

## Ageing with HIV



## How health systems can adapt to a population ageing with HIV and comorbid disease

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As people age with HIV, their needs increase beyond solely managing HIV care. Ageing people with HIV, defined as people with HIV who are 50 years or older, face increased risk of both age-regulated comorbidities and ageing-related issues. Globally, health-care systems have struggled to meet these changing needs of ageing people with HIV. We argue that health systems need to rethink care strategies to meet the growing needs of this population and propose models of care that meet these needs using the WHO health system building blocks. We focus on care provision for ageing people with HIV in the three different funding mechanisms: President's Emergency Plan for AIDS Relief and Global Fund funded nations, the USA, and single-payer government health-care systems. Although our categorisation is necessarily incomplete, our efforts provide a valuable contribution to the debate on health systems strengthening as the need for integrated, people-centred, health services increase.

## Introduction

As HIV enters into its fifth known decade of existence, patients with HIV initially diagnosed early in the epidemic have aged into their 50s and 60s.<sup>1,2</sup> The number of ageing people with HIV, that is adults (aged 50 years and older) living with HIV, is increasing and their proportion among total people with HIV is estimated to rise from 28% in 2010, to 73% in 2030 (see the first paper in this Series).<sup>3,4</sup> As people age with HIV, however, their needs grow beyond sole management of HIV.

Ageing people with HIV face a confluence of risks posed by both HIV and ageing that increases both their risk for non-communicable diseases (NCDs), and their risk for worse morbidity and mortality from NCDs. HIV infection compounds the risks associated with ageing<sup>5-8</sup> by independently increasing the risk of frailty,<sup>9,10</sup> cardiovascular disease,<sup>8,11</sup> AIDS-defining and non-AIDS-defining malignancies,<sup>12,13</sup> diabetes,<sup>8,14</sup> chronic respiratory diseases,<sup>15</sup> pill burden,<sup>16,17</sup> and provider visits.<sup>18</sup> Globally, metabolic syndrome among older adults living with HIV ranges from 19.7% to 26.6%.<sup>19</sup> Moreover, screening for many NCDs in ageing people with HIV might be hindered by the limited uptake of HIV-specific risk stratification frameworks for diseases, such as cardiovascular disease, which are routinely risk stratified in HIV-negative populations. Additionally, a higher pill burden in multimorbidity and neurocognitive decline might impair understanding of drug regimens, which could lead to increased risk of adverse events due to drug-drug interactions or reduced drug excretion due to ageing-related renal and hepatic dysfunction.<sup>16</sup>

In addition to an increase in comorbid conditions, ageing populations are confronted with stigma and discrimination, including ageism, that has resulted in a high prevalence of social isolation and loneliness among older adults (see the second paper in this Series).<sup>20-23</sup> These challenges are worsened by the lack of intersection of ageing-related and HIV-related social services and support

systems. Structurally, health-care providers assume that older adults are not sexually active and, as a result, are less likely to screen them for HIV or offer sexual education (see the first paper in this Series).<sup>4,24</sup> There are scarce HIV prevention and treatment options, including treatment guidelines for ageing people with HIV.<sup>25</sup> Despite these risks and care needs, many health-care systems are not optimally designed to care for ageing people with HIV<sup>26</sup>—resulting in episodic and siloed management that potentially places patients at risk of long-lasting complications and death.<sup>27,28</sup> Health systems must therefore adapt to preventing and managing comorbidities and

## Key messages

- Ageing people with HIV have increased needs beyond sole management of HIV, as they face greater risk of both age-regulated comorbidities and ageing-related issues than those without HIV
- Although health-care systems, globally, continue to evolve to meet the changing needs of ageing populations living with HIV, the evolution has resulted in many piecemeal approaches to equitably increase access to comprehensive care for these populations
- Persistent challenges in health-care systems to meet the needs of ageing people with HIV are worsened by the lack of intersection of ageing-related and HIV-related social services and support systems
- Within a universal health coverage approach, ageing people with HIV would have consistent access to the full range of services needed over the course of their lives, including prioritising ending the HIV epidemic by creating a strong monitoring and evaluation system that incorporates measuring and tracking healthy longevity with HIV; providing integrated, reliable, and affordable services for basic care needs beyond HIV; and ensuring access to different specialists as needed by this population

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**Panel 1: Case example from the AMPATH, Kenya**

The President's Emergency Plan for AIDS Relief-supported programmes like the Academic Model Providing Access to Healthcare (AMPATH) have been leveraging the external investment in HIV and internal partnership with the ministry of health to promote enhancements to the overarching health-care system. AMPATH is a partnership between Moi University College of Health Sciences, Moi Teaching and Referral Hospital, Eldoret, Kenya, and a consortium of North American universities led by the Indiana University School of Medicine, Indianapolis, IN, USA. AMPATH has collaborated with the Kenyan Ministry of Health to introduce comprehensive care services across western Kenya.<sup>33</sup>

Since its inception as a comprehensive response to HIV in 2001, AMPATH has been using the experience with responding to HIV to reinforce all other aspects of the health-care system. This more comprehensive approach includes creating health-care infrastructure to treat many of the illnesses that ageing people with HIV have a higher risk of developing than younger populations living with HIV or those without HIV. Because of AMPATH's commitment to the entire population residing in its vast western Kenyan catchment area, this same infrastructure has been used to support the health-care needs of the non-HIV infected population. To build upon these gains in providing clinical care for both those living with and without HIV, AMPATH has integrated responses to the social determinants of health in all activities.<sup>34</sup> This approach has helped create an integrated model, which has decreased the fragmentation of health care while simultaneously addressing the underlying socioeconomic challenges that continue to be a crucial area of emphasis in the response to HIV. From creating community-based savings and loans groups that increase access to capital, nutrition support programmes for food-insecure patients,<sup>35</sup> establishing peer-based care delivery,<sup>36,37</sup> and creating livelihood opportunities,<sup>34</sup> these efforts have revolutionised HIV care to provide contextualised and comprehensive care services for the entire population at large.<sup>38-40</sup> AMPATH also pursues the ambitious goal of integrating all these activities into locally sustained universal health coverage programmes like Kenya's National Hospital Insurance Fund. This HIV-informed approach has helped transform AMPATH from a programme focused only on HIV into one that is making great strides in sustainably advancing gains in addressing important social determinants of health for the entire population, regardless of HIV status. When considering the many challenges ageing people with HIV face, this approach would be expected to be much more effective in improving the quantity and quality of life not just for ageing people with HIV but the entire community, especially low-income populations, which tend to bear a disproportionate burden of disease in general.

respond to the social, structural, and economic needs of the ageing HIV population.

Although this general theme applies to the global management of HIV, considerable variability exists in the system-level response to addressing these evolving challenges in different countries. In high-income countries with single payer government systems, HIV care has been integrated into primary care, whereas health systems in the USA typically have assigned most aspects of care for ageing people with HIV to infectious diseases specialists.<sup>29,30</sup> As virally suppressed people living with HIV age and experience more age-related comorbidities, many have questioned whether the current setup of care in either health-care system optimally responds to the health needs of ageing people with HIV.<sup>3</sup> In low-income and middle-income countries, especially in geographical areas with a high burden of HIV, system responses to HIV are influenced by external funders such as the President's Emergency Plan for AIDS Relief (PEPFAR) and The Global Fund to Fight AIDS, Tuberculosis, and Malaria. Despite several successful care models, which have been developed and implemented to address the HIV-specific needs of populations in these regions, most public sector health systems struggle to address the growing burden of NCDs and age-related syndromes in ageing people with HIV.<sup>1,31</sup> Globally, these setting-specific health-care system dynamics have left ageing people with HIV in a precarious position as they navigate their constantly changing health needs.<sup>32</sup>

This narrative review aims to describe health-care system challenges, specifically addressing the needs of ageing people with HIV, by highlighting the current status of care delivery and proposing models of care to meet them. Because of the immense variability between how national health-care systems approach HIV management in different parts of the world, we have broadly divided these systems into three categories: (1) countries that receive a large portion of funding for HIV care through PEPFAR

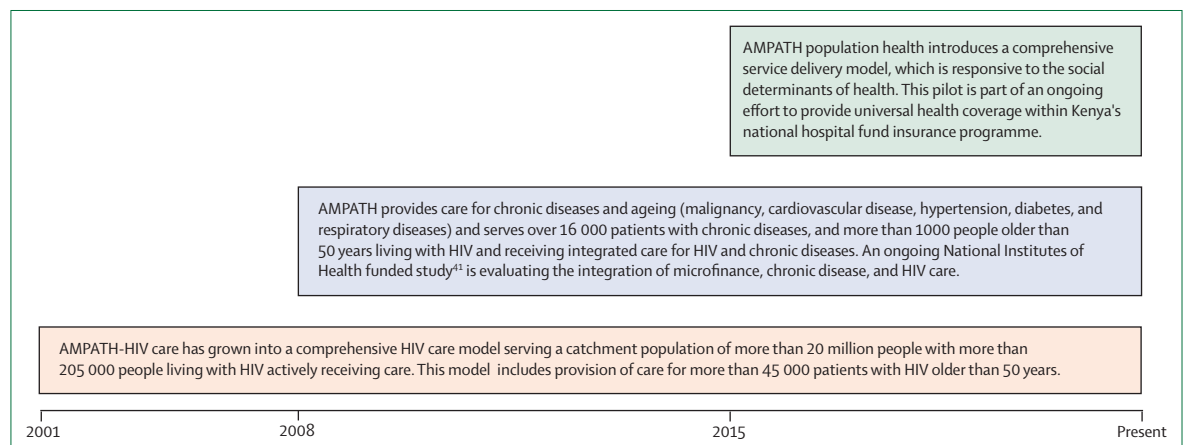


Figure 1: Evolution of the Academic Model Providing Access to Healthcare's (AMPATH) efforts to provide comprehensive services in western Kenya<sup>34</sup>

and The Global Fund (PEPFAR–The Global Fund supported countries); (2) the US health-care system; and (3) single payer government systems in high-income countries, relying primarily on the UK as a case example. Although this health system is an overgeneralised division, this approach tries to consider where the bulk of existing research comes from and the settings where HIV burden is geographically located.

There is considerable variability in the responsiveness of different types of health-care systems to HIV, chronic disease, and ageing care needs that people living with HIV face across the different stages of life. Worldwide, health-care systems have undeniably made considerable progress in improving access to HIV care as the basic essential antiretroviral medications, laboratory support, and clinical care are consistently available in all health systems, despite differences in the comprehensiveness and quality of care across different regions.

## Organisation of care for ageing populations

### PEPFAR–The Global Fund supported countries

HIV programmes in countries supported by PEPFAR–The Global Fund are typically focused on ending the epidemic with integrated and differentiated care models for HIV and NCDs (panel 1; figure 1). Strengths of these programmes include monitoring and evaluating and task-shifting to meet the increasing patient needs. Despite the progress made in the response to HIV, the response to NCDs within PEPFAR–The Global Fund supported countries continues to lag behind the amount of care available for HIV.<sup>42</sup> For example, many of these countries have the highest rates of early mortality from diabetes and the lowest availability of medications for hypertension.<sup>43</sup> These same trends extend to the ageing population, who have partial access to their care needs.<sup>26,44–46</sup> This limited access is further complicated by the fragmentation of care when ageing people with HIV receive comprehensive and free care for HIV while being asked to pay user fees for their NCDs.<sup>47</sup> In places where integrated chronic disease management has been introduced, including within the HIV care platforms,<sup>48</sup> its successful implementation has been hampered by various factors including staff shortages resulting in long waiting times.<sup>49</sup>

### The US health-care system

In the USA, specialised care services are well established and access to a specialised care consultation is available when needed (panel 2). Many patients rely on state and federal safety-net programmes to ensure affordability of antiretroviral therapies (ART). HIV care has historically been delivered by infectious disease-trained and HIV-trained specialists who manage both HIV and primary care needs. Over time, however, discrete HIV care delivery models have emerged. For example, HIV and primary care can be delivered by a single provider (either infectious disease-trained or internal

### Panel 2: Case example from the Golden Compass Program for older adults living with HIV in the USA

At Ward 86 outpatient HIV clinic at San Francisco General Hospital, San Francisco, CA, USA, an innovative team-based, geriatric-HIV focused programme was designed to address the comprehensive care and social needs of ageing people with HIV from within the San Francisco community. Briefly, the Golden Compass Program was launched with patients and key stakeholders' input in 2017.<sup>50</sup> The programme provides clinical care for all people living with HIV aged 50 years or older. The four core components of the programme resemble the four points of a compass: (1) heart and mind services provide care for cardiology and cognitive evaluation; (2) bones and strength services provide education classes for fitness, bone health, and geriatric needs; (3) dental, hearing, and vision provides screening, linkage, and referral for dental, hearing, and eye services; and (4) networking and navigation focuses on social and community activities for patients. Adoption of services by providers, as assessed by referrals, was high. In addition, both patients and providers expressed that they were highly satisfied with the services offered by the programme. The Golden Compass Program is an innovative example designed to address both clinical and psychosocial needs in ageing people with HIV in the USA and is a model worth considering for adaptation and replication.

medicine-trained) or in a model of shared care delivery, with an infectious disease specialist delivering HIV care and a generalist providing primary care. As ART selection and management has been simplified for many patients and viral suppression is more widespread, questions remain as to whether providers for HIV or other infectious diseases should continue to serve as primary care providers or whether primary care providers should provide both primary care and HIV care, with an infectious disease specialist consultation for complicated cases or issues.<sup>29,30</sup> In an era when most of the time during clinical visits is spent on chronic disease management and counselling instead of HIV-related issues, a primary care clinician might be the more appropriate provider. Ageing people with HIV have increasing rates of chronic diseases, which primary care providers routinely manage and for which HIV specialists might have less training and experience in managing.<sup>29,30</sup> Results on the effectiveness of HIV specialists in managing comorbidities has been mixed, with some studies showing a lack of concordance with guidelines for statin prescriptions, and others showing similar rates of NCD screening.<sup>51</sup> Conversely, HIV providers have a detailed understanding of the increased risk and novel risk factors at play in comorbidities affecting people living with HIV and of the subtleties of prevention and management, which might differ from those in the non-HIV population. Although guidelines call upon special considerations and awareness in caring for

### Panel 3: Case example from the Royal Free Hospital in London, UK

The Sage Clinic at the Royal Free Hospital in London, UK, specifically addresses frailty syndromes using a one-stop-shop model. Here, the geriatricians work together with occupational therapists, physiotherapists, and pharmacists as well as HIV specialist clinicians and nurses. Patient assessment leads to individual care plans with onward referral or advice to primary care practitioners where permitted. An evaluation<sup>58</sup> of this service showed a high proportion of unmet needs. The median age of attendees was 69 years (53–93) with 77% being male, 63% being White, 49% being heterosexual, and 97% being virally suppressed. Most (83%) met the criteria for frailty with the Fried frailty phenotype. 18 issues linked to ageing were identified, with the most common being affective symptoms (51%), memory loss (37%), and falls (29%). Not all service users completed feedback, but satisfaction rates were high in those who did. The authors concluded that although older people living with HIV are a heterogeneous group, frailty is common and appears to present early. Recommendations were that HIV services either need to adapt to meet these additional needs, or must support users in transitioning to established services.<sup>58</sup> The SARS-CoV-2 pandemic has made continuing with a face-to-face multidisciplinary model difficult, but the service is now running appointments again with a dedicated HIV physician, geriatrician, and specialist pharmacist. Good referral links are established with physiotherapists and occupational therapists. This slimmed down model has important implications for those considering developing similar services elsewhere and is likely to be more cost-effective. Particularly for small HIV clinics, one recommendation is to provide a specialist service by simply flexing appointment times and scheduling as the first step so that those with increased needs can be offered extended, more in-depth appointments to get to the root cause of complex multimorbidity issues. The HIV clinician can then play a trusted coordinator role in supporting navigation of complex care. In this scenario, making strong links outward to other specialists is important, rather than the more costly and time intensive inclusion of a wider team within a dedicated clinic.

ageing people with HIV<sup>52</sup> few guidelines provide HIV-specific recommendations for the management of comorbidities. In the absence of HIV-specific guidelines for most chronic diseases, HIV primary care guidance relies heavily on general population guidelines. In instances when HIV-specific guidance does exist, such as the American Heart Association's<sup>53</sup> scientific statement on HIV and cardiovascular disease, clinical judgement is required to follow the specific guidance, such as uptitration of the calculated cardiovascular disease risk prediction function based on the presence of risk-enhancing factors such as HIV. Moreover, given

increased rates of and differing risk factors for comorbidities in people living with HIV, different thresholds for symptom evaluation and screening might need to be considered. This relative lack of HIV-specific guidance has led to suggestions that an HIV specialist will be helpful in interpreting, adapting, and applying general guidelines to the HIV population. Finally, the question of how to best integrate geriatric services with HIV care is also under active discussion, with several proposed models to optimally address issues including frailty, cognition, polypharmacy, social isolation, and end-of-life care and preferences.<sup>54–56</sup> As with NCDs, the management of geriatric syndromes might need to be modified in the HIV setting; one commentary suggested adding a sixth so-called M for HIV-related modifiable factors to the traditional five Ms of geriatrics: mind, mobility, medications, multicomplicity, and matters most.<sup>57</sup>

### Single-payer government systems

Within single-payer government systems, HIV services are typically consistently reliable and affordable. A culture of guideline-driven practice and continuous quality improvement helps to make services easy to navigate (panel 3). Health-care systems with government-based single payer financing have typically had stronger primary care systems to integrate HIV care into than PEPFAR supported countries or the USA, with the exception of the USA's Veteran Health Administration that uses single payer health care. Many single payer settings, such as the UK, have originally established HIV care outside of sexual health-care programmes. Although this approach more adequately addresses the needs of younger people living with HIV who are of reproductive age, it is suboptimal for ageing people with HIV who are still sexually active but require greater attention to other health-care issues than their younger counterparts. Because of these dynamics, systems have been pushing the main responsibility for the care of ageing people with HIV back to primary care providers with intermittent targeted guidance from other specialists. Primary care providers in the UK, are supported in these roles through the availability of comprehensive protocols and quality improvement targets accredited and supported by the government's National Institute for Clinical Effectiveness.<sup>59</sup> Although these protocols are not HIV specific, many ageing people with HIV report gaps in the care they receive between primary and HIV specialist care.<sup>60</sup> UK postgraduate specialty training in sexual health and HIV has now moved to mandate dual accreditation in internal medicine to reflect the need to train a generation of doctors who can manage the complexity of older patients with HIV infection;<sup>61</sup> although whether all health care for ageing people with HIV will be commissioned within specialty services remains to be seen.

	Current practice in regions funded by PEPFAR-The Global Fund	Proposed changes to current practice	Current practice in the USA	Proposed changes to current practice	Current practice in single-payer government systems	Proposed changes to current practice
Service delivery	Siloed HIV care systems; parallel or lagging-behind care systems for other comorbidities and ageing needs	Integrated screening models for NCDs and NCD risk factors among patients with HIV enrolled in care at the health facility and community levels; integrated care models for HIV and NCDs; differentiated care models for ageing people with HIV and NCDs; incorporate palliative care and end-of-life planning	Largely provided by infectious disease or specific HIV-trained specialists	Additional support to integrate HIV specialty care and non-HIV care needs; propose the so-called 6M model of service delivery; incorporating palliative care and end-of-life planning	Main responsibilities for the specific ageing care needs of ageing people with HIV are with general practitioners, with intermittent targeted guidance from other specialists	Multidisciplinary clinics where specialist geriatric HIV services are key in supporting older patients with HIV and geriatric syndromes; incorporating palliative care and end-of-life planning
Health workforce	More familiarity with acute and HIV care at the primary care level; task-shifted care emphasised	Additional training and development of practice-based competencies; extending the roles of nurses, community-health workers, and HIV peers to provide clinical care for ageing people with HIV	Specialist vs primary care physicians with little task-shifting	Training for specialists and primary care physicians, and additional engagement with patients and community members for task-shifting	General practitioners feel uncomfortable providing HIV care and patients are more comfortable receiving care from HIV specialists	The general practitioner role can be expanded to support care for ageing people with HIV; if appropriate training opportunities are provided
Health information systems	Electronic medical records are more common in HIV care vs non-HIV care	Health information technology tools with integration capability and decision support functionality should be used; enhance communication and information flow	Electronic medical record systems are individualised to separate health systems and might not be viewable across systems	Decision support systems for care providers can play a role in improving the quality of care and adherence to guidelines and best practices	Electronic medical record systems are individualised to separate health systems and might not be viewable across systems	Decision support systems for care providers can play a role in improving the quality of care and adherence to guidelines and best practices
Access to essential medicines	Parallel systems with free-of-charge HIV medicines, but out-of-pocket non-HIV medicines	Financial resources availed for both HIV and non-HIV medications; joint orders and pooled procurement of all essential medications; innovative pharmacy models and distribution strategies at all levels of the health-care system	Medication access and affordability is based on insurance packages and available state-specific public health safety net programmes	Expansion of the Affordable Care Act, the Ryan White HIV/AIDS Program, and the 340B Drug Pricing Program	Free-of-charge HIV medicines	Single-payer system ensures there are no financial barriers to medication access
Financing	More financial support for HIV vs non-HIV care initiatives	Financial resources availed to meet the priorities of both HIV and non-HIV comorbidities and age-related syndromes; pushing forward the universal health-care agenda	Priority for financial support and investment in care services over social services	Crucial need to increase financial resources for both care and social support; integration of HIV and geriatrics social work teams to optimise social support for ageing people with HIV	Care provision is available free-of-charge through the national health insurance system	Single-payer system ensures there are no financial barriers to care service access
Leadership and governance	An agenda setting for ageing people with HIV is still lacking; challenges with leveraging and aligning priorities for public vs private vs non-profit organisations	Increased advocacy and priority setting for the ageing patient population with HIV; formal supervision, national guideline development, and collaborative governance with local authorities	System-driven given complex reimbursement schemes	Increased advocacy and priority setting for the ageing patient population with HIV	There is limited availability of national guidelines for managing HIV and age-related syndromes in ageing people with HIV	Strong culture on guideline-driven practice and quality improvement should be expanded to meet the care needs of ageing people with HIV

NCD=non-communicable disease.

**Table: Current practices and proposed approaches for ageing people with HIV and comorbid disease in regions funded by the President's Emergency Plan for AIDS Relief and The Global Fund to Fight AIDS, Tuberculosis and Malaria, the USA, and single-payer government systems by WHO building blocks**

### Proposed organisation of care within the health-care system to meet the needs of the ageing HIV population

As seen through the various solutions used by the different health-care systems mentioned previously, there are still many piecemeal approaches to catchup to the rapidly evolving needs of ageing people with HIV. Overall, common themes that emerge from these approaches reveal the overwhelming need to respond by (1) the creation of a seamless care system, (2) the incorporation of holistic care models to support geriatric patients, patients with HIV, and those with other comorbidities, and (3) training across specialisations to expand the roles of geriatricians, primary care providers, and HIV specialists. From a health system perspective, to achieve durable and sustainable success for a condition, which has become a chronic disease, these efforts must be incorporated into a responsive universal health coverage approach to ensure ageing people with HIV have uninterrupted access to the full range of services they will need over the course of their lives. In tracking the attainment of universal health coverage across these three health-care system categorisations, single payer government systems like in the UK (with a universal health coverage score of >90) have made the most progress, whereas high-income countries like the USA still trail behind<sup>62</sup> due to the inequitable access to health services. Countries supported by PEPFAR–The Global Fund have been making strides in advancing the policy landscape to achieve universal health coverage; however, progress on other key indicators used to track attainment of this goal still generally lags behind other regions.<sup>63</sup>

As a result, health systems must adapt to the special needs of ageing people with HIV and comorbid diseases to improve both patient-centred and population-centred health outcomes.<sup>64</sup> Given the unique contexts and distinguishing social, economic, and health needs within PEPFAR-funded programmes versus non-PEPFAR funded programmes such as single-payer health systems worldwide and within the USA, we propose contextualised strategies to organise care approaches to meet the needs of the ageing HIV population (table), based on the WHO health system strengthening building blocks. With these proposed strategies and examples, we aim to reduce the stigma of HIV management while also improving care. Our goal is for ageing people with HIV to have an easier time accessing the multimorbidity care they need as they face the anticipated progression of chronic diseases and ageing.

### Service delivery

In health systems supported by PEPFAR–The Global Fund, new HIV care models for patients have been created to improve the alignment of health-care system responses to the varying needs of patients. These differentiated approaches have been applied to every stage of the HIV care cascade, including prevention,

testing, linkage, treatment initiation, follow-up, referrals, and integration with non-HIV care needs.<sup>65</sup> Existing HIV care infrastructure has been leveraged to provide non-HIV related health services and social services, to cater for the changing social and behavioural, structural, and biological and physiological needs of ageing people with HIV.<sup>32,66</sup> Several models for integration of service delivery in sub-Saharan Africa have been described in recent literature<sup>67</sup> and are achievable. Those services include offering integrated screening models for NCDs and NCD risk factors among patients with HIV enrolled in care at the health facility and community levels, providing integrated HIV and NCD care within the same clinic setting, creating differentiated care models for ageing people with HIV and NCDs, and including palliative care services.<sup>42,68–70</sup> In the USA, similar comprehensive management care models for ageing people with HIV have also been proposed.<sup>55,57,71</sup> In settings with a high number of ageing people with HIV, colocated services within the same care setting with geriatricians, primary care clinicians, nurses, and physician assistants with training in HIV can take care of patients' non-HIV and geriatric-related needs. Conversely, in clinics with a few ageing people with HIV, HIV and non-HIV related care needs for the ageing people with HIV population can be provided by non-infectious disease practitioners, who can still seek necessary consultations from an infectious disease specialist in complex scenarios.<sup>71</sup> Similarly, in some single-payer health systems including the UK, Canada, and Spain, multidisciplinary team approaches include HIV and geriatric specialists working together to create individualised care plans for patients to establish whether the patient needs to be referred to a HIV physician, social care services, or a general practitioner.<sup>72,73</sup>

### Health workforce

The health workforce in many countries supported by PEPFAR–The Global Fund are well positioned to address care needs for acute illnesses and communicable diseases, such as HIV.<sup>74</sup> In the long-term, key interventions to create a sustainable and appropriate workforce to provide care for ageing people with HIV must include additional training and development of practice-based competencies. However, in the short-term, other targeted interventions proven to work for both HIV and NCD care should be considered, such as NCD care training for HIV clinicians and extending the roles of nurses, community-health workers, and HIV peers to support clinical care for ageing people with HIV.<sup>37,75–78</sup> Given evidence that older patients with HIV might have preferences for matched gender and older-age care providers, task-shifting and expanding the workforce to respond to these preferences could prove beneficial.<sup>32</sup> In the USA, most infectious disease specialists who manage HIV care for patients also play the role of a primary care provider, providing screening

and care for patients with HIV with other non-HIV primary care needs.<sup>71</sup> As a result, additional health workforce training for coordinated care among infectious disease specialists, primary care clinicians, geriatricians, and non-physician health workers to ensure seamless service implementation and referral is needed. Additional training opportunities should include training to care for arising needs in ageing people with HIV such as cognition, frailty, poly-pharmacy, depression, and social isolation. In many single-payer systems, general practitioners might be able to add to the health workforce caring for age-related primary care needs for ageing people with HIV. Structured and targeted training within the medical curriculum should be implemented to ensure that general practitioners can comfortably diagnose, treat, and manage various clinical needs for this population.<sup>61</sup> In addition, training schemes leading to specialisation in HIV management must evolve to include general medical issues that will affect ageing people with HIV.

### Health information technology

In all practice settings in countries funded by PEPFAR–The Global Fund, the USA, and single-payer systems, information and communication technologies can be optimised to document and promote care needs related to HIV and non-HIV to reduce the fragmentation associated with HIV care. Health information technology can be designed to enhance the communication and information flow, while providing a decision support tool for clinicians to best respond to patients' specific care needs. Best practices can be created on the basis of protocols and guidelines to remind all care providers to address both clinical and non-clinical care needs for the ageing people with HIV population. Social determinants of health can also be included as part of electronic medical records to ensure that the psychological and social needs of older patients are tended to.<sup>79</sup> For example, within the Academic Model Providing Access to Healthcare (AMPATH) programme in Kenya, a robust electronic medical records system was initially developed to support HIV care. As patient needs have changed, the system has evolved and expanded into a point-of-care health information technology tool that supports other NCD care needs with capacity to collect and manage clinical data, but also to generate data analytics for quality reviews.<sup>80,81</sup>

### Access to essential medicines

In both countries supported by PEPFAR–The Global Fund and single-payer health-care systems, low-cost (about US \$15/month) generic ART are often free-of-charge and readily available to patients through subsidisation by PEPFAR–The Global Fund funding. The single-payer system in the UK provides emergency HIV care and medicines to all free of charge, as well as ART and all essential medicines to those who are entitled

to NHS care. In the USA, however, listed wholesale acquisition costs for first-line ART range between US \$23 000 and \$39 000 annually. Without essential public health programmes, such as the Ryan White HIV/AIDS Program or the 340B Drug Discount Program, essential ART for patients with HIV might be challenging to access for many patients. In addition, similar to patients in countries funded by PEPFAR–The Global Fund, patients in the USA who are uninsured and underinsured also face the burden of out-of-pocket payments for essential medicines for other chronic NCD medications, which often represents an insurmountable barrier for accessing much needed drugs for their conditions.<sup>82</sup> Parallel systems for HIV and non-HIV medication procurement and distribution can be difficult for patients to navigate and dedicate sufficient resources to afford medications for non-HIV needs. Through the many innovations that have been developed to create a reliable supply chain infrastructure for HIV supplies and medications, systems can rely upon lessons learned from HIV to build responsive supply chain models for non-HIV commodities.<sup>83</sup> For example, dedicating local, international, private, and public financial resources to ensure availability, accessibility, and accountability to medications would probably lead to enhanced medication adherence and favourable outcomes for patients.<sup>83,84</sup> Joint orders and pooled procurement through one system for HIV and non-HIV essential medications can ensure that medicines are mobilised and used efficiently.<sup>83</sup> Lastly, creating innovative pharmacy models and distribution strategies at all levels of the health-care system will improve availability and patient-level access, leading to better patient adherence and clinical outcomes than is currently the case.<sup>85–87</sup>

### Financing

Investments in HIV and AIDS specific programmes over the past few decades have inadvertently diverted needed financial resources to address the needs of other non-HIV programmes.<sup>69,88,89</sup> To mitigate against siloed funding that can result in the fragmentation of services, increased funding streams that support integration and align with national disease burdens and priorities are needed.<sup>90</sup> Financing policies should be strengthened alongside the universal health coverage agenda.<sup>42</sup> Global efforts must continue as domestic efforts emerge for successful universal health coverage policies.<sup>91</sup> In the USA, the financing landscape for health care in general, and HIV prevention and treatment is complex given complicated funding streams and payment mechanisms.<sup>92</sup> The implementation of the Affordable Care Act increased insurance coverage and allowed patients to overcome barriers to care access.<sup>92</sup> A majority of patients with HIV now rely on Medicaid (40%) to receive HIV care services, with a small portion of patients receiving Medicare (8%). In addition, the Ryan White HIV/AIDS Program offers a package of HIV-specific medical and support services for

uninsured and underinsured patients and has been shown to be an extremely impactful programme, achieving viral suppression rates of up to 87·1%.<sup>93</sup> Efforts must be made to uniformly scale up access to HIV and non-HIV care across all US states (through the Affordable Care Act expansion of Medicaid), to reduce patient cost-sharing responsibilities (through drug assistance programmes such as the 340B drug pricing), and to invest in innovative models of HIV care (through public health initiatives such as the Ryan White HIV/AIDS Program) to extend care services for ageing people with HIV. Within a single-payer system, care provision is largely available free-of-charge or with minimal copays through the national health systems, which view access to basic health care as a human right rather than a privilege as seen in the US health-care system. Providers are therefore encouraged to provide comprehensive acute and preventative care services to patients regardless of their ability to pay.

### Leadership and governance

Growing older with HIV presents challenges at a public health level.<sup>94</sup> Given the burden of HIV and the growing burden of ageing people with HIV, national health policies, strategies, advocacy, and priorities should be set to meet the comprehensive needs of ageing people with HIV, their comorbid conditions, and their ageing needs. Adopting a collaborative governance approach to build trust and partnerships from the ministry of health level all the way to local health facilities and the communities in which patients reside, is essential to provide responsive care. Clinical standard operating procedures and guidelines, with consideration for the specific needs of ageing people with HIV should be established and implemented to guide the care provision for this population. In the USA, the Ending the HIV Epidemic: a Plan for America initiative offers a renewed commitment to respond to the HIV epidemic within the country. Political forces should be united to expand the Affordable Care Act and Medicaid and reduce the inequities in HIV care access.<sup>92</sup> HIV care standards and guidelines through the British HIV Association and a health-care culture that values audit and quality improvement are strong in the UK. This emphasis on audit and quality improvement is a unique strength that can continue to be expounded to ageing people with HIV as national guidelines for care and research in these patients, and their preferences are still limited.<sup>95</sup>

### Discussion and recommendations

There is considerable variability in the responsiveness of different types of health-care systems to HIV, chronic disease, and ageing care needs that people living with HIV face. However, one commonality is the lack of, or in some cases minimal, integration of care to meet the needs of ageing people with HIV. The siloed approach to

care was designed to reflect the priorities of funders and health-care providers at the start of the HIV epidemic. However, a revised approach should be built that considers the unique needs of this patient group and that prioritises the integration of care and services.

As seen with the remarkable progress made in tracking and responding to the HIV epidemic in countries supported by PEPFAR–The Global Fund, this more patient-centred approach also requires aspirational targets, which continue to build upon the progress made with the 90–90–90 plan to end the epidemic. This target of ensuring 90% of people living with HIV know their HIV status, 90% receive sustained ART, and 90% on ART achieve viral suppression has greatly advanced HIV aspects of care; however, it neglects the practical challenges patients with HIV face as they age. This neglect is especially concerning as the 90–90–90 targets could hasten the end of the epidemic while unfortunately neglecting the expanding needs of the ageing HIV population.

As mentioned by Harris and colleagues<sup>96</sup> and Lazarus and colleagues,<sup>97</sup> adding a fourth 90 to this monitoring framework, focused on optimising health-related quality of life, would help ensure programmes continue to track their progress in meeting the evolving needs of patients with HIV. With the ongoing transition of HIV into a routinely managed illness with a declining effect on life expectancy for patients who achieve virological suppression, we propose incorporating a fourth 90 that strives to reach 90% of the average life expectancy across different age strata from the region where the people living with HIV are receiving care. Through the introduction of this parameter, programmes worldwide would be encouraged to redesign care delivery to preserve overall health rather than a fragmented focus on managing individual conditions. With estimates from 2011–16 suggesting that people living with HIV on ART in the USA typically live 6·8 fewer years than HIV-negative populations,<sup>98</sup> attaining 90% of the average life expectancy is both an aspirational and achievable target with the recent advancements in HIV care through simplified regimens and injectable combinations.<sup>99,100</sup> A target like this one could also be integrated into the comprehensive monitoring and evaluation that PEPFAR and The Global Fund require for all funding recipients. It would also have the indirect benefit of affirming a lifelong commitment to people living with HIV rather than a commitment to the HIV-specific aspects of their care.

Furthermore, these advancements in care for the ageing HIV population in high-burden HIV settings, in countries supported by PEPFAR–The Global Fund, can help spur improvements in health-care infrastructure for the general population as seen with programmes such as AMPATH, Partners in Health, the International Center for AIDS care and treatment Program, and the Baylor International Pediatrics AIDS Initiative. With the case



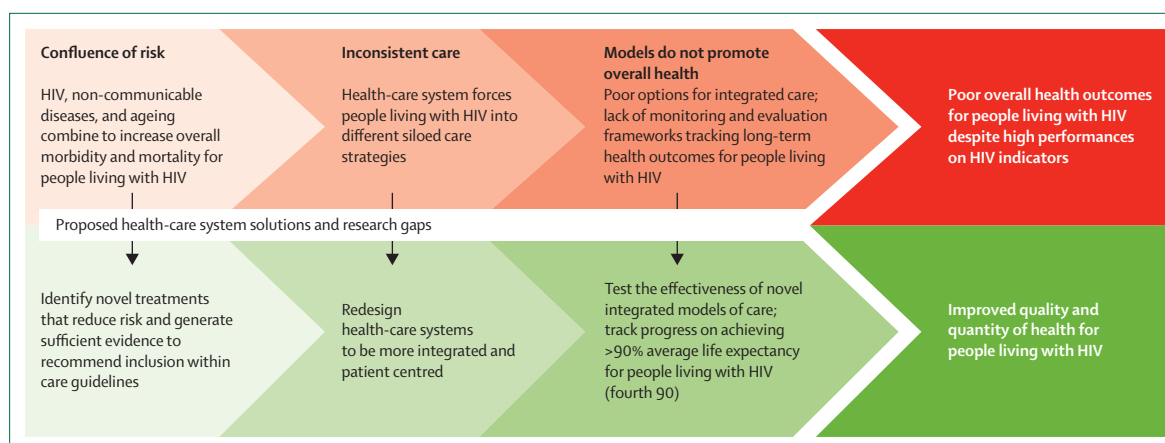


Figure 2: Proposed solutions for health systems to care for ageing people with HIV and comorbid disease

### Search strategy and selection criteria

We searched PubMed using the following terms and keywords; “HIV” or “Acquired immunodeficiency Syndrome” and “older adults” OR “aging” OR “ageing” OR “elderly” and “comorbidities”. We considered original articles or reviews describing existing models of care and management that have incorporated the needs (such as social and behavioural, structural, and biological and physiological) of ageing people with HIV. We also screened the reference lists of retrieved articles to identify additional relevant articles. Articles published in English from Jan 1, 2010, up to the time of this review (Nov 27, 2021) were included. The models of care in the three health systems were assessed within the WHO health system building blocks framework. For each health system, we highlight three exemplar models and describe the challenges and gaps that exist. We then propose recommendations for how to address some of the identified challenges and establish a research agenda to promote progress for the ageing people with HIV population.

example from AMPATH, this expanding mandate would also align with the push for universal health coverage emerging in many PEPFAR-supported countries.

As we continue with this progression towards patient-centred universal health coverage for all patients including people living with HIV, many of the divisions between HIV, chronic diseases, and ageing presented in this Series paper will hopefully become relics of an antiquated siloed health-care system. Instead of continuing to put different services into additional silos, services must be integrated into a simple patient-friendly package that combines responses to all the social determinants of health instead of a unilateral focus on clinical care. This integrated approach is a crucial transition for all health systems to promote optimal health for the populations that rely on them.<sup>101</sup> Governmental institutions like the US Health Resources

and Services Administration have also adopted this more expansive view of health for ageing people with HIV by promoting the integration of responses to social isolation, food and housing insecurity, income security, and financial management of health and social benefits.<sup>102</sup>

Research funding agencies like the National Institutes of Health have realised the importance of integrating cardiovascular care into the care of people living with HIV through the creation of funding opportunities like HLB SIMPLE, which is designed to support implementation research focused on providing sustainable and effective interventions for heart, lung, blood, and comorbid sleep disorders for people living with HIV in low-income and middle-income countries. Additional research with aspirational goals like HLB SIMPLE is hoped to fill the many research gaps (figure 2).

### Conclusion

Ageing people with HIV face a confluence of risks posed by both HIV and ageing that increases their risk for ageing-related comorbidities and social issues, requiring enhanced care that meet these needs (see key messages). Although many piecemeal approaches have been developed by health-care systems to catch up to the rapidly evolving needs of ageing people with HIV, there is a pressing need to equitably increase access to comprehensive care for this population worldwide. To achieve durable and sustainable success, these efforts must be incorporated into a responsive universal health coverage approach to ensure ageing people with HIV have uninterrupted access to the full range of services they will need over the course of their lives. Instead of continuing piecemeal approaches, the strengths of the three programmes; (1) countries supported by PEPFAR–The Global Fund, (2) the US health-care system, and (3) single-payer government systems in high-income countries, should be integrated into the health-care system response used to manage ageing people with HIV in every setting. This comprehensive approach includes prioritising

ending the epidemic with a strong monitoring and evaluation system, providing integrated, reliable, and affordable services for basic care needs, and ensuring access to different specialists as needed.

#### Contributors

JK, DNT, and SDP conceptualised, wrote the original draft, reviewed, and edited the draft and final versions of the manuscript. TB, BN, RV, and VAT wrote the original draft, reviewed, and edited the draft and final versions of the manuscript. SDP developed the figures for the manuscript. All authors have read and approved the final draft.

#### Declaration of interests

SDP serves as a consultant for Abbott and Becton Dickinson; TB serves as a consultant for ViiV Healthcare, Gilead and Merck, and THELA. The two authors consult for work unrelated to the subject matter discussed in this Series paper. All other authors declare no competing interests.

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