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VIEWPOINTS

Human Immunodeficiency Virus (HIV) Care Models During the Coronavirus Disease 2019 (COVID-19) Era

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The coronavirus disease 2019 (COVID-19) pandemic is an unprecedented global challenge that substantially risks reversing the progress in ending human immunodeficiency virus (HIV). At the same time, it may offer the opportunity for a new era of HIV management. This viewpoint presents the impact of COVID-19 on HIV care, including the Joint United Nations Programme on HIV/AIDS (UNAIDS) "three 90s" targets. It outlines how to enhance a patient-centered care approach, now known as the "fourth 90," by integrating face-to-face patient–physician and telemedicine encounters. It suggests a framework for prevention and treatment of multimorbidity and frailty, to achieve a good health-related quality of life, and to preserve intrinsic capacity in all people living with HIV.

Keywords. AIDS care; COVID-19; HIV; quality of life.

The coronavirus disease 2019 (COVID-19) pandemic has the potential to alter chronic disease care models and, in particular, usher in a new era of human immunodeficiency virus (HIV) care. HIV is a chronic infectious disease that requires regular care, which is often provided as an in-person (ie, face to face—F2F) encounter. However, the response to the pandemic has reduced the availability of routine outpatient HIV care. Specifically, many infectious disease physicians have been reassigned to COVID-19 care and many patients have not been able to reach hospitals and clinics due to confinement measures. Communities of people living with HIV (PLHIV) have expressed concern that imposed limitations on clinic visits resulting from COVID-19 and measures to control it may reduce clinical assessments, laboratory procedures, and other clinical services [1]. Further, this has led to suboptimal assessments of the efficacy, toxicity, adherence, and other medication-related aspects of these changes in care [2, 3]. As such, new care models have been considered, including reduced F2F visits [2], telehealth (ranging from teleconsulting to advanced telemedicine diagnostic and treatment tools) [4], and the prescription of antiretroviral therapy (ART) for longer periods to ensure uninterrupted supply of medications to the patient's home.

It is not fully understood how COVID-19 affects PLHIV. Epidemiological and clinical reports of COVID-19 outcomes in PLHIV vary according to geographic area. Case–control studies in the European Union (EU) [5] and the United States (US) [6, 7] did not identify differences in COVID-19 severity on admission to hospital or clinical outcomes by HIV status, but showed a higher mortality risk in a recent United Kingdom (UK) study in those under 60 years of age [8]. Nonetheless, a significantly larger proportion of PLHIV had a history of smoking and comorbid illnesses compared to demographically similar HIV-negative patients, which are both risk factors for COVID-19. COVID-19 may also exacerbate the consequences of stigma and discrimination, particularly for the most marginalized populations, including men who have sex with men, people who use drugs, sex workers, transgender people, and people in prisons. All of these populations have been particularly vulnerable to HIV service interruptions during the COVID-19 pandemic [9]. The World Health Organization (WHO) is working with partners, including the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the Global Network of People Living with HIV (GNP+), to safeguard human rights in the response to COVID-19 and allow PLHIV continuous access to HIV-related services (Table 1) [10]. By interrupting HIV treatment services, COVID-19 could hinder progress in HIV care, which may consequently increase morbidity and mortality [11]. Key global HIV/AIDS stakeholders have launched statements and guidelines on HIV management to allow optimal care for PLHIV during the COVID-19 pandemic (Table 1).

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Table 1. HIV Management During the COVID-19 Pandemic: Statements and Guidelines Launched by Key HIV/AIDS Societies

HIV/AIDS society	Recommendations
The International AIDS Society (IAS)	Maintain decentralized safe points of care preferred by vulnerable populations where and when they receive HIV services;
<https://www.iasociety.org/covid-19-hiv>	Expand multi-month dispensing and refills of ART, PrEP and other medications through community- and mail-based services;
	Implement telemedicine to address the health and safety needs of PLHIV and monitor the effects of the pandemic on the cascade of care.
Joint United Nations Programme on HIV/AIDS (UNAIDS)	Protect against risks to supply chain production and assist in the distribution of ART, harm reduction materials, and HIV testing materials to facilities;
<https://www.unaids.org/en/covid19>	Encourage multi-month dispensing and remove financial barriers to care, especially for vulnerable populations.
Centers for Disease Control and Prevention (CDC)	PLHIV should maintain healthy lifestyles and continue treatment in consultation with their doctor;
https://www.cdc.gov/hiv/basics/livingwithhiv/index.html	PLHIV can be allies in preventing COVID-19 stigma by sharing factual information and speaking out against negative behaviors and statements.
BHIVA, DAIG, EACS, GESIDA & the Polish Scientific AIDS Society Statement on risk of COVID-19 for PLHIV	No evidence is available to justify switching PLHIV from their usual ART;
<https://www.eacsociety.org/home/bhiva-daig-eacs-gesida-and-polish-scientific-aids-society-statement-on-risk-of-covid-19-for-people-living-with-hiv-plwh.html>	Avoid ART for HIV-negative people outside the context of PrEP;
	Consult the COVID-19 drug interactions website for clinical management to avoid the risks of drug–drug interactions in intensive care units.
U.S. Department of Health and Human Services (HHS)	Treat clinical management of PLHIV in the same manner as the general population with COVID-19, including for medical care triage;
<https://aidsinfo.nih.gov/guidelines/html/8/covid-19-and-persons-with-hiv--interim-guidance-/554/interim-guidance-for-covid-19-and-persons-with-hiv>	Replace face-to-face encounters with telephonic consultations or virtual visits for routine or non-urgent care, clinic or laboratory monitoring, and adherence counseling;
	Maintain a multi-month ART supply;
	Avoid changes and substitutions of ART medications.

Abbreviations: ART, antiretroviral therapy; BHIVA, British HIV Association; COVID-19, coronavirus disease 2019; DAIG, Deutsche AIDS Gesellschaft (German AIDS Society); EACS, European AIDS Clinical Society; GESIDA, Grupo de Estudio del SIDA-SEIMC (HIV Study Group SEIMC); HIV, human immunodeficiency virus; PrEP, pre-exposure prophylaxis; PLHIV, people living with HIV; U.S., United States.

With this viewpoint, we outline how to utilize the opportunities afforded by COVID-19 to hasten progress towards patient-centered HIV care, emphasizing the need to recognize and address health-related quality of life (HRQoL) in PLHIV.

CURRENT HIV CARE PARADIGMS ARE CHALLENGED BY THE COVID-19 PANDEMIC

The contemporary HIV care framework is based on the UNAIDS "90–90–90 targets," which is primarily based on viral–immunological success [12]. The "first 90" target aims to have 90% of PLHIV know their status, which may be compromised due to a reduction in HIV testing as well as prevention efforts, including pre-exposure prophylaxis (PrEP) programs during the pandemic. This may consequently increase the already high proportion of PLHIV with advanced HIV at diagnosis. Moreover, the risk of stigma related to COVID-19 may drive late presentation among people with respiratory symptoms [13]. However, COVID-19 also offers an opportunity to increase HIV testing in acute medical settings, if hospitals establish HIV testing for those suspected or diagnosed with the virus [14].

The "second 90" target aims to have 90% of those diagnosed with HIV on ART, which is associated with improved survival, decreased HIV-related complications, and reduced HIV transmission. Yet, ART interruption during the pandemic may lead to increased deaths due to HIV. According to one modeling study, deaths could increase by up to 10% compared with pre-pandemic rates in low-/middle-income countries [15]. ART interruption also increases the risk of progression to AIDS, which is especially problematic for patients disengaged in care. Risk factors for progression to AIDS in patients disengaged from care include psychiatric comorbidities, migration status, and alcohol and substance abuse. This highlights the need to identify vulnerable populations, who bear a disproportionate impact of the consequences of the pandemic, and engage them in care, especially since these populations may be less accessible through telemedicine [16]. Therefore, it is crucial to offer personalized and community-based interventions that incorporate re-engagement efforts.

The "third 90 goal" aims to have 90% of people on treatment achieve viral suppression, which could be affected by COVID-19's impact on monitoring frequency. Since the risk of treatment failure on modern ART is low, viral load monitoring, typically every 6 months, has been postponed for many during the pandemic. It is possible that less frequent monitoring may encourage a shift in consultations to focus on broader issues beyond laboratory results, such as HRQoL. As such, it is necessary to use this COVID-19 "experiment" to develop evidence-based monitoring recommendations.

The management of older PLHIV presenting with multimorbidity and frailty has led to the recognition that viral

suppression is not the only endpoint of HIV care, resulting in the development of a "fourth 90" target [17]. The fourth 90 target aims to have 90% of people living with HIV having a good HRQoL. Given that many PLHIV experience multimorbidity and frailty, which may have worsened during the pandemic, medical care should no longer focus primarily on "disease" [18] but be broadened to an outcome perspective that also addresses quality of life (QoL) and healthy living with HIV. Incorporating patient-reported outcomes (PROs) to routinely assess HRQoL provides a measure of symptom severity and patients' functional and social capacities associated with healthcare or treatment [19].

SHAPING A NEW HIV PATIENT-CENTERED CARE PARADIGM IN THE COVID-19 ERA

HIV care must move beyond viral–immunological success to incorporate patient-centered outcomes based on the intrinsic characteristics of the individual and their environment [20]. Care should take into account the mental and physical health complexes, as well as social challenges of each patient to tailor care to their needs. Furthermore, service redesign should be oriented around the diverse needs of individuals, rather than the prerequisites of providers, and must ensure health equity. In particular, any changes to care delivery must address existing disparities in access and care among vulnerable populations to enhance care.

A patient-centered health model could utilize telemedicine, which has been used increasingly during the pandemic and offers new research opportunities and the possibility of redesigning previous models of care. Realizing the promise of telehealth requires an understanding of how telemedicine can contribute to the full care spectrum, including data collection, patient empowerment, diagnosis, and therapy provision. The degree to which telemedicine impacts the provision of evidence-based care, and quality of care, must be assessed in the case of HIV. Nonetheless, telemedicine should not be limited to those providing HIV medical services but should comprise other healthcare professionals involved in HIV care such as nurses, psychologists, pharmacists, and other medical specialists who provide diagnostic and exploratory procedures.

To optimize care delivery, telemedicine should be combined with the traditional F2F patient–physician encounter, which is often considered essential at the time of HIV diagnosis. Following the first F2F encounter at diagnosis, subsequent visits can utilize both F2F and telehealth encounters. Table 2 suggests a follow-up framework based on the health domains listed in the European AIDS Clinical Society (EACS) guidelines [21]. It sets out 13 procedures that require a physical appointment, such as drawing blood, and 13 assessments that could be carried out by telemedicine, such as self-reported anthropometry, drug reconciliation lists, and patient-reported outcomes. Overall, the follow-up time schedule suggests 2–3 patient–physician encounters each year, alternating one F2F meeting and 1 or 2 subsequent telephone/video calls 4–6 months apart. Some health data could be obtained both with telehealth and F2F. The former should not be considered a surrogate of the latter: for instance, self-reported frailty is complementary rather than a substitute for assessment of the frailty phenotype. Similarly, in the context of polypharmacy, a self-collected drug reconciliation list, possibly through dedicated smartphone apps, may be an adequate preequisite for deprescribing interventions. Follow-up frequency should have a personalized approach and be established based on the patient's healthcare needs.

Absent in the original EACS table on "Assessment of PLHIV at Subsequent Visits" is the operationalization of healthy aging through intrinsic capacity as a new HIV care outcome, as suggested by the WHO Guidelines on Integrated Care for Older People (ICOPE) [22]. Healthy aging is defined by WHO as the process of developing and maintaining the functional ability that enables well-being in older age [23]. This construct derives from the relationship of 2 entities: (i) intrinsic capacity, which is the composite of all cognitive and physical functioning of the individual; and (ii) their environment. Healthy aging is particularly important for HIV since PLHIV face more age-related physical and mental health comorbidities compared to those without HIV. As such, it is critically important to monitor chronic conditions and indicators related to aging in PLHIV.

Future research should aim to investigate the best methods for collecting information on each of the intrinsic capacity domains, including mobility, cognition, psychosocial, sensory, and vitality domains. Currently, digital biomarkers are already in use for existing health services. These integrate the internet services of medical things, which use innovative healthcare information technology systems, in clinical settings. Predictive medicine in particular is a unique tool for HIV care, which can shift the clinical evaluations of specific diseases to the overall health of the individual. Predictive medicine relies on machine learning to predict observations [24, 25] and offers a unique opportunity for "P4 medicine" (Preventive, Predictive, Personalized, and Participatory), which, if applied to HIV care, may help make it more proactive [25]. Ultimately, such transformations can be utilized alongside telemedicine to maximize wellness for each individual rather than simply treat disease [26].

This shift towards patient-centered models of care has already started in HIV medicine [27] and the disruption introduced by the COVID-19 pandemic is driving further innovation. Our task is now to provide evidence as to how these changes impact achievement of all 4 HIV "90" targets.

CONCLUSIONS

The COVID-19 crisis is an unprecedented challenge for healthcare systems worldwide. Nevertheless, it offers the opportunity to accelerate a shift towards personalized and people-centered approaches to improve the health of PLHIV.

Table 2. Assessment of PLHIV at Subsequent Visits Via Face-To-Face or Telehealth Consultations

	Assessment	Follow-up frequency (#)	F2F	Telehealth	Tool	Comment
3rd 90 target						
Virology	Plasma HIV-VL	12 months	✓		More frequent monitoring of HIV-VL at start of ART. Perform genotypic resistance test before starting ART if not previously tested or if at risk of super-infection or in case of suboptimal adherence.	
	Genotypic resistance test and sub-type	At virological failure	✓		Annual CD4 count if stable on ART and CD4 count >350 cells/μL CD4/CD8 ratio is a stronger predictor of serious outcomes	
Immunology	CD4 absolute count and %, CD4/CD8 ratio (optional: CD8 and %)	12 months	✓			
4th 90 target						
Health-Related Quality of life		At 4- and 8-months post F2F		✓	Questionnaire	
Psychosocial	Current lifestyle (alcohol use, smoking, diet, exercise, drug use)	At 4- and 8-months post F2F		✓	Questionnaire	Adverse lifestyle habits should be addressed more frequently
	Employment	At 4- and 8-months post F2F		✓	Screening questions	Provide advice and support if needed
	Social and welfare			✓	Screening questions	
	Psychological morbidity			✓	Screening questions	
	Partner and children			✓	Screening questions	Test partner and children if at risk
Sexual and Reproductive Health	Sexual history	At 4- and 8-months post F2F		✓	Screening questions	Address issues concerning sexual dysfunction Risk of sexual transmission should be addressed
	Safe sex			✓	Screening questions	
	Partner status and disclosure			✓	Screening questions	Recommend starting ART in serodiscordant couples
Blood exams	FBC, TC, HDL-c, LDL-c, TG, Serum glucose, AST, ALT, bilirubin, ALP	12 months	✓			
Body Composition	Physical examination	12 months	✓		Lipodystrophy assessment and measurement of weight height and waist circumference	DEXA for body composition should be advised if available
Body Composition	Body-mass index	At 4- and 8-months post F2F		✓	Screening questions Self-assessment of weight and waist circumference	
Comorbidities	Cardiovascular disease Hypertension Pulmonary disease Liver disease Renal disease Bone disease Cancers	12 months or as indicated in EACS guideline for special populations			As indicated by EACS guidelines	Should be performed in all men >40 years and women >50 years without CVD
Comorbidities		At 4- and 8-months post F2F		✓	Screening questions Self-reported list of comorbidities Self-reported blood pressure, heart, and respiratory rate, any new symptoms	Should be performed in all men >40 years and women >50 years without CVD

Table 2. Continued

	Assessment	Follow-up frequency (#)	F2F	Telehealth	Tool	Comment
Cognitive impairment		At 4- and 8-months post F2F		✓	Screening questionnaire	Screen all persons without highly confounding conditions. If abnormal or symptomatic, for further assessment
Depression		At 4- and 8-months post F2F		✓	Questionnaire	Screen at-risk persons
Polypharmacy		At 4- and 8-months post F2F		✓	Possibly using cell phone apps or pictures of drugs that patients take	Recall the updated list of drugs and dosages the patients is taking Ask about medication burden, medication beliefs, and medication taking practice
Polypharmacy	Assess drug reconciliation list to exclude drug-to-drug interactions and potentially inappropriate drug prescription	12 months	✓		Deprescribing strategies (including ARV) aim to calibrate the patient's therapeutic regimen, according to the actual need in their treatment path (or a part of it), interrupting the prescription of drugs not considered necessary for the maintenance/achievement of the patient's well-being	
Frailty	Frailty phenotype	12 months	✓		Assessed by 5 specific features 1.Self-reported weight loss 2.Self-reported exhaustion 3.Low levels of physical activity as measured by the Minnesota Leisure physical activity questionnaire 4.Measured 4 mile walk speed time 5.Measured grip strength	
Frailty		At 4- and 8-months post F2F		✓	Screening questionnaire	PLWH aged >50 years
Falls		At 4- and 8-months post F2F		✓	Questionnaire	
Urinary incontinence		At 4- and 8-months post F2F		✓	Questionnaire	
Intrinsic capacity	Locomotion	At 4- and 8-months post F2F		✓	Screening questions	Refer to WHO ICOPE program https://www.who.int/ageing/health-systems/icope/en/
	Vitality	At 4- and 8-months post F2F		✓	Screening questions	
	Sensory	At 4- and 8-months post F2F		✓	Screening questions	
	Cognition	At 4- and 8-months post F2F		✓	Screening questions	
	Psychosocial	At 4- and 8-months post F2F		✓	Screening questions	

Source: Adapted from EACS guidelines 10.1. https://www.eacsociety.org/files/guidelines-10.1_5.pdf.

(#) Follow-up frequency implies a personalized approach established on a patient's health care needs. This is a function of cognitive and physical complexity and can be addressed by the frailty status of the patient. The listed frequencies are considered for middle-aged PLWH undergoing routine visits while on effective ART with the capability to have a telephone call (ideally a videocall using a smartphone or a computer).
The follow-up time schedule suggests two to three patient–physician encounters each year, alternating one F2F meeting and one or two subsequent telephone/video calls 4–6 months apart.

Abbreviations. ALT, alanine transaminase; ALP, alkaline phosphatase; ARV, antiretrovirals; ART, antiretroviral therapy; AST, aspartate aminotransferase; CD4, cluster of differentiation 4; CD8, cluster of differentiation 8; CVD, cardiovascular disease; DEXA, dual energy X-ray absorptiometry; EACS, European AIDS Clinical Society; F2F, face to face; FBC, full blood count; HDL-c, high density lipoprotein-cholesterol; ICOPE, Integrated Care for Older People; LDL-c, low density lipoprotein-cholesterol; PLWH, people living with HIV; TC, total cholesterol; TG, triglycerides; VL, viral load; WHO, World Health Organization.

Notes

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