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Title: Reorienting health systems to the new HIV care paradigm: strategic priorities for the 'beyond viral suppression' era

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Reorienting health systems to the new HIV care paradigm: strategic priorities for the 'beyond viral suppression' era

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Abstract

The effectiveness of antiretroviral therapy and its increasing availability globally mean that millions of people living with HIV (PLHIV) now have a much longer life expectancy. However, PLHIV have disproportionately high rates of major comorbidities as well as reduced health-related quality of life. Health systems must respond to this situation by pioneering care and service delivery models that promote wellness rather than mere survival. This review synthesizes evidence about the emerging challenges of the "beyond viral suppression" era and identifies four priority areas for action: integrating HIV services and non-HIV services, reducing HIV-related discrimination in health-care settings, identifying indicators to monitor health systems progress toward new goals, and catalysing new forms of civil society engagement in the more broadly focused HIV response that is now needed in countries worldwide. Furthermore, in the context of an increasing burden of chronic diseases, the paradigm change that is underway in the HIV field must be considered in relation to burgeoning policy and programmatic efforts to promote healthy ageing.

Key messages

- Because life expectancy has increased greatly for people living with HIV (PLHIV), health systems face the challenge of meeting the complex healthcare needs of growing numbers of aging PLHIV in the coming years.
- PLHIV have higher levels of comorbidity than their HIV-negative peers, and also face challenges relating to polypharmacy and health-related quality of life (HRQoL).
- Viral suppression has long been regarded as the ultimate goal of HIV care, but health systems need to adopt new goals relating to long-term well-being.
- The broader HIV care agenda that is emerging calls for health systems to focus on health system integration, HIV-related discrimination, new measures of progress, and new roles for civil society actors.
- As the global response to HIV is redefined, efforts should be aligned with the healthy ageing agenda for the general population.

Introduction

After the antiretroviral therapy (ART) breakthroughs of the late 1990s dramatically improved the prognosis for people living with HIV (PLHIV), high-income countries experienced rapid declines in HIV-related deaths.[1–3] The scale-up of ART has been much slower in low- and middle-income countries, but sustained efforts have yielded steady progress, and 59% of the world's estimated 36.9 million PLHIV received ART in 2017.[4] The UNAIDS "90-90-90" target, introduced in 2014, continues to spur countries at all income levels to try to bring the epidemic under control. It calls for 90% of all PLHIV to be diagnosed, for 90% of those diagnosed to be receiving ART, and for 90% of those receiving ART to be virally suppressed.[5]

Life expectancy for PLHIV, while lower than that of the general population, has increased considerably in recent years.[6] Progress toward the 90-90-90 target thus means that health systems are responsible for the care of increasingly large numbers of ageing PLHIV. These individuals face the full array of health and social challenges commonly associated with ageing, such as decreasing physical mobility,[7] cognitive decline, chronic comorbid diseases, social isolation and suboptimal family support.[8] At the same time, their HIV-positive status may exacerbate these challenges,[9,10] as may their identification with marginalized groups such as men who have sex with men, transgender people, sex workers, migrants and people who inject drugs. They also may experience ongoing financial instability as a result of living with HIV-related health issues for many years. Stigma and discrimination remain implicated in health outcomes for PLHIV of all ages.[11,12] Providing PLHIV with the knowledge, skills and tools to prevent onward transmission of HIV continues to be a challenge in many settings worldwide. There is a recognised need to comprehensively address the syndemic nature of HIV and its most commonly co-occurring psychosocial conditions, including substance abuse, violence, mental health problems and sexual risk behaviours, particularly among key populations. Multidisciplinary interventions that more effectively address the intersection of HIV with these conditions are necessary to achieve and maintain viral suppression.[13]

In this complex landscape, the traditional focus on viral suppression as the ultimate goal of HIV care is beginning to give way to recognition that additional goals are needed, such as our "fourth 90" target proposed to address the health-related quality of life (HRQoL) of PLHIV (Figure 1).[14,15] There has been little discussion, however, about the role of national and subnational health systems in broadening the HIV care agenda.

Figure 1. A proposed "fourth 90" target for health-related quality of life

The World Health Organization (WHO) defines a health system as *all organizations, people and actions whose primary intent is to promote, restore or maintain health*. The WHO health systems framework sets out the key functions of a health system in terms of six essential "building blocks" for improving health outcomes: (i) leadership/governance; (ii) health workforce; (iii) financing; (iv) service delivery; (v) health information; and (vi) medical products, vaccines and technologies.[16] Health system researchers have emphasised that it is important to look beyond how individual elements of a health system function and consider how these elements interact with each other, as well as with the political, social and economic contexts.[17,18] Innovations in the use of electronic technologies for health-related purposes, i.e. e-health, are giving rise to new strategies for improving health system functioning. [19] Further, in recent years there has been a concerted effort to study how health systems can become more people-centred.[20–22] One aspect of people-centredness is attention to patient-reported outcomes, and the use of quantitative measures of patient-reported outcomes in healthcare delivery is an area of growing interest.[23]

The *Lancet HIV* series on HIV outcomes beyond viral suppression seeks to foster strategic thinking about the role of health systems in the current phase of the global HIV response. Its premise is that the nature of the HIV epidemic is changing in ways that call for a comprehensive strategic reorientation to the challenges of providing lifelong care in the context of high HIV treatment uptake. At the same time, the global community cannot allow a "fourth 90" target to distract stakeholders from the ongoing effort to achieve the 90-90-90 target of increasing HIV diagnosis, treatment and viral suppression rates. However, reorienting the HIV field to focus more holistically on the well-being of PLHIV rather than merely their viral load levels could potentially support better outcomes across the HIV care cascade. That is, a strategic emphasis on the importance of helping all PLHIV enjoy good HRQoL might very well reduce barriers and improve outcomes in regard to the progression of HIV-infected people to diagnosis, treatment initiation and sustained viral suppression.

Search strategy and selection criteria

We searched PubMed for English-language publications relating to the broad range of topics addressed in this article, using the search terms "HIV" and "AIDS" in combination with search terms such as "comorbidity", "multimorbidity", "polypharmacy", "health-related quality of life", "discrimination" and "civil society". We prioritised review articles published since January 2013 and utilised original research articles and commentaries when necessary to supplement information from review articles. We utilised publications from 2012 and earlier when we were unable to locate more recent information. We also identified references through searches of grey literature published by major stakeholders including UNAIDS and the World Health Organization. We reviewed the reference lists of key publications that were retrieved in order to identify other relevant publications not located through the other search strategies.

What challenges do health systems face in the context of high ART coverage?

Health systems that serve PLHIV using ART on a long-term basis can expect to see this population experiencing a wide range of health issues as well as issues with HRQoL.

Clinical concerns

When ART is initiated in a timely manner and is successful in suppressing HIV replication, the immune system recovers its ability to fight off many of the diseases associated with untreated HIV. Thus, in settings with high ART coverage, once-common HIV-related opportunistic infections such as *Pneumocystis jiroveci* pneumonia and cryptococcal meningitis are occurring much less frequently. However, a number of chronic noncommunicable diseases and disorders have emerged as major health issues, including cardiovascular, respiratory, renal and liver diseases, non-AIDS malignancies, bone thinning, and psychiatric and neurocognitive disorders.[24–30] For example, a large, cross-sectional study from the United Kingdom found that three-quarters of people with HIV were living with a diagnosed long-term health condition, most commonly mental health conditions such as depression and anxiety, along with precursors of cardiovascular disease such as hypertension, high cholesterol and diabetes. [31] Infectious diseases such as hepatitis B, hepatitis C and tuberculosis also continue to contribute to the burden of disease.[4,32]

PLHIV to date have experienced higher levels of multimorbidity than their HIV-negative peers.[33,34] In a 2018 study, multimorbidity rather than age or HIV-specific markers predicted unplanned hospital admissions for PLHIV in Australia.[35] Late presentation for HIV diagnosis has been identified as a risk factor for multimorbidity. Longer duration of HIV infection and longer time on ART are also risk factors for multimorbidity, independent of age.[34]

Treating PLHIV for multiple comorbidities often results in polypharmacy, which is commonly defined as the simultaneous use of five or more medications.[36] Commonly prescribed non-HIV medications that can potentially interact with antiretroviral regimens in harmful ways include statins, psychotropic drugs and narcotic/analgesic drugs.[37,38] Polypharmacy increases the risk of missing doses of ART or other medications and is associated with poor ART adherence.[39] PLHIV taking multiple types of medications are less likely to be prescribed single-tablet ART regimens, a finding that may reflect healthcare providers' concerns about the incompatibility of these regimens with other medications.[40] Polypharmacy in PLHIV has been associated with adverse outcomes such as cognitive alterations and falls,[41] and in one large study it was found to be independently associated with risk of hospitalisation and risk of death after controlling for underlying health status.[42] Other areas of medicine, particularly geriatric medicine, have seen the emergence of an evidence base to guide "deprescribing", or the supervised discontinuation of inappropriate medications.[43] However, there is scant research on deprescribing in HIV patient populations.

Multiple factors might contribute to the high incidence of some comorbidities in PLHIV taking ART. A number of comorbidities are linked to smoking, condomless sex, and consumption of alcohol and illicit drugs, and some PLHIV populations have high levels of these behaviours.[44–47] Additionally, various antiretroviral drugs have toxicities that may increase the risk for some comorbidities such as cardiovascular disease, kidney disease, bone loss, and depression.[48–51] Current treatment regimens are much more tolerable in this regard. However, negative consequences of exposure to earlier antiretroviral drugs may persist for many years after the drugs were discontinued.[52] Also, some newer drugs with milder toxicities may still have negative health implications because of the cumulative effects of prolonged use, although there are not sufficient data to draw conclusions about this issue.

Health-related quality of life

Although PLHIV who are able to access ART have seen dramatic improvements in many aspects of their health, concerns persist about their HRQoL. A large study found that PLHIV in the United Kingdom reported significantly lower HRQoL than the general population across all domains measured, with particularly low mental health scores.[53] Studies from different settings present a complex picture of HRQoL in older PLHIV. A Swiss study found that perceived social support was correlated with better HRQoL outcomes in older PLHIV, while having a greater unmet need for support (e.g. household, financial, emotional) was correlated with worse HRQoL outcomes.[54] In the HIV and Later Life study in the United Kingdom, multivariate analysis identified two factors associated with better HRQoL in PLHIV above age 50: not receiving state benefits and being partnered.[55] As for the influence of age itself, older age has been associated with better mental HRQoL among PLHIV in France and Ireland,[56,57] although a Swiss study found that older PLHIV scored better than their younger counterparts in only one of 29 domains: financial resources.[58]

Since factors affecting HRQoL may vary greatly across different settings, it is advisable to perform studies at the national or subnational level in order to effectively target HRQoL interventions. As for what those interventions should be, a wide range of individual and group interventions have been studied such as peer support, physical activity, symptom self-management, and mindfulness-based stress reduction. A systematic review of HRQoL interventions for PLHIV taking ART found that many of the 28 studies included in the review had methodological shortcomings such as selection bias and insufficient reporting of information about study instruments, leading the authors to conclude that more methodologically rigorous research is needed on this topic.[59]

How can health systems improve care for PLHIV in the context of high ART coverage?

Meeting the challenges identified in the preceding section will require health systems to take fundamentally different approaches to the care of people living with HIV. Here, we describe the four aforementioned issues that are likely to be central to this reorientation process. We present specific recommendations associated with these issues in Figure 2.

Figure 2. Meeting key health system challenges of the new HIV era

Health service integration

Health service integration, while not a new strategy, is becoming relevant to increasingly more PLHIV and their healthcare providers, including primary care providers who are assuming a greater role in the long-term care of PLHIV. This interest is being driven in part by the emphasis that global health leaders have placed on integrated health services as a key to achieving universal health coverage and the Sustainable Development Goals. In 2016, the World Health Assembly adopted WHO's Framework on Integrated People-Centred Health Services, which puts forth a vision of "equal access to quality health services that are … coordinated across the continuum of care, and are comprehensive, safe, effective, timely, efficient and acceptable".[60] Furthermore the 2018 International AIDS Society–*Lancet* Commission on advancing global health and strengthening the HIV response in the era of the Sustainable Development Goals stated in one of its three penultimate recommendations that "HIV should be carefully and strategically integrated within primary care and the broader global health agenda."[61]

Integration in the HIV field may entail expanding the range of services provided by existing HIV clinics, or alternately, primary healthcare clinics or other types of clinical facilities may incorporate HIV care into their services.[23] Services that have been combined with HIV care in integrated clinics include services for sexual and reproductive health, sexually transmitted infections, cervical cancer screening, tuberculosis, diabetes, hypertension, chronic respiratory disease, mental health, substance use disorders, methadone maintenance, and hepatitis C treatment.[62–65] The co-location of services is often a feature of integrated service delivery models, but this is not an absolute requirement as effective referral including the use of telemedicine may be seen as a form of service integration.

Different health systems are likely to have different service integration priorities. For example, in a setting where high levels of depression and other mental health disorders have been observed among PLHIV engaged in care, integrating mental health services into HIV clinics may be an effective strategy for improving health outcomes. In a setting where people who inject drugs account for a large proportion of the HIV disease burden, and harm reduction services are available, it may be advantageous to integrate HIV clinical management services into needle and syringe programmes, safe injection rooms and opioid substitution therapy clinics.

The body of research on service integration in the HIV field contains examples of good results,[64, 66–68] but other findings are inconclusive,[69,70] and the evidence base overall is undermined by a dearth of methodologically rigorous studies reporting on concrete health outcomes or cost-effectiveness outcomes.[71,72] It is probable that the performance of integrated health services is highly context-specific, with numerous factors at play, including institutional norms and the level of health system centralisation or decentralisation. In spite of gaps in the evidence to guide HIV service integration, it remains imperative for health systems to explore this strategy, as it seems questionable whether existing service delivery models can provide comprehensive high-quality care to large cohorts of patients with HIV and multiple major comorbidities in the coming years.

Achieving greater health system integration for PLHIV will require the effective management of patient health information in the context of complex privacy concerns and data protection laws and regulations. Some countries and subnational jurisdictions have introduced laws to provide a higher level of protection to patients with health conditions that make them vulnerable to discrimination, including HIV, mental health disorders, and substance use disorders. Such laws may have implications for the design and operation of integrated services for PLHIV.[73,74]

HIV-related discrimination in healthcare settings

PLHIV experience HIV-related discrimination in healthcare settings in all regions of the world.[4,75–77] Such discrimination is both a human rights violation and a threat to the health and HRQoL of PLHIV. HIV-related discrimination in healthcare settings has been linked to medication non-adherence, persistent viral activation, and other negative health outcomes.[78–80]

In 2015, the Thai government established a national network to monitor HIV-related stigma and discrimination in healthcare settings, and findings are informing ongoing efforts to counter this problem. The Thai experience became the model for a similar monitoring project in Ho Chi Minh City, Vietnam, where the resulting training intervention was credited with reducing stigma and discrimination in local health facilities.[4,81] Other than these examples, however, there appears to be little public documentation of health system initiatives to reduce HIV-related discrimination in healthcare settings.

To counter such discrimination, health systems should begin by examining the available evidence about the nature and extent of the problem. One potential resource is the civil society-driven People with HIV Stigma Index, which has been used to document stigma and discrimination in more than 90 countries to date.[82] For example, Stigma Index findings from Greece indicate that 11% of PLHIV reported experiencing the denial of healthcare because of their HIV status at least once in the preceding 12 months.[83] National and community-level nongovernmental organisations (NGOs) that address the social and legal aspects of HIV may be another valuable source of information.

Indicators to monitor progress toward new goals

Measuring how health systems respond to the needs of PLHIV is essential for programme planning and resource allocation, and ultimately for achieving and sustaining better health outcomes. A key question in the beyond viral suppression era is whether the indicators that currently guide national and subnational HIV responses adequately reflect issues raised in this review such as multimorbidity, HRQoL, service integration and discrimination in healthcare settings.

Historically, HIV indicators in low- and middle-income countries have been dictated by monitoring frameworks from three major global institutions: UNAIDS, PEPFAR, and The Global Fund.[84–86] European countries have increasingly used the *Dublin Declaration Questionnaire* to contribute to a regional HIV monitoring process coordinated by the European Centre for Disease

Prevention and Control (ECDC) and have incorporated these indicators into their national monitoring programmes.[87] A 2018 analysis of indicators in these three global frameworks and the *Dublin Declaration Questionnaire* found that out of hundreds of indicators, only a handful monitored major non-AIDS-defining comorbidities, and none of these indicators were harmonised across frameworks.[88] For example, the only items addressed comprehensively in the *Dublin Declaration Questionnaire* were access to services for bacterial STIs, liver diseases and psychiatric disorders, and there were a number of dissimilar findings regarding how these items were addressed in the other monitoring frameworks. Furthermore, unpublished data collected by the ECDC indicate that only five of the 48 countries that reported to the ECDC in 2018 measure the HRQoL of PLHIV as part of their national HIV monitoring (personal communication, European Centre for Disease Prevention and Control to Jeffrey V Lazarus, 5 June 2018).

These findings suggest that reviewing the available monitoring data to identify gaps should be a key component of rethinking health system approaches to HIV care. Monitoring systems may require only minor modifications to assess the screening, diagnosis and treatment of some major non-AIDS-defining conditions in PLHIV, as well as associated lifestyle risk factors such as smoking, and alcohol and drug use. Also, it may be feasible to utilise existing health system monitoring mechanisms relating to other health issues such as viral hepatitis and noncommunicable diseases.

Monitoring HRQoL, on the other hand, is likely to require new approaches. Well-being is subjective and multidimensional, and data collection can be burdensome and costly. However, a single global question such as self-rated health status, which has been shown to be significantly and independently associated with morbidity, mortality, and health service utilisation,[89–91] can provide insight into a patient's subjective view of his or her health and can help to guide clinical consultations. Alternately, a multi-dimensional index can be used to generate an overall HRQoL score from several questions. The drawbacks associated with using an instrument with a larger number of questions may be outweighed by benefits such as increased sensitivity to changes over time and capacity to measure changes within individual dimensions of health, for example, mental health or physical functioning.[92,93] A further benefit of an HRQoL index is that there exist both generic instruments that allow comparisons to the general population as well as instruments that cover HIV-specific symptoms and problems such as antiretroviral side-effects and stigma.

Data on self-perceived well-being must, by definition, be patient-reported, as opposed to clinician or laboratory reports traditionally used in HIV reporting. One way of obtaining data is to survey patients via HIV clinics or national HIV cohorts that can be linked to surveillance, using methods to ensure that the sample is representative.[94,95] Alternately, questions on well-being and quality of life can be integrated into routine clinical care and captured by electronic patient records for routine reporting.

Finally, there is the question of how to measure health system progress toward a "fourth 90" target that is meant to represent whatever is crucial for PLHIV to attain in addition to viral suppression. The desired outcome is widely described as good health-related quality of life, but this does not necessarily mean that progress should be assessed solely in terms of the self-reported data that are collected using HRQoL instruments. In fact we originally conceived of the "fourth 90" target as encompassing two domains: self-reported quality of life and comorbidities.[14] More recently, Guaraldi et al have suggested that health-adjusted life expectancy, frailty assessment and measures of intrinsic capacity all may contribute as well to providing a composite picture of healthy aging in PLHIV populations.[96] Further work is needed to develop consensus regarding the appropriate instruments for quantifying health system performance in regard to a new target and to pilot such instruments.

Civil society engagement

Historically, civil society actors, including NGOs, community-based organisations, and patient groups have been involved in many aspects of HIV care, such as patient education, peer support, and advocacy for sound HIV treatment policies. As health systems confront the question of how to better address the current needs of PLHIV, there are opportunities to explore new roles for civil society.

For example, the AIDS Community Research Initiative of America (ACRIA), an NGO established in 1991 to bring a community-based perspective to the study of new HIV treatments, now operates a Center on HIV and Aging. The centre receives public funding to provide ageing-related training and technical assistance to service providers in New York.[97] The Canadian NGO *Realize* expanded its focus to ageing-related issues after being established in 1998 to address the rehabilitation needs of Canadian PLHIV. The Public Health Agency of Canada provides much of the funding for *Realize*, which published a series of policy briefings in 2018 to advise provincial and territorial ministers of health on various aspects of ageing with HIV.[98]

Civil society also has the potential to guide health systems in becoming more responsive to the needs of PLHIV in specific service delivery settings. For example, a Norwegian hospital initiated a user-driven redesign of its outpatient HIV clinic in 2011, with decision-making guided by a board of patients.[99] This board identified holistic care and treatment as a key service target and requested that the clinic provide patients with individual care plans. It also developed a checklist of 108 items to be monitored in individual patient care, including mental health, alcohol/drug dependence, and neurocognitive decline (personal communication, Maryan Said to Kelly Safreed-Harmon, 24 September 2018).

Additionally, there are unexplored opportunities for health systems to leverage the expertise of NGOs that provide services to PLHIV by encouraging these stakeholders to address comorbidities and diseases of ageing. For example, NGOs might refocus their programming to support PLHIV who have new health-related goals relating to exercise, diet, smoking cessation and effective self-management of chronic conditions such as diabetes. Community-based NGOs have a long history of providing PLHIV with peer support, which is likely to remain a prominent element of psychosocial well-being as PLHIV age and encounter new challenges in relation to their health as well as other aspects of their lives.[100] Health system leadership, technical support, and funding are needed to foster a new era of NGO activity addressing this broader agenda.

Conclusion

In countries worldwide, ongoing progress toward and beyond the 90-90-90 target is changing the face of the HIV epidemic. This review has examined challenges confronting health systems in the increasing number of settings where the widespread availability of ART enables many people living with HIV to effectively control their HIV infection on a long-term basis. High levels of multimorbidity have been observed among PLHIV in these settings, and the evidence base also raises concerns about the HRQoL of PLHIV. We identified four strategies for meeting the new challenges of the “beyond viral suppression” era: service integration, reduction of discrimination in healthcare settings, the introduction of new health system indicators, and new forms of civil society engagement.

The two other review papers in the HIV outcomes beyond viral suppression series examine patient-reported outcomes (PROs) and interventions to reduce stigma in the context of this strategic agenda. PROs can serve as effective indicators of patient well-being and health system progress in the HIV field, but there is insufficient awareness of how to best use these instruments to address the challenges of a complex and changing epidemic. The paper by Kall et al presents an overview of validated PRO instruments for HIV and discusses considerations in selecting PROs, data collection methods, and challenges and opportunities associated with further integrating PROs into the global HIV response. A key task for stakeholders working to reduce discrimination in healthcare settings is to understand how the stigmatizing attitudes that give rise to discrimination can be successfully challenged. The paper by Andersson et al provides insight into this issue by examining the effects of stigma-reducing interventions in various populations. The series concludes with a comment in which van den Berk et al discuss how e-health can contribute to meeting some of the key challenges of the “beyond viral suppression” era.

While the HIV outcomes beyond viral suppression series focuses on health system priorities, the health-related needs of people who are living with HIV on a decades-long basis are deeply intertwined with other fundamental needs. Thus the health system agenda for achieving good HIV outcomes beyond viral suppression should be integrated with efforts to ensure that PLHIV have food security, financial security, adequate housing and other forms of social support. It is also essential to continue to confront the health and socioeconomic disadvantages that have made some people more vulnerable to HIV and to poor health outcomes, and in doing so to confront institutionalized forms of discrimination against marginalized groups.

Since high-income countries generally have the largest proportions of PLHIV who are consistently virologically suppressed,[4,101] much of the evidence in our review has been drawn from these countries. However, high-income countries are simply at the forefront of a worldwide transition. In low- and middle-income countries, similar challenges regarding long-term HIV care are beginning to emerge.[65,102] Our observations and conclusions are intended to inform the health policy discourse globally, although it is recognized that variations in progress toward the 90-90-90 target make the emerging agenda that is discussed in this article a more immediate priority in some settings than others.

In the context of an increasing worldwide burden of chronic diseases, the paradigm change that is underway in the HIV field must be considered in relation to burgeoning policy and programmatic efforts to promote healthy ageing. HIV stands apart from other conditions in some ways, most notably for the particular stigma that it invokes and the many forms of discrimination arising from this stigma. Yet many of the key healthcare-related challenges faced by older HIV-positive people are the same as those faced by other older people: a shortage of provider expertise in geriatric health issues, a lack of coordination among healthcare providers, ageism, high out-of-pocket costs and inadequate long-term care options.[8] As policy-makers and other health system actors define the healthy ageing agenda in the coming years, it is important for the HIV field to contribute to broadly targeted initiatives in this realm as well as focusing on how to provide the best care for PLHIV. Coordinating the ageing agenda of the HIV field with that of the community at large will present opportunities to maximise financial and human resources, and may also enable HIV stakeholders to more directly counter discrimination in mainstream healthcare settings.

Although government stakeholders typically have the most prominent role in setting health system agendas, the strategies discussed in this review can best be operationalised through multistakeholder initiatives that bring together actors from government, medical and research societies, private industry, the PLHIV community, NGOs and other relevant sectors. Information-sharing is vital as the HIV field reorients itself to the task of providing holistic long-term care to PLHIV. Stakeholders are urged to report on operational research findings and other evidence emerging from new initiatives in this realm.

Author's contributions

JVL and KSH had the idea for this review, designed it and oversaw its development including preparing the first draft with input from all authors. JA worked with KSH and JVL in the preliminary stages of development and drafting. All authors reviewed and approved the final version of the manuscript.

Conflict of interest statements

JA reports personal fees and non-financial support from Gilead Sciences, personal fees from MSD and personal fees from Janssen outside of the submitted work. GMNB reports grants and personal fees from Gilead Sciences, personal fees from Janssen, personal fees from MSD and personal fees from ViiV Healthcare outside of the submitted work. UD reports grants from Gilead Sciences and grants from ViiV Healthcare outside of the submitted work. JDA reports personal fees from ViiV Healthcare, Gilead Sciences and MSD outside of the submitted work. MK reports grants from Gilead Sciences outside of the submitted work. JVL reports grants from the HIV Outcomes Beyond Viral Suppression Coalition during the conduct of the study, and also reports grants, personal fees and other support from AbbVie; grants, personal fees and other support from Gilead Sciences; grants and personal fees from MSD; personal fees from Janssen; and personal fees from CEPHEID outside of the submitted work. KP reports personal fees from ViiV Healthcare outside of the submitted work. KSH reports grants from the HIV Outcomes Beyond Viral Suppression Coalition during the conduct of the study. The other authors have no conflicts of interest to report related to this work.

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