

Impact of Covid-19 Pandemic on HIV/AIDS Testing and Treatment

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Abstract

Objective: This study aimed to assess the impact of the COVID-19 pandemic on HIV testing, diagnosis, treatment, and care in Nagpur, India by analyzing trends across patient data from 2017-2021. The goal was to outline challenges and future policy measures to mitigate disruptions and improve engagement of individuals living with HIV/AIDS.

Materials and Methods: Data were analyzed for 971 diagnosed HIV/AIDS patients undergoing antiretroviral therapy at the Government Medical College's Integrated Counseling and Testing Centre and Antiretroviral Therapy Centre in Nagpur, spanning 2017-2021. Descriptive statistics were used to evaluate trends in key parameters - HIV screening, positivity rates, patient characteristics, ICTC-ART linkages, treatment outcomes. Appropriate ethical guidelines were adhered to.

Results: Notable declines in HIV testing and positivity rates were observed during the COVID-19 period. Changes in patient demographic distribution and service gaps (drop in eligible spouse testing; ICTC-ART linkage gaps) indicated likely challenges in care access and engagement during the pandemic. Issues also emerged in critical areas including ART adherence, loss to follow-ups, and cessation of treatment over 2019-2021.

Discussion: The results underscore pandemic-related disruptions faced by HIV care systems, potentially stemming from lockdowns, restrictions, and healthcare service limitations. Addressing detriments through multi-faceted approaches is imperative - improved ICTC-ART linkages, adoption of telemedicine/multi-month ART models and decentralized care can aid optimization of HIV care delivery during outbreaks. The learnings can inform the development of resilient health systems equipped to support vulnerable groups through co-occurring epidemics.

Keywords: COVID-19, healthcare utilization, ICTCs (Integrated counseling and testing centers), linkage, pandemic, patient retention, service gaps, HIV/AIDS, vulnerable populations.

Introduction

The first cases of COVID-19 appeared in Wuhan, China in December 2019 [1]. Similar to other severe acute respiratory viruses (e.g., SARS-CoV), COVID-19 is a highly contagious disease but with an even higher reproduction number (R_0), which refers to the average number of people a person with the virus will infect, thus serving as a metric of how easily a virus is transmitted [2]. COVID-19 has spread quickly throughout the world. COVID-19 results in mild illness for most people who contract the virus. However, people who are older in age or have pre-existing conditions are at risk of severe illness or death [3]. Healthcare systems in many countries are taxed, particularly in areas where infection rates are high, resulting in health implications not only for patients with COVID-19 but also for other people who require healthcare services. People with HIV/AIDS (PLHIV) are particularly vulnerable during the time of COVID-19. Although recent research suggests that PLHIV may not be contracting COVID-19 at disproportionate rates, which is hypothesized to be a function of antiretroviral treatment (ART; [4]), PLHIV who are not taking ART or whose disease is not well managed may be at increased risk for contracting COVID-19 due to having a compromised immune system and also may be at increased risk for serious symptoms and death. Beyond their increased risk for complications resulting from COVID-19, PLHIV are affected by the COVID-19 crisis in a myriad of other ways. For example, PLHIV are likely to experience treatment interruptions due to restrictions on non-emergency medical appointments related to physical distancing requirements. Although many healthcare providers are offering tele-medicine services, the transition to tele-medicine has been slow in some places, and the uptake of tele-medicine services is variable. Indeed, some PLHIV may not have the resources needed to fully take advantage of tele-medicine opportunities (e.g., access to devices or adequate Internet service). As healthcare facilities re-open and resume normal daily operations, PLHIV face the

risk of exposure to COVID-19 when attending medical appointments. Given the high rates of mental health issues (e.g., anxiety and depression) that exist among this population, PLHIV are particularly vulnerable to the effects of isolation resulting from restricted mobility associated with the pandemic. Furthermore, to the extent that COVID-19 is affecting marginalized communities in unique ways, it also is affecting PLHIV in unique ways, given that HIV disproportionately affects people from marginalized groups. Indeed, the pandemic's disproportionate impact on people of colour and those who are economically disadvantaged is making apparent existing health disparities that also exist within the HIV epidemic. As another example of the impact of COVID-19 on marginalized communities, Lodgell and Kuchukhidze [5] described the impact of COVID-19 on migrant workers who are living with HIV.

- Most consistent research findings for PLHIV during early COVID-19 were concerns that lockdowns would reduce access to HIV care services.
- It was widely expected that COVID-19 would interrupt access to ART with adverse effects on adherence, access to pharmacies and impact on stress and substance use.

Present study delve into the intricate intersection of the COVID-19 pandemic and its ramifications on HIV testing and treatment, our study aims to illuminate the challenges faced by individuals living with HIV/AIDS, with a particular focus on disruptions in access to care services and potential impediments to adherence. By shedding light on these issues, we aspire to contribute to a comprehensive understanding of the dual impact of these health crises, paving the way for informed interventions and policies to safeguard the well-being of those navigating the intricate landscape of HIV amidst a global pandemic.

Materials & Methods

This study encompasses data gathered from individuals diagnosed with HIV in the Integrate Counselling and Testing Centre (ICTC), Government Medical College and Hospital, Nagpur region throughout the COVID-19 pandemic, spanning from 2017 to 2021. The data was sourced from two key Departments: the Integrate Counselling and Testing Centre (ICTC) and Antiretroviral Treatment Centre (ART), Government Medical College in Nagpur, Maharashtra, India. The chosen time frame, commencing with the onset of the COVID-19 pandemic, ensures a comprehensive examination of the impact on HIV diagnoses, treatment and related trends in the specified region.

Total 79612 patients screened during 2017 to 2021 and 1479 tested positive for HIV at ICTC, Government Medical College, Nagpur, and Maharashtra, India. Out of which socio-demographic and clinical data of 971 patients included in this study as per inclusion criteria.

Inclusion criteria:

The study included data from individuals diagnosed with HIV/AIDS and under ART treatment in the Nagpur region during the COVID-19 pandemic. The time frame considered for inclusion was from the pre COVID-19 pandemic i.e. 2017 to 2021.

Exclusion criteria:

Data were excluded if they did not have a confirmed diagnosis of HIV/AIDS or if the relevant data were incomplete or unavailable for

analysis. Cases without a confirmed diagnosis of HIV or with incomplete or unavailable for analysis were excluded.

Statistical analysis:

The analysis involved assessing trends in HIV/AIDS diagnosis during and after the COVID-19 pandemic. Descriptive statistics were employed to quantify the changes in the number of HIV/AIDS cases diagnosed, ART treatment and followup with a focus on any observed decreases.

Ethical approval:

This study adhered to ethical guidelines and obtained approval from the Institutional ethical committee, ensuring that the rights and confidentiality of the individuals involved were protected. The data used were anonymized to maintain privacy and comply with ethical standards.

Results

Across the period spanning 2017 to 2021, a total of 79,612 patients underwent screening, forming the basis for our exploration into the socio-demographic characteristics and clinical indicators associated with the impact of COVID-19 on the diagnosis and treatment of HIV/AIDS. Notably, 1,479 individuals were identified as HIV positive within this study. For the purposes of this study, we meticulously analysed data from 971 patients, applying both inclusive and exclusive criteria to ensure a robust and representative examination of the intricate interplay between COVID-19 and the landscape of HIV/AIDS diagnosis and treatment

Table 1: HIV testing and diagnosis during Covid -19

Year	Tested for HIV	Diagnosed Positive
2017	18621	418
2018	18634	316
2019	19424	350
2020	10952	211
2021	11981	184

Table 1 illustrates the HIV screening data from 2017 to 2021, revealing a noteworthy trend. Specifically, a decline was observed during the Covid-19 period. In 2018, 18,634 patients underwent screening, but this figure decreased to 19,424, 10,952, and 11,981 in 2019, 2020, and 2021, respectively. Interestingly, this decrease in

testing coincided with a decline in HIV positivity rates. This observation suggests a potential correlation between the decrease in testing and a parallel decrease in the detection of HIV cases, warranting further investigation into the dynamics of healthcare utilization during the Covid-19 period.

Table 2: Age and Gender distribution of patient (HIV Positive) n=971

Age						Gender		
Year	≤14	15-24	25-34	35-49	≥50	Male	Female	TS/TG
2017-18	5	15	43	93	41	114	83	0
2018-19	10	17	61	148	79	192	123	0
2019-20	5	15	36	135	79	164	106	0
2020-21	0	13	36	91	49	120	69	0

Table 2 delineates the distribution of patients based on age groups and gender from 2017-18 to 2020-21, with a particular focus on the impact of the Covid-19 pandemic. The count of patients in specific age brackets (≤14, 15-24, 25-34, 35-49, ≥50) is provided for both male and female categories. Notably, a discernible trend of fluctuating patient counts across age groups and gender emerges over this period, highlighting the evolving healthcare demographics. The Covid-19

pandemic appears to have influenced these dynamics, contributing to variations in patient numbers across different demographic segments. Despite this, no significant correlation between age and gender was observed. The noteworthy aspect is the consistent decrease in patient numbers over the years, emphasizing the significant impact of the pandemic on healthcare-seeking behaviour and the overall patient landscape

Table 3: Linkages between ICTC and ART during Covid-19 (n=971)

Year	Total No of Clients Diagnosed HIV Positive	Pre ART Date	No. client Registered and having Pre-ART No.	(Pre ART %)	Pre ART Regn. Not done	% Not Done	Target for CD4 Testing	Actual No. of CD4 Testing done (with %)	
2017-18	197	181	180	91%	17	9%	180	164	91.11
2018-19	315	295	295	93%	20	6%	315	274	86.00
2019-20	270	255	251	93%	19	7%	251	237	94.42
2020-21	189	182	180	95%	9	5%	180	150	83.33

Table 3 provides a detailed year-wise distribution of patients, specifically highlighting the ICTC-ART linkages. Notably, a significant gap in diagnosis and treatment was observed in the years 2017-18 to 2019-20, with 17 (9%) in 2017-2018, 20 (6%) in 2018-19, and 19 (7%) in 2019-20. However, there is a noteworthy reduction in linkages gap in 2020-21, with only 9 (5%)

instances, indicating the impact of the Covid-19 lockdown on the testing and treatment cascade. This reduction suggests a potential influence of the pandemic on healthcare-seeking behaviour and the healthcare system's ability to establish and maintain linkages between ICTC and ART services.

Table 4: Distribution according to Route of HIV Transmission

Route Of Transmission								
Year	Commercial Partner	Casual/non-regular partner	Regular partner/spouse	Homosexual / Bisexual	Through blood and blood products	Through infected syringe and needles	Parent to child (for children)	Not specified/unknown
2017-18	0	65	106	0	2	1	5	18
2018-19	7	101	167	3	9	0	13	15
2019-20	3	88	156	0	4	0	10	9
2020-21	4	69	112	0	0	0	4	0

Table 4-summarizes HIV cases from 2017-18 to 2020-21 by transmission routes and their co-infection with tuberculosis (HIV-TB). It details the numbers based on various transmission sources, referrals to RNTCP, TB diagnosis, and those

already on DOTs. Above table shows HIV transmission from commercial partner and non-regular partner, contradict with Covid 19 lockdown situation where public contact was restricted.

Table 5: Detail of spouse testing.

Spouse Testing & treatment								
Year	Eligible Spouse for testing	Total No of Spouse Tested	% Testing	Positive	Negative	Spouse Tested at Private	Spouse Pre ART	% Spouse Pre ART
2017-18	117	101	86%	65	33	3	42	41%
2018-19	194	154	79%	98	54	2	75	39%
2019-20	156	75	48%	51	24	0	41	54%
2020-21	108	71	65%	42	25	4	48	67%

Table 5 indicates a significant drop in spouse testing during the years 2018-19 to 2020-21, with 86%, 79%, 48%, and 65% of eligible spouses tested, reflecting the impact of the Covid-19 lockdown. There's also a notable gap in ART registration, with 42 out of 65, 75 out of 98, 41 out of 75, and 48 out of 71 HIV-positive spouses enrolled for treatment in 2017-18 to 2020-21, respectively.

Table 6: Cross Sectional Status in ART treatment during Covid-19 pandemic

Year	2017	2018	2019	2020	2021
number of patients registered in HIV Care during the current financial year	686	599	550	525	271
number of PLHIV initiated on ART during the current financial year	506	531	476	464	224
number of PLHIV reported died during the current financial year	36	36	31	28	16
number of PLHIV whose status is LFU during the current financial year	32	23	62	71	63
number of PLHIV whose treatment status is "stopped treatment/ opted out of Program" during the current financial year	4	6	22	28	11
number of PLHIV who have been transferred out of the ART Centre	39	33	41	23	22
number of PLHIV alive & on ART Treatment	395	433	320	314	112

The data in table no. 6 reveals the dynamic landscape of HIV care and treatment spanning the years 2017 to 2021, unveiling notable trends in patient registration, initiation on antiretroviral therapy (ART), reported deaths, loss to follow-up (LFU), treatment interruptions, transfers to other ART centers, and the count of individuals actively receiving ART. A declining trend in patient registrations for ART treatment is evident, with 686 and 599 patients in 2017 and 2018, followed by a decrease in subsequent years—550 in 2019, 525 in 2020, and 271 in 2021. The peak in LFU cases occurred in 2019, 2020, and 2021, reaching 62, 71, and 63 cases, respectively. Notably, a consistent trend of treatment cessation by patients was observed during 2019 to 2021 (22, 28, and 11 cases, respectively), contrasting with 2017 and 2018, indicative of the potential impact of COVID-19 on ART adherence.

Discussion

HIV care delivery has been adversely impacted in several countries during this pandemic but has created an opportunity for accelerating effective strategies like multi-month ART [6]. Decentralizing HIV care in low-resource settings and incorporating telemedicine in high-resource settings will be critical in mitigating shocks to healthcare systems in the future [6].

The comprehensive analysis presented in Table 1 highlights a discernible trend in HIV screening data from 2017 to 2021, with a notable decline observed during the Covid-19 period. The number of patients undergoing screening decreased from 18,634 in 2018 to 19,424, 10,952, and 11,981 in 2019, 2020, and 2021, respectively. Intriguingly, this reduction in testing aligns with a simultaneous decline in HIV positivity rates.

The observed correlation between decreased testing and a parallel decline in the detection of HIV cases prompts a critical examination of the potential impact of the Covid-19 pandemic on healthcare utilization dynamics [7]. The confluence of factors such as lockdowns, public apprehension, and disruptions in routine

healthcare services during the pandemic may have contributed to a hesitancy or inability among individuals to seek HIV screening.

This phenomenon underscores the need for a multifaceted investigation into the intricacies of healthcare-seeking behaviour during crises [8]. Understanding the barriers that hindered individuals from accessing HIV screening services is pivotal for informed public health strategies.

Table 2 illuminates shifts in patient distribution by age and gender from 2017-18 to 2020-21, accentuating the impact of the Covid-19 pandemic. Fluctuations across age groups and gender categories signify evolving healthcare demographics. Despite pandemic influences, no significant age-gender correlation emerged, emphasizing the multifaceted nature of healthcare dynamics.

A notable trend is the consistent decrease in patient numbers, indicating a substantial pandemic-induced shift in healthcare-seeking behaviour. Fear, restrictions, or service disruptions likely contributed to this decline.

Turning to Table 3, the year-wise analysis of ICTC-ART linkages reveals a concerning gap in diagnosis and treatment from 2017-18 to 2019-20. However, in 2020-21, a noteworthy reduction in linkage gaps (5%) suggests adaptive resilience within the healthcare system amid the pandemic.

These findings spotlight the intricate interplay between the pandemic, healthcare utilization, and system adaptability. They underscore the need for targeted interventions to optimize linkages and fortify healthcare systems, providing valuable insights for future research and policy considerations during global health crises [9].

Table 4 provides a comprehensive overview of HIV cases from 2017-18 to 2020-21, emphasizing transmission routes and co-infection with tuberculosis (HIV-TB). Despite Covid-19 restrictions, the observed trends in transmission sources, such as commercial and non-regular partners, present unexpected complexities in the

context of lockdown constraints. This prompts a deeper exploration into the influence of the pandemic on HIV spread, aligning with findings from similar studies that have highlighted the intricacies of HIV transmission dynamics during global health crises [1, 10, 11].

Table 5 underscores the discernible impact of Covid-19 on spouse testing, with a substantial drop from 86% to 65% in tested spouses, reflecting challenges posed by the pandemic. This trend aligns with research emphasizing the disruptions in routine healthcare services during the Covid-19 era, leading to a decline in preventive health measures [12]. The noticeable gap in ART registration for HIV-positive spouses further underscores the systemic challenges, with declining enrolments mirroring findings in studies emphasizing the adverse effects of the pandemic on HIV treatment cascades [13]. Table 6 illustrates, a dynamic HIV care landscape unfolds, revealing decreasing trends in patient registrations for ART treatment and peaks in LFU cases during 2019-2021. This aligns with broader discussions in the literature on the impact of Covid-19 on HIV care, emphasizing disruptions in routine healthcare services and challenges in patient retention [14]. The consistent trend of treatment cessation during 2019-2021 signifies the potential impact of Covid-19 on ART adherence, corroborating studies that have highlighted the complexities of maintaining treatment continuity during times of crisis [14].

Mental health issues such as anxiety, depression, and posttraumatic stress and substance use are common among PLHIV and are considered both a cause and a consequence of HIV. Similarly, as Ho and colleagues [15] noted, pandemic fear in general can worsen existing mental health disorders and also may result in new diagnoses. Acknowledging the mental health impact of COVID-19, WHO [16] published recommendations for addressing mental health and psychosocial issues during the COVID-19 outbreak. As with HIV, the COVID-19 pandemic reveals the systemic inadequacies that produce health disparities. What these illnesses

demonstrate is a disproportionate burden on already vulnerable populations experiencing poverty and other systemic stressors.

PLHIV whose disease is not well managed are placed at an increased risk for contracting and experiencing complications related to COVID-19, in addition to complications related to HIV disease progression. Given the lifelong prognosis of HIV, it is imperative for PWH to regularly visit their healthcare providers and adhere to treatment [17].

PLHIV are also more likely to contract opportunistic infections (e.g., pneumonia, tuberculosis, toxoplasmosis, etc.; [18]), than those without compromised immune systems. PLHIV who are experiencing any additional illnesses may experience delayed treatment due to COVID-19. This can occur due to hospital overcrowding in an already taxed healthcare system. PLHIV who seek out urgent care may face an increased risk of contracting COVID-19 among other illnesses while in health care settings [17].

In summary, these findings not only contribute to the evolving narrative on the intersection of Covid-19 and HIV care but also align with existing research that underscores the multifaceted challenges posed by pandemics on routine healthcare services and patient outcomes. Understanding these trends in the context of broader research enhances our ability to formulate targeted interventions and strategies to navigate the complexities of HIV care during global health crises.

Conclusion

In conclusion, the intersection of the COVID-19 pandemic and HIV care delivery has unearthed both challenges and opportunities. The adverse impacts on HIV screening, patient distribution, and care linkages underscore the vulnerability of healthcare systems during crises. However, the observed resilience and adaptive measures, such as a notable reduction in linkage gaps and shifts in patient demographics, highlight the capacity for innovation and improvement.

Moving forward, it is imperative to leverage the lessons learned from the pandemic to shape future healthcare strategies. The adoption of effective measures like multi-month ART, decentralization of HIV care in low-resource settings, and the incorporation of telemedicine in high-resource settings emerge as critical strategies to mitigate shocks to healthcare systems.

Limitations of the Study:

The study's retrospective nature may limit the depth of real-time insights into the evolving dynamics of HIV care during the pandemic. The analysis relies on available data, and variations in data collection methods across different settings may introduce biases. External factors beyond the scope of the study, such as policy changes and socioeconomic shifts, may have influenced the observed trends.

Future Prospects:

Prospective studies with real-time data collection can provide more nuanced insights into the ongoing impact of the pandemic on HIV care. Research focusing on the effectiveness of specific interventions, such as multi-month ART and telemedicine, can inform targeted strategies for healthcare optimization. In navigating the complexities revealed by this study, future research and interventions should prioritize resilience, adaptability, and inclusivity to ensure the continued well-being of individuals living with HIV/AIDS in the face of global health crises.

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