HIV, aging and continuity care: strengthening health systems to support services for noncommunicable diseases in low-income countries

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Although health systems in most low-income countries largely provide episodic care for acute symptomatic conditions, many HIV programs have developed effective, locally owned and contextually appropriate policies, systems and tools to support chronic care services for persons living with HIV (PLWH). The continuity of care provided by such programs may be especially critical for older PLWH, who are at risk for more rapid progression of disease and are more likely to have complications of HIV and its treatment than their younger counterparts. Older PLWH are also more likely to have other chronic noncommunicable diseases (NCDs), including hypertension, diabetes, cancers and chronic lung disease. As the number of older PLWH rises, enhanced chronic care systems will be required to optimize their health and wellbeing. These systems, lessons and resources can also be leveraged to support the burgeoning numbers of HIV-negative individuals with chronic NCD in need of ongoing care.

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Introduction

Health systems in most low-income countries (LICs) largely provide episodic care for acute symptomatic conditions [1,2] and services for maternal, infant and child health [3,4], reflecting their limited resources and historical disease patterns. The global burden of noncommunicable diseases (NCDs) is rising rapidly, however [5,6], and although populations are aging around the world [7], most health systems have generally not adapted to these demographic and epidemiologic changes [8,9]. Episodic care is not an effective or efficient way to approach chronic disease management – from either the perspective of affected individuals or the perspective of health systems – and this model of service delivery will not achieve optimal outcomes for the growing population with NCDs and other aging-related conditions [10,11]. How can poorer countries, many facing a 'quadruple burden' of maternal and child health threats, infectious diseases, chronic diseases and injury [12,13], transform their health systems to enable longitudinal prevention, care and treatment services for chronic diseases?

NCDs represent a heterogeneous and etiologically diverse group of health challenges, but a common defining characteristic is their *chronicity*. The successful management of chronic diseases requires coordination of services over time and across disciplines, delivered by health systems designed to provide continuity of care [14,15]. Thus, in order to respond to the changing disease burdens of their populations, LICs will need to fundamentally reassess the

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goals and structures of their primary healthcare systems, designing health services able to tackle both chronic and acute conditions.

Nolte and McKee [14] note that chronic conditions 'require a complex response over an extended time period that involves coordinated inputs from a wide range of health professionals and access to essential medicines and monitoring systems, all of which need to be optimally embedded within a system that promotes patient empowerment'. Bischoff *el al.* [16] have characterized the fundamentals of chronic care as the six Cs: continuity of relationship between provider and patient; coordination amongst multidisciplinary care teams; communication among providers and between patients and care teams; cooperation, with patients as active partners; consultations and effective linkages between levels of the health system; and community linkages. In order to provide these key elements of continuity care, health services in LICs will need to markedly enhance their ability to diagnose and engage patients with NCDs, retain patients in care over time and provide coordinated services via strong referral and linkage systems.

Of note, many LICs have already established continuity care programs for HIV, an achievement whose relevance to the current and future challenge of NCDs and the needs of aging populations is often overlooked. National HIV programs developed over the past decade provide local models of large-scale, contextually appropriate and increasingly decentralized chronic disease initiatives. Lessons learned from HIV scale-up may enable these same countries to accelerate programs for a range of chronic health conditions, leveraging investments in HIV services to strengthen health systems for continuity care [17–20].

Lessons learned from NCD programs around the world can also enrich HIV programs, and a comprehensive approach to NCD prevention, care and treatment will likely improve the quality of care for persons living with HIV (PLWH) irrespective of age. Data from LICs are limited, but they suggest that PLWH are at higher risk than the general population for cardiovascular disease, as they are in resource-rich settings; dyslipidemia and diabetes are also associated with some antiretroviral drugs [21–23]. Thus, the inclusion of systematic approaches to screening for and management of NCD and NCD risk factors will be needed to maintain the advances of HIV treatment scale-up and to assure optimal overall health outcomes for PLWH.

In this article, we explore ways in which innovative strategies introduced in the past decade for HIV service delivery might inform and support health system adaptation for NCDs and other health services for aging populations.

The graying of persons living with HIV

Data on the numbers and trends of older PLWH in LICs are scant. As noted by other authors in this Supplement, more than 13% of PLWH in sub-Saharan Africa (SSA) are 50 years of age or older [24] and these patients have not received particular attention to date [25], despite evidence of their higher risk of mortality and more rapid disease progression than younger PLWH [26]. Other data have emerged from HIV programs in recent years, demonstrating the growing prevalence of older PLWH in care and treatment programs. For example, ICAP Columbia University (www.columbia-icap.org), a large program funded by the President's Emergency Plan for AIDS Relief, supported HIV care and treatment services for approximately 1 064 000 individuals at 2284 health facilities in 11 countries in SSA as of 30 June 2011. Findings from a subset of these facilities (in Kenya, Mozambique, Rwanda and Tanzania) illustrate an increase in enrollment of PLWH over the age of 50 from 9.9 to 12.6% between 2005 and 2011 (Fig. 1).

The centrality of continuity care for older persons living with HIV

Older PLWH are at risk for more rapid progression of HIV disease than their younger counterparts [27–29], and are more likely to have chronic complications of HIV and its treatment [30–32]. Older PLWH are also more likely to have NCD comorbidities, including hypertension, diabetes, cancers and chronic lung disease. Polypharmacy in older patients may be complicated by an increased frequency of adverse events and the need to adjust dosing due to aging-related renal insufficiency; it may also make adherence even more challenging, particularly in patients with aging-related frailty, forgetfulness, limited mobility and other psychosocial barriers.

Given these challenges, high-quality continuity care is particularly important for older PLWH. Studies such as the Strategies for Management of Anti-Retroviral Therapy trial [33] have shown that antiretroviral therapy may decrease the risk of non-AIDS events such as cardiovascular, liver and renal complications. Psychosocial and adherence support, HIV-specific clinical and laboratory monitoring and screening and management of NCD and NCD risk factors can all help to mitigate the increased risks of older PLWH. As HIV programs – and their patients – mature, attention to the specific needs of older patients should include close monitoring for disease progression and response to treatment, vigilance for adverse effects of treatment, support for adherence and retention and incorporation of NCD prevention and management strategies. Coordination, coscheduling and colocation of services will optimize outcomes, as will the

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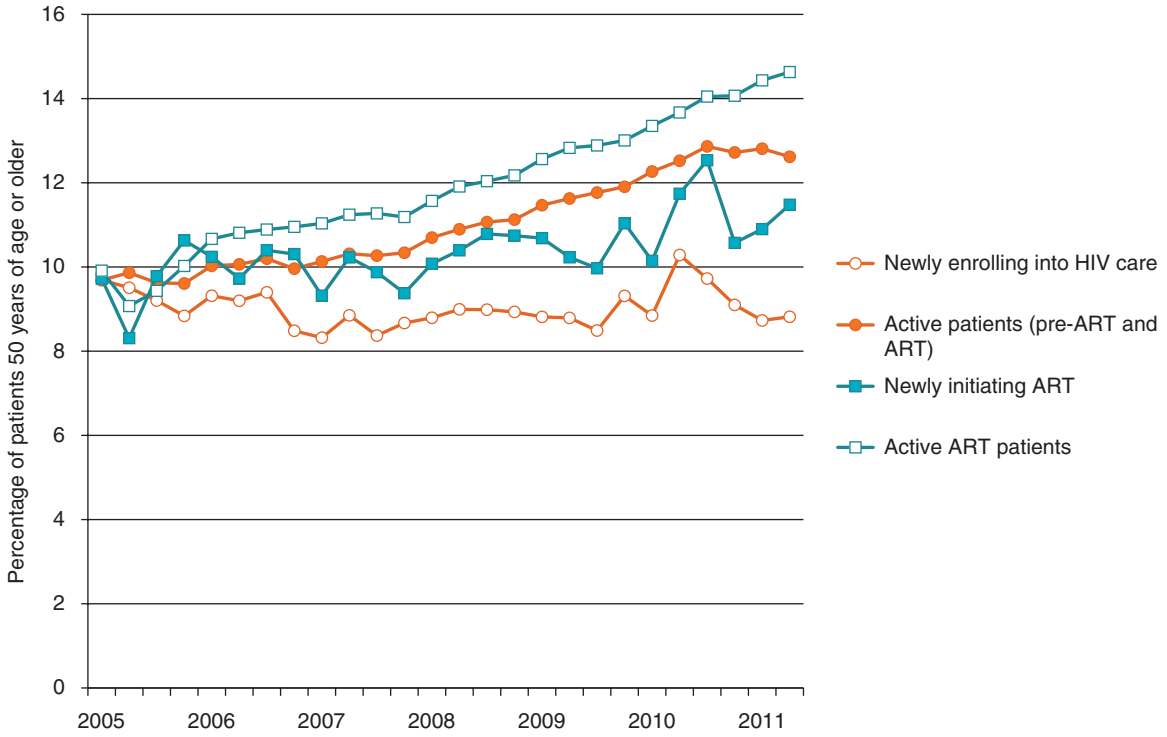

Fig. 1. Percentage of patients at least 50 years of age enrolled in HIV care at ICAP-supported health facilities in Rwanda, Tanzania, Mozambique and Kenya. Data from ICAP Columbia (www.columbia-icap.org).

utilization of multidisciplinary teams of providers attending to both clinical and supportive services [34].

Whether guidelines for ART initiation, clinical and laboratory monitoring, psychosocial support or other elements of HIV-specific management should be modified for patients over 50 years remains unknown. It is clear, however, that robust continuity care systems are required to optimize HIV outcomes for older PLWH. In addition, HIV programs will need to expand to include systematic efforts to screen for and manage NCD and NCD risk factors among the millions of PLWH enrolled in care and treatment programs.

Continuity care systems: lessons from HIV scale-up

Formerly considered diseases of affluence and of the elderly, it is now clear that mortality from NCD is disproportionately high in LICs, where deaths also occur at a younger age compared with high-resource countries [35]. In SSA, for example, NCD account for approximately one-third of deaths among adults aged 15–59 years [36].

As we have described previously [16], the constrained health systems in resource-limited settings typically provide only episodic care and are often designed for the relief of acute symptoms rather than the maintenance of wellbeing or the prevention and care of chronic conditions. Although expert guidance on chronic care in wealthy countries and in LIC has long been available [37–40], very few countries in SSA have national NCD programs, and large-scale chronic care services are rarely available [41,42]. In contrast, the resources, political will, civil society engagement and human rights framework of HIV programs have enabled the scale-up of complex chronic services for millions of people [43], providing hands-on experience in the implementation of national chronic disease programs.

Although a detailed description of the strategies, systems and tools used to support continuity care for HIV and 'the six Cs' within HIV programs is beyond the scope of this article, Table 1 [18] summarizes the key highlights. Not all of these approaches will be relevant to every context or program, but many practical, validated and contextually appropriate resources are available in local languages and are familiar to clinicians and managers at the facility, district, province and national levels.

Opportunities

HIV programs in many countries have a wealth of experience in designing, implementing and evaluating

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Table 1. Approaches to continuity care: lessons from HIV scale-up.

Approaches to support continuity care	Examples from HIV programs in LICs
Policies	The 'three ones' approach: one national coordinating body, one national guideline, one national M&E system
	Prevalence-based enrollment targets at facility, district, province and national levels
	Development of an 'essential package of care' for facilities at each level of the health system (hospitals, clinics, health centers)
	Use of a public health approach and standardized step-by-step protocols (not just guidelines) for diagnosis, care and treatment
	Promotion of simplified point-of-service diagnostic testing
	Use of simple indicators for longitudinal M&E of cohorts
Systems	Decentralized, community-based diagnostic testing
	HMIS systems adapted for chronic disease services
	Appointment and defaulter tracking systems
	Procurement of drugs and supplies
	Clinical mentoring and supportive supervision systems
	Tiered laboratory systems and referral networks
	Task-shifting and task-sharing approaches
	The systematic use of peer educators and expert clients
Tools	Appointment books
	Charting tools, forms and flow sheets
	Job aids and algorithms
	Adherence support tools, pill boxes and reminder systems
	M&E registers, logbooks and databases
	Referral and linkage forms
	Transportation vouchers
	Patient education materials for adherence support

HMIS, health management information systems; LIC, low-income country; M&E, monitoring and evaluation. Adapted from [18].

continuity care services. These resources now have the potential to support enhanced chronic care for older PLWH, and the platform created by HIV programs may also provide an opportunity to expand continuity care systems and chronic disease services to the broader non-HIV population. As illustrated in Fig. 2, there are multiple approaches to providing such care, ranging from parallel to fully integrated chronic care services.

In some contexts, this may necessitate the development of integrated chronic disease programs, which provide services both for PLWH and for HIV-negative patients with illnesses such as diabetes or cardiovascular disease. One such example is the integration of HIV and NCD care at 'chronic disease clinics' in Cambodia described by Janssens *et al.* [44]. A related approach was piloted at a hospital in Uganda, which used its HIV clinic to offer chronic care services for HIV-negative patients with diabetes and hypertension 1 day a week; results of this project are yet to be published [45]. In other settings, the HIV testing platform has been used to screen for cardiovascular disease and NCD risk factors in a pilot study in Kenya (http://www.fhi360.org/en/Country-Profiles/Kenya/res_KenyaCVD.htm) and in South Africa [46].

In other contexts, integration may be limited to programmatic or 'back office' functions rather than at the service delivery level, such as guideline development, procurement and laboratory support, decentralized diagnosis, appointment systems, support for adherence and retention, and/or approaches to cohort monitoring and evaluation. We demonstrated the potential of this approach in a small pilot study in Ethiopia by adapting HIV-specific systems and tools to support care for patients with diabetes in the outpatient department of the same facility [47]. Services for HIV and diabetes were not integrated at the point of care, but the approach developed to support lifelong care for PLWH was effectively leveraged to enhance diabetes services at the same facility.

Challenges

Despite the availability of local experience, strategies and tools to support continuity care, national NCD programs face formidable barriers. Innovative conceptual, policy and programmatic frameworks will be needed to balance the commonalities and differences between this diverse group of diseases, creating integrated systems for continuity care while recognizing the need for disease-specific guidelines and interventions. Avoiding siloes and strictly 'vertical' programs is another challenge, as is the need to expand NCD services without undermining HIV programs or compromising care for other priority health conditions, such as maternal and child health. Implementation research is needed to identify optimal approaches to the integration (or coordination) of chronic care services for NCDs. Funding remains a

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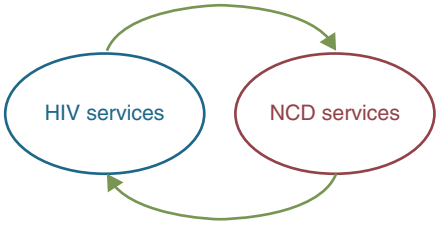
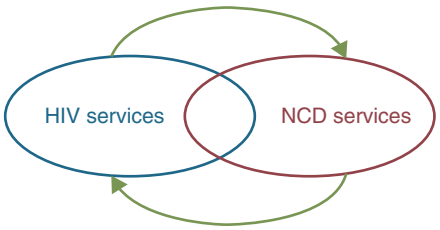


Scenario 1: Parallel services
In this model, chronic care for older PLWH is delivered by one program, and chronic care for the general population (those with chronic NCD's, for example) is delivered by a second program. Linkages and referrals may exist, but the programs do not share strategies, systems or tools.



Scenario 2: Coordinated services
In this model, chronic care services for older PLWH and for the general population are not co-located, but there is some sharing of strategic planning, systems and tools. For example, case management guidelines, procurement, laboratory systems and/or monitoring and evaluation strategies may be shared although services are not integrated at the clinical level. An example of this approach is the Ethiopia case study described in reference 47.

Scenario 3: Integrated services
In this model, chronic care services for older PLWH and for the general population are largely integrated at the point of care. For example, chronic disease clinics may provide services to PLWH and to HIV-negative patients with chronic NCDs using the same staff, systems and tools. An example of this approach is the Cambodia case study described in reference 44.

Fig. 2. Approaches to delivering chronic care to older persons living with HIV and to the general population.

critical challenge: the average health expenditure in SSA in 2011 remained considerably less than the recommended $45 per capita, an amount that does not include the current costly treatment of NCDs [48]. Also, although the United Nations General Assembly Special Session on NCD in September 2011 raised awareness of the burden of NCD in LIC, has yet to catalyze significant additional funding to respond to this threat.

Conclusion

Older patients – with and without HIV – will increasingly require health systems capable of providing continuity care at all levels. The lessons of HIV scale-up and the resources developed by HIV programs to support continuity care have the potential to support and enhance NCD services for PLWH and the general population alike. One key lesson from HIV programs is the need for a public health approach in which simple, standardized algorithm-driven interventions are developed for multidisciplinary teams, particularly nonphysician clinicians. NCD programs that depend on physicians and individualized treatment protocols are unlikely to achieve the coverage necessary to confront the widespread NCD burden in most LICs. The engagement of patients and communities is also a critical component of chronic care programs, needed to support the vitally important element of retention in care and adherence with treatment. Finally, the development of a unified approach to continuity care services that encompasses HIV and NCD programming can avoid the creation of multiple vertical programs. These tested approaches will require additional domestic and international resources to implement at scale, and the global donor community will need to confront the looming threat of chronic disease if health gains are to be sustained and expanded.

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Conflicts of interest

There are no conflicts of interest.

References

1. de-Graft Aikins A, Boynton P, Atanga L. **Developing effective chronic disease interventions in Africa: insights from Ghana and Cameroon.** *Global Health* 2010; **6**:6.
2. Goudge J, Gilson L, Russell S, Gumede T, Mills A. **Affordability, availability and acceptability barriers to healthcare for the chronically ill: longitudinal case studies from South Africa.** *BMC Health Serv Res* 2009; **9**:75.

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3. WHO Regional Office for Africa (WHO-Afro). *The work of the WHO in the African region: 2004–5. Biennial report of the regional director*. Brazzaville: WHO-Afro; 2006.
4. De-Graft Aikins A, Unwin N, Agyemang C, Allotey P, Campbell C, Arhinful D. **Tackling Africa's chronic disease burden: from the local to the global.** *Global Health* 2010; **6**:5.
5. *World Health Organization. Preventing chronic disease: a vital investment*. Geneva, Switzerland: World Health Organization; 2005.
6. Horton R. **Chronic diseases: the case for urgent global action.** *Lancet* 2007; **370**:1881–1882.
7. National Research Council. In: Cohen B, Menken J, editors. *Aging in sub-Saharan Africa: recommendations for furthering research. Panel on policy research and data needs to meet the challenge of aging in Africa*. Committee on population, division of behavioral and social sciences and education. Washington, District of Columbia: National Academies Press; 2006. pp. 55–91.
8. Samb B, Desai N, Nishtar S, Mendis S, Bekedam H, Wright A, *et al*. **Prevention and management of chronic disease: a litmus test for health-systems strengthening in low-income and middle-income countries.** *Lancet* 2010; **376**:1785–1797.
9. Beaglehole R, Epping-Jordan J, Patel V, Chopra M, Ebrahim S, Kidd M, Haines A. **Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary healthcare.** *Lancet* 2008; **372**:940–949.
10. World Health Organization. *Innovative care for chronic conditions: building blocks for action*. WHO Global Report. Geneva: WHO Press; 2002.
11. Swartz L, Dick J. **Managing chronic diseases in less developed countries.** *BMJ* 2002; **325**:914–915.
12. Mayosi BM, Flisher AJ, Lalloo UG, Sitas F, Tollman SM, Bradshaw D. **The burden of noncommunicable diseases in South Africa.** *Lancet* 2009; **374**:934–947.
13. Groenewald P, Bradshaw D, Daniels J, Zinyakatira N, Matzopoulos R, Bourne D, *et al*. **Local-level mortality surveillance in resource-limited settings: a case study of Cape Town highlights disparities in health.** *Bull World Health Organ* 2010; **88**:444–451.
14. Nolte E, McKee M. *Caring for people with chronic conditions: a health system perspective*. Geneva, Switzerland: World Health Organization on behalf of the European Observatory on Health Systems and Policies; 2008.
15. Haggerty JL, Reid RJ, Freeman GK, Starfield BH, Adair CE, McKendry R. **Continuity of care: a multidisciplinary review.** *BMJ* 2003; **327**:1219–1221.
16. Bischoff A, Ekoe T, Perone N, Slama S, Loutan L. **Chronic disease management in sub-Saharan Africa: whose business is it?** *Int J Environ Res Public Health* 2009; **6**:2258–2270.
17. Rabkin M, El-Sadr WM. **Why reinvent the wheel? Leveraging the lessons of HIV scale-up to confront noncommunicable diseases.** *Global Public Health* 2011; **6**:247–256.
18. Rabkin M, Nishtar S. **Scaling up chronic care systems: leveraging HIV programs to support noncommunicable disease services.** *J Acquir Immune Defic Syndr* 2011; **57 (Suppl 2)**: S87–S90.
19. Narayan KMV, Ali MK, del Rio C, Koplan JP, Curran J. **Global noncommunicable diseases: lessons from the HIV-AIDS experience.** *N Engl J Med* 2011; **365**:876–878.
20. Lamptey P, Merson M, Piot P, Reddy KS, Dirks R. **Informing the 2011 UN session on noncommunicable diseases: applying lessons from the AIDS response**. *PLoS Med* 2011; 8:e1001086.
21. Palella FJ Jr, Baker RK, Moorman AC, Chmiel JS, Wood KC, Brooks JT, Holmberg SD, HIV Outpatient Study Investigators. **Mortality in the highly active antiretroviral therapy era: changing causes of death and disease in the HIV outpatient study**. *J Acquir Immun Defic Syndr* 2006; **43**:27–34.
22. Lau B, Gange SJ, Moore RD. **Risk of non-AIDS-related mortality may exceed risk of AIDS-related mortality among individuals enrolling into care with CD4+ counts greater than 200 cells/mm^3**. *J Acquir Immune Defic Syndr* 2007; **44**:179–187.
23. Brown TT, Cole SR, Li X, Kingsley LA, Palella FJ, Riddler SA, *et al*. **Antiretroviral therapy and the prevalence and incidence of diabetes mellitus in the multicenter AIDS cohort study.** *Arch Intern Med* 2005; **165**:1179–1185.
24. Negin J, Cumming RG. **HIV infection in older adults in sub-Saharan Africa: extrapolating prevalence from existing data**. *Bull World Health Organ* 2010; **88**:847–853.
25. Mills EJ, Rammohan A, Awofeso N. **Aging faster with AIDS in Africa.** *Lancet* 2011; **377**:1131–1133.
26. Babiker AG, Peto T, Porter K, Walker AS, Darbyshire JH. **Age as a determinant of survival in HIV infection**. *J Clin Epidemiol* 2001; **54**:S16–S21.
27. Centers for Disease Control and Prevention. *HIV/AIDS surveillance report 2006. Volume 18*. Atlanta, Georgia: Department of Health and Human Services, Centers for Disease Control and Prevention; 2008. pp. 1–55.
28. Collaborative Group on AIDS Incubation and HIV Survival. **Time from HIV-1 seroconversion to AIDS and death before widespread use of highly-active antiretroviral therapy. A collaborative analysis**. *Lancet* 2000; **355**:1131–1137.
29. Schmid GP, Williams BG, Garcia-Calleja JM, Miller C, Segar E, Southworth M, *et al*. **The unexplored story of HIV and aging**. *Bull World Health Organ* 2009; **87**:162–162.
30. Justice AC. **HIV and aging: time for a new paradigm.** *Curr HIV/AIDS Rep* 2010; **7**:69–76.
31. Hontalez JA, Lurie MN, Newell ML, Bakker R, Tanser F, Barnighausen T, *et al*. **Aging with HIV in South Africa.** *AIDS* 2011; **25**:1665–1667.
32. Walrauch C, Barnighausen T, Newell ML. **HIV prevalence and incidence in people 50 years and older in rural South Africa.** *S Afr Med J* 2010; **100**:812–814.
33. El-Sadr WM, Lundgren JD, Neaton JD, Gordin F, Abrams D, Arduino RC, *et al*., Strategies for Management of Antiretroviral Therapy (SMART) Study Group. **CD4+ count-guided interruption of antiretroviral treatment.** *N Engl J Med* 2006; **355**:2283–2296.
34. Rabkin M, El-Sadr WM. Saving mothers, saving families: the MTCT plus experience. *Perspectives and practice in antiretroviral treatment*. Geneva Switzerland: WHO Press; 2003. http://www.who.int/hiv/pub/prev_care/en/Saving_Mothers_E.pdf. [Accessed 4 December 2011]
35. World Health Organization. *Global status report on noncommunicable diseases 2010*. Geneva, Switzerland: WHO Press; 2011. http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf. [Accessed 5 October 2011]
36. Lopez AD, Mathers CV, Ezzati M, Jamison DT, Murray CJ. **Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data.** *Lancet* 2006; **367**:1747–1757.
37. Wagner EH, Davis C, Schaefer J, Von Korff M, Austin B. **A survey of leading chronic disease management programs: are they consistent with the literature?** *Manag Care Q* 1999; **7**:56–66.
38. Bodenheimer T, Wagner EH, Grumbach K. **Improving primary care for patients with chronic illness.** *JAMA* 2002; **288**:1775–1779.
39. Holman H, Lorig K. **Patients as partners in managing chronic disease.** *BMJ* 2002; **320**:526–527.
40. World Health Organization. *Integrated Management of Adult and Adolescent Illness (IMAI): general principles of good chronic care, interim guidelines for first level health workers*. Geneva, Switzerland: WHO Press; 2004. http://www.who.int/3by5/publications/documents/en/generalprinciples082004.pdf. [Accessed 10 October 2011]
41. Mendis S, Fukino K, Cameron A, Laing R, Filipe A Jr, Leowski J, Ewen M. **The availability and affordability of selected essential medicine for chronic diseases in six low- and middle-income countries.** *Bull World Health Organ* 2007; **85**:279–288.
42. Beran D, McCabe A, Yudkin JS. **Access to medicines versus access to treatment: the case of type 1 diabetes.** *Bull World Health Organ* 2008; **86**:577–656.
43. UNAIDS. *AIDS at 30: nations at the crossroads*. Geneva, Switzerland: UNAIDS; 2011. http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/20110531_JC2095E_aids_at_30_section0.pdf. [Accessed 9 October 2011]
44. Janssens B, Van Damme W, Raleigh B, Gupta J, Khen S, Soy Ty K, *et al*. **Offering integrated care for HIV/AIDS, diabetes and hypertension within chronic disease clinics in Cambodia.** *Bull World Health Organ* 2007; **85**:880–885.

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45. NCD Alliance Briefing Paper: Tackling Non-Communicable Disease: What Can Health Systems Do? August 2011. http://www.ncdalliance.org/sites/default/files/rfiles/NCDA%20Briefing%20Paper%20-%20Health%20Systems.pdf. [Accessed 12 March 2012]
46. Outline of the national HIV Counselling and Testing (HCT) campaign by Dr Aaron Motsoaledi, Minister of Health http://www.info.gov.za/speeches/2010/10032611051001.htm.
47. Melaku Z, Reja A, Rabkin M. **Strengthening health systems for chronic care and noncommunicable diseases: leveraging HIV programs to support diabetes services in Ethiopia** [abstract #WEPDD0104]. In: 6th *IAS conference*; July 2011; Rome, Italy.
48. *Commission on Macroeconomics and Health*. *Macroeconomics and health: investing in health for economic development*. Geneva, Switzerland: WHO Press; 2001.

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