female ratio of 0.87. Females were predominant in the moderate form (63.7%), while males were predominant in the severe form (75%).

### Clinical Outcomes of COVID-19 in PLHIV

The most common symptom among PLHIV with moderate forms of COVID-19 was cough (72.7%), followed by fatigue (63.6%), fever (45.6%), and arthromyalgia (36.4%). In PLHIV with severe forms, the most frequently observed symptoms were fatigue, anorexia, fever, dyspnea, oxygen desaturation with SpO<sub>2</sub> less than 90%, and crackles.

### WHO Clinical Stages of HIV/AIDS Progression and COVID-19 Severity

According to WHO clinical stages, 36.4% (n=4) of patients with moderate forms of COVID-19 were in stage 1, followed by 27.3% (n=3) in stage 2 and 27.3% (n=3) in stage 3. One patient (9%) was in stage 4. All patients (n=4) with severe forms of COVID-19 were found to be in WHO clinical stage 2.

### Outcomes of COVID-19 lung abnormalities on Chest CT Scans in PLHIV

In our study of individuals living with HIV who tested positive for COVID-19, all participants underwent chest CT scans without the use of iodinated contrast medium. The scans revealed that all PLHIV had morphological abnormalities in their lungs. The extent of lung involvement was found to be greater in cases of severe forms of COVID-19, compared to moderate forms. Subpleural consolidations were a frequently observed feature in patients with moderate forms of COVID-19. However, not all PLHIV displayed evidence of multifocal ground-glass alveolar opacities or the "crazy paving" appearance in their scans. Only one PLHIV had a unilateral ground-glass opacity in the right lower lobe of the lung accompanied by bilateral subpleural consolidations. (Figure 1).

Severe forms of COVID-19 were characterized by the presence of bilateral subpleural consolidations mainly in the posterior regions of the lungs, as well as evidence of multifocal ground-glass opacities, as revealed by chest CT scans (Figure 2A, 2B). Notably, none of the patients with severe forms of COVID-19 displayed evidence of the "crazy paving" appearance in their scans.

### HIV-infected patients with or without ART prior to admission

Our study found that 60% of PLHIV (n=9) were on antiretroviral therapy (ART), which consisted of Tenofovir/Lamivudine and Dolutegravir. Of the patients with moderate forms of COVID-19, 63.6% (n=7) were

on ART and 36.4% (n=4) had not started ART prior to admission. In the severe forms, 50% (n=2) had discontinued treatment or had not received ART before admission.

## DISCUSSION

The prevalence of HIV among patients diagnosed with COVID-19 was found to be 11%, with a higher rate of occurrence in Africa compared to other regions.<sup>[11,15]</sup>

In our study, moderate forms of COVID-19 were predominant in 73.3% of the HIV population, while severe forms were present in 26.7%. Similar results were reported by Mbarga N. et al in Cameroon, with a prevalence of moderate forms in 57.2% of patients and severe forms in 42.8% of PLHIV.<sup>[16]</sup> In Spain, it was observed that 75% of PLHIV had moderate forms of COVID-19, while 25% had severe forms.<sup>[10]</sup>

In France, Etienne N. et al found that moderate forms of COVID-19 were more widespread among PLHIV, affecting 64.8% of patients, while severe forms impacted 25.9% of this population.<sup>[17]</sup>

A systematic review carried out by Hossein et al found that 66.5% of PLHIV had mild to moderate forms of COVID-19, while 33.5% had severe or critical forms.<sup>[18]</sup>

Our findings, could not definitively establish a prevalence of severe forms in PLHIV, due to the small sample size. However, these results may suggest that co-infection with HIV does not necessarily increase the risk of severe COVID-19, but could lead to hospitalization.<sup>[11,19-21]</sup>

The occurrence of severe forms of COVID-19 in PLHIV might be related to the extent of immunosuppression brought on by the HIV infection. The decrease in TCD4 lymphocytes results in a weakened humoral immune response and increasing the susceptibility to various opportunistic infections.<sup>[22]</sup>

Our results found that the median age of PLHIV who were diagnosed with moderate forms of COVID-19 was 34 years, whereas the median age for those with severe forms of the disease was 45 years. This highlights the vulnerability of young adults to both mild and severe forms of COVID-19 when living with HIV.

Our study results align with those reported by other researchers, including Hu Yifei et al in China who reported a median age of 36 years among their population of individuals living with HIV and Berenger J. et al in Spain who found a median age of 43 years among PLHIV. And are also consistent with those observed by Baluku J.B. et al in Uganda and Durstenfeld M S. et al in California.<sup>[21,23,24]</sup> These results collectively provide evidence of the impact of COVID-19 on young individuals living with HIV. It appears that the young adult population of PLHIV may be at an increased risk of developing moderate to severe forms of COVID-19. The susceptibility of younger PLHIV to severe forms of COVID-19 may be a result of the combined impact of aging and the immunocompromised state brought on by HIV infection.<sup>[24]</sup>

Among patients with both moderate and severe forms of COVID-19, 46.7% were male and 53.3% were female. This female predominance was also observed by Parker et al in Cape Town.<sup>[25]</sup>

The moderate forms of COVID-19 were found to have a predominant representation of females, with 63.7% of cases. This disparity could be attributed to the significant impact of COVID-19 on young women living with HIV in sub-Saharan Africa.<sup>[26,27]</sup>

Severe forms of COVID-19 were predominantly found in males, accounting for 75% of cases (n=3). This aligns with the findings of Mirzaei et al, who reported a higher proportion of men living with HIV (22.8%) diagnosed with severe or critical forms of COVID-19 compared to women (11.1%).<sup>[18]</sup>

A study by the Western Cape Department of Health and the National Institute for Communicable Diseases revealed a female predominance among non-deceased people living with HIV (PLHIV) who tested positive for COVID-19. The results found that 79% of non-deceased PLHIV who tested positive for COVID-19 were women, while only 21% were men. This study provides valuable information on the gender distribution of COVID-19 among PLHIV in South Africa.<sup>[28]</sup> Our findings also suggest that male gender may increase the risk of severe forms of COVID-19.<sup>[29-32]</sup>

Our findings indicated that the main symptoms observed in moderate forms of COVID-19 were cough, fatigue, fever, and arthromyalgia, which resembled a flu-like syndrome. Siméon et al, also reported a predominance of cough and fever in their studies on HIV populations. Conversely, Hu Yifei et al, noted a high frequency of digestive symptoms, such as diarrhea and abdominal discomfort.<sup>[21]</sup> These findings may suggest a wide range of symptoms among PLHIV with moderate forms of COVID-19.

In severe forms, the most common symptoms observed were fatigue, anorexia, fever, dyspnea and oxygen saturation below 90% in ambient air (SpO<sub>2</sub><90%).<sup>[20-21]</sup>

Moderate forms of COVID-19 in PLHIV were mainly found in WHO clinical stages 1, 2, and 3 at 90.9%. All severe COVID-19 cases were in stage 2. These results may suggest that HIV does not worsen the severity of COVID-19.<sup>[24,33,34]</sup>

Subpleural consolidations and multifocal ground-glass opacities were observed in PLHIV with both moderate and severe forms of COVID-19. These morphological abnormalities seen in the chest CT scan illustrated the significant lung involvement in severe forms of COVID-19, emphasizing the potential value of chest CT scans in the diagnosis and monitoring of the disease. These findings align with those of Vizcarra et al, who reported a predominance of bilateral pulmonary condensation syndrome in PLWHIV with confirmed COVID-19.<sup>[10]</sup>

Different lung lesions in PLHIV with COVID-19 may be due to several factors such as the natural progression of the disease, SARS-CoV-2's tropism for the lung, and the expression of the ACE2 receptor which may lead to vasodilation and hypercoagulability. Late hyper-inflammation may contribute to tissue damage in the pulmonary alveoli, leading to subpleural condensation, particularly in distal regions, and ground-glass opacities.<sup>[35,36]</sup> This findings emphasize the significance of the hyper-immune response in the appearance of different lung lesions associated with COVID-19 in PLHIV.

Our study observed that 60% of PLHIV were receiving ART with Tenofovir/Lamivudine and Dolutegravir. Among those with moderate COVID-19, 36.4% were not on ART prior to admission, while 50% of those with severe COVID-19 had discontinued treatment or had not started ART before admission.

A study in Uganda by Bakamutumaho B. et al, reported that 72.9% of PLHIV were on ART prior to admission, 68.2% with moderate forms of COVID-19 and 86.7% with severe forms.<sup>[37]</sup>

These results suggest that being on ART may not prevent PLHIV from having a severe form of COVID-19. But further research is necessary to fully understand the relationship between antiretroviral therapy and this disease.<sup>[38,39]</sup>

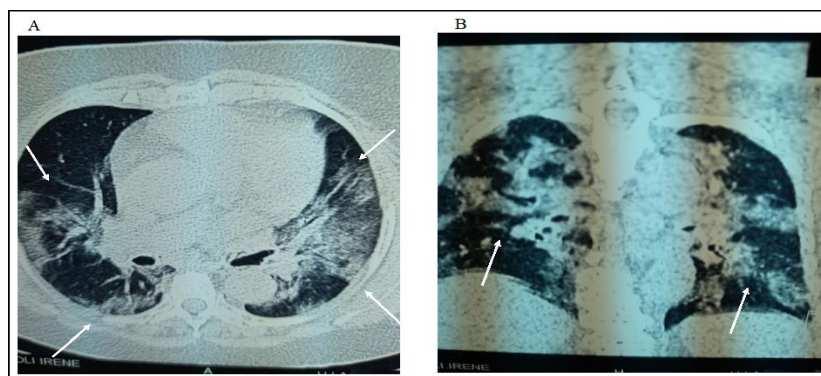
## CONCLUSION

This study has significant implications for Sub-Saharan African countries, where HIV and COVID-19 are both major public health concerns. The study suggests that younger adults living with HIV are at a higher risk of both

moderate and severe forms of COVID-19, even when receiving antiretroviral therapy and males appear to be more likely to have severe forms of the disease. In addition, these findings can aid healthcare professionals in identifying the common symptoms and lung lesions associated with COVID-19 in PLHIV. However, given the small sample size, larger prospective studies are necessary to better understand the mechanisms of COVID-19 in people living with HIV. Overall, this study highlights the urgent need for targeted interventions to mitigate the impact of COVID-19 on this vulnerable population in Sub-Saharan African countries.



**Figure 1:** Chest CT scan performed at HIA OBO without iodinated contrast medium indicating a moderate case of COVID-19, displaying unilateral ground glass opacities in the right lung (indicated by the white arrow) and bilateral posterior (marked by the black arrows) in the axial view.



**Figure 2:** Chest CT scan without iodinated contrast medium showing multifocal ground glass opacities and bilateral subpleural consolidation, predominantly distributed in the posterior region (indicated by white arrows) in both axial (A) and coronal views (B) of a patient with severe COVID-19. Images sourced from the COVID Unit at HIA OBO.

## REFERENCES

1. Hongzhou Lu, Charles W Stratton, Yi-Wei Tang. Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. J Med Virol . 2020 Apr;92(4):401-402.

2. Catrin Sohrabi, Zaid Alsafi, Niamh O'Neill, Mehdi Khan, Ahmed Kerwan, Ahmed Al-Jabir, et al. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). Int J Surg. 2020;76:71-76.
3. Timeline of WHO's response to COVID-19. 2021
4. Naming the coronavirus disease (COVID-19) and the virus that causes it. 2019.
5. V Bonny, A Maillard, C Mousseaux, L Plaçais, Q Richier. COVID-19: Pathogenesis of a multi-faceted disease. Rev Med Interne. 2020;41(6):375-389.
6. Ping-Hsing Tsai, Wei-Yi Lai, Yi-Ying Lin, Yung-Hung Luo, Yi-Tsung Lin, Hsiao-Kang Chen, et al. Clinical manifestation and disease progression in COVID-19 infection. J Chin Med Assoc. 2021;84(1):3-8.
7. Hans Bösmüller, Matthias Matter, Falko Fend, Alexandar Tzankov. The pulmonary pathology of COVID-19. Virchows Arch. 2021;478(1):137-150.
8. The Lancet. Redefining vulnerability in the era of COVID-19. Lancet. 2020;395(10230):1089.
9. Guidance for COVID-19 and People with HIV. 2022.
10. Pilar Vizcarra, María J Pérez-Elías, Carmen Quereda, Ana Moreno, María J Vivancos, Fernando Drona, et al. Description of COVID-19 in HIV-infected individuals: a single-centre, prospective cohort. 2020;7(8): E554-E564.
11. Celestin Danwang, Jean Jacques Noubiap, Annie Robert, Jean Cyr Yombi. Outcomes of patients with HIV and COVID-19 co-infection: a systematic review and meta-analysis. AIDS Res Ther. 2022;19(1):3.
12. Karan Varshney, Prerana Ghosh, Helena Stiles, Rosemary Iriowen. Risk Factors for COVID-19 Mortality Among People Living with HIV: A Scoping Review. AIDS Behav. 2022;26(7):2256-2265.
13. Paola Costenaro, Chiara Minotti, Elisa Barbieri, Carlo Giaquinto, Daniele Donà. SARS-CoV-2 infection in people living with HIV: a systematic review. 2020.
14. <https://www.union.sonapresse.com/gabon-culture-societe/lutte-contre-le-sida-46-000-personnes-vivent-avec-le-vih-au-gabon-24302>.
15. Lawrence Mwananyanda, Christopher J Gill, William MacLeod, Geoffrey Kwenda, Rachel Pieciak, Zachariah Mupila, et al. Covid-19 deaths in Africa: prospective systematic postmortem surveillance study. BMJ. 2021;372:n334.
16. Nicole Fouda Mbarga, Emilienne Epee, Marcel Mbarga, Patrick Ouamba, Herwin Nanda, Aristide Nkengni. Clinical profile and factors associated with COVID-19 in Yaounde, Cameroon: A prospective cohort study. PLoS One . 2021;16(5):e0251504.
17. Nicolas Etienne, Marina Karmochkine, Laurence Slama, Juliette Pavie, Dominique Batisse, Rafael Usubillaga, et al. HIV infection and COVID-19: risk factors for severe disease. AIDS. 2020;34(12):1771-1774.
18. Hossein Mirzaei, Willi McFarland, Mohammad Karamouzian, Hamid Sharifi. COVID-19 Among People Living with HIV: A Systematic Review. AIDS Behav. 2021;25(1):85-92.
19. Lillian B. Brown, Matthew A Spinelli, Monica Gandhi. The Interplay between HIV and COVID-19: summary of the data and responses to date. Curr Opin HIV AIDS. 2021;16(1): 63-73.

20. S Siméon, S Landowski, F. Moreau, S. Bessis, M Marcou, H Mascitti. Caractéristiques des infections à SARS-CoV-2 chez 10 patients infectés par le VIH. 2020;50:S72.
21. Yifei Hu, Juntao Ma, Haojie Huang, Sten H Vermund. Coinfection With HIV and SARS-CoV-2 in Wuhan, China: A 12-Person Case Series. J Acquir Immune Defic Syndr. 2020;85(1):1-5.
22. Christina C Chang, Megan Crane, Jingling Zhou, Michael Mina, Jeffrey J Post, Barbara A Cameron, et al. HIV and co-infections. Immunol Rev. 2013;254(1):114-42.
23. Joseph Baruch Baluku, Shem Mwebaza, Gloria Ingabire, Chris Nsereko, Moses Muwanga. HIV and SARS-CoV-2 coinfection: A case report from Uganda. J Med Virol. 2020;92(11):2351-2353.
24. Matthew S Durstenfeld, Kaiwen Sun, Yifei Ma, Fatima Rodriguez, Eric A Secemsky, Rushi V Parikh. Association of HIV infection with outcomes among adults hospitalized with COVID-19. AIDS. 2022;36(3):391-398.
25. A Parker, C F N Koegelenberg, M S Moolla, E H Louw, A Mowlana, A Nortjé, et al. High HIV prevalence in an early cohort of hospital admissions with COVID-19 in Cape Town, South Africa. S Afr Med J. 2020;110(10):982-987.
26. Ameena Goga, Linda Gail Bekker, Philippe Van de Perre, Wafaa El-Sadr, Khatija Ahmed, Mookho Malahleha, et al. Centring adolescent girls and young women in the HIV and COVID-19 responses. Lancet . 2020;396(10266):1864-1866.
27. UNAIDS. UNAIDS data. 2020
28. Western Cape Department of Health in collaboration with the National Institute for Communicable Diseases, South Africa. Risk Factors for Coronavirus Disease 2019 (COVID-19) Death in a Population Cohort Study from the Western Cape Province, South Africa. Clin Infect Dis. 2021;73(7):e2005-e2015.
29. Fei Zhou, Ting Yu, Ronghui Du, Guohui Fan, Ying Liu , Zhibo Liu, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet. 2020;395(10229):1054-1062.
30. Rong-Hui Du, Li-Rong Liang, Cheng-Qing Yang, Wen Wang, Tan-Ze Cao, Ming Li, et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. Eur Respir J. 2020;55(5):2000524.
31. Safiya Richardson, Jamie S Hirsch, Mangala Narasimhan, James M Crawford, Thomas McGinn, Karina W Davidson, et al. Presenting Characteristics, Comorbidities, and Outcomes Among 5700 Patients Hospitalized With COVID-19 in the New York City Area. 2020;323(20):2052-2059.
32. Paola Costenaro, Chiara Minotti, Elisa Barbieri, Carlo Giaquinto, Daniele Donà. SARS-CoV-2 infection in people living with HIV: a systematic review. Rev Med Virol. 2021;31(1):1-12.
33. Julia Del Amo, Rosa Polo, Santiago Moreno, Asunción Díaz, Esteban Martínez, José Ramón Arribas, et al. Incidence and Severity of COVID-19 in HIV-Positive Persons Receiving Antiretroviral Therapy : A Cohort Study. Ann Intern Med. 2020;173(7):536-541.
34. Jean B Nachega, Nathan Kapata, Nadia A Sam-Agudu, Eric H Decloedt, Patrick D M C Katoto, Tumaini Nagu, et al. Minimizing the impact of the triple burden of COVID-19, tuberculosis and HIV on health services in sub-Saharan Africa. Int J Infect Dis. 2021;113 Suppl 1:S16-S21.



35. Jiaxiang Chen, Xinge Cheng, Rongpin Wang, Xianchun Zeng. Computed tomography imaging of an HIV-infected patient with coronavirus disease 2019. J Med Virol. 2020;92(10):1774-1776.
36. Junwei Su, Xiaomin Shen, Qin Ni, Hong Zhao, Jieru Cai, Biao Zhu, et al. Infection of severe acute respiratory syndrome coronavirus 2 in a patient with AIDS. AIDS. 2020;34(10):1575-1576.
37. Barnabas Bakamutumaho, Julius J Lutwama, Nicholas Owor, John Kayiwa, Jocelyn Kiconco, Mercy Haumba, et al. Epidemiology, Clinical Characteristics, and Mortality of Hospitalized Patients with Severe COVID-19 in Uganda, 2020-2021. Ann Am Thorac Soc. 2022;19(12):2100-2103.
38. Katrina M Byrd, Curt G Beckwith, Joseph M Garland, Jennie E Johnson, Su Aung, Susan Cu-Uvin, et al. SARS-CoV-2 and HIV coinfection: clinical experience from Rhode Island, United States. J Int AIDS Soc. 2020;23(7):e25573.
39. Amanda D Castel, Brittany Wilbourn, Manya Magnus, Alan E Greenberg. SARS-CoV-2 and HIV: Epidemiology, Treatment, and Lessons Learned from HIV. AIDS Rev. 2020;22(3):133-142.