

Lost opportunities to identify and treat HIV-positive patients: results from a baseline assessment of provider-initiated HIV testing and counselling (PITC) in Malawi

Saeed Ahmed^{1,2}, Monica Schwarz³, Robert J. Flick^{1,4,5}, Chris A. Rees¹, Mwelura Harawa¹, Katie Simon^{1,2}, Jeff A. Robison⁶, Peter N. Kazembe¹ and Maria H. Kim^{1,2}

1 Baylor College of Medicine Children's Foundation Malawi, Lilongwe, Malawi

2 Baylor International Pediatric AIDS Initiative at Texas Children's Hospital, Baylor College of Medicine, Houston, TX, USA

3 University of Utah School of Medicine, Salt Lake City, UT, USA

4 University of Colorado School of Medicine, Denver, CO, USA

5 University of North Carolina Project-Malawi, Lilongwe, Malawi

6 Department of Pediatrics, University of Utah, Salt Lake City, UT, USA

Abstract

OBJECTIVE To assess implementation of provider-initiated testing and counselling (PITC) for HIV in Malawi.

METHODS A review of PITC practices within 118 departments in 12 Ministry of Health (MoH) facilities across Malawi was conducted. Information on PITC practices was collected via a health facility survey. Data describing patient visits and HIV tests were abstracted from routinely collected programme data.

RESULTS Reported PITC practices were highly variable. Most providers practiced symptom-based PITC. Antenatal clinics and maternity wards reported widespread use of routine opt-out PITC. In 2014, there was approximately 1 HIV test for every 15 clinic visits. HIV status was ascertained in 94.3% (5293/5615) of patients at tuberculosis clinics, 92.6% (30 675/33 142) of patients at antenatal clinics and 49.4% (6871/13 914) of patients at sexually transmitted infection clinics. Reported challenges to delivering PITC included test kit shortages (71/71 providers), insufficient physical space (58/71) and inadequate number of HIV counsellors (32/71) while providers from inpatient units cited the inability to test on weekends.

CONCLUSIONS Various models of PITC currently exist at MoH facilities in Malawi. Only antenatal and maternity clinics demonstrated high rates of routine opt-out PITC. The low ratio of facility visits to HIV tests suggests missed opportunities for HIV testing. However, the high proportion of patients at TB and antenatal clinics with known HIV status suggests that routine PITC is feasible. These results underscore the need to develop clear, standardised PITC policy and protocols, and to address obstacles of limited health commodities, infrastructure and human resources.

keywords provider-initiated testing and counselling, HIV, Malawi, HIV testing and counselling, register, PITC

Introduction

In 2014, UNAIDS announced their goal for 90% of people with HIV to know their status by the year 2020. This benchmark is particularly ambitious considering that in 2013 fewer than half of the 35 million people living with HIV globally were estimated to know their HIV-positive status [1]. To achieve the 90% target, access to and uptake of HIV testing and counselling (HTC) needs to dramatically increase. Provider-initiated testing and counselling (PITC) for HIV is believed to be a high yield strat-

egy for identifying HIV-infected persons [2]. WHO recommends that countries with generalised HIV epidemics routinely perform HIV testing on all patients presenting for medical care [3]. PITC has been successfully employed in clinical settings such as tuberculosis, antenatal and sexually transmitted disease clinics with testing rates of 47–99% and HIV prevalence of 18.6–88% [4–9].

Despite the general consensus on the utility of PITC for HIV case finding, several different interpretations of how PITC should be implemented are commonly utilised

S. Ahmed *et al.* **Lost opportunities to treat HIV patients in Malawi**

(Figure 1). Symptom-based screening refers to a process where providers identify and offer testing to patients with a clinical presentation suggestive of HIV. Routine opt-in testing occurs when providers ask patients whether they would like to be tested, regardless of their presenting symptoms. Routine opt-out testing (ROOT) occurs when all patients reporting to a health facility are tested for HIV unless they specifically decline testing.

In Malawi, where the prevalence of HIV in adults is 10.8% [10], the Ministry of Health (MoH) recommends routine PITC, but does not specify which specific approach should be used to offer HIV testing [11]. There is a paucity of data about the current implementation of PITC in non-research settings [12]. As such, the objective of this assessment was to describe both how PITC is currently being implemented in MoH facilities in Malawi, as well as barriers to successful implementation.

Methods

Study setting

The assessment was conducted at 12 health care facilities in central Malawi (six health centres, six hospitals) with a combined catchment area population of 904 000 [13]. Convenience sampling was used to guide site selection within an existing HIV community-based programme

[14, 15]. Each of the facilities included in this assessment had at least one dedicated space for HTC.

HIV testing policy and procedures

HIV testing is conducted in accordance with policy outlined in the National Guidelines for HIV Testing and Counseling [16]. Counsellors are required to have completed at least a 3-week standardised national training in HTC. Lay and volunteer counsellors are permitted, as long as they have completed the required training. Testing is performed via antibody-based rapid tests. In regard to PITC, the guidelines indicate that the 'provider recommends test as standard practice for anyone coming to this clinic', but guidance is not given on how this should be practically implemented or how the test should be recommended.

Assessment of PITC practices

From June to July 2014, a structured survey was administered verbally to 71 providers of HIV testing and counselling. All respondents conducted HTC as part of their core responsibilities. Nurses were most frequently interviewed (35), followed by health surveillance assistants (14), HIV counsellors (7), medical assistants (6) and clinical officers (5). Four respondents were in other cadres. The survey was designed to assess whether referral for HIV testing and counselling is symptom-based or routine, and if routine, is presented as an opt-in or opt-out service according to standardised definitions (Figure 1). Providers were asked about their use of a PITC register, defined as any tool that recorded all patient encounters and included a field for patient HIV status. Finally, the survey assessed provider opinions of barriers to routinely offering HIV testing to all patients.

Facility attendance and HIV testing

Routinely collected data were abstracted from the Malawi Health Management Information System and MoH HIV Unit quarterly reports for January through December of 2014 [17–20]. Data from these reports were used to calculate total health centre attendance, the ratio of HIV tests to total attendance and the percentage of individuals tested for HIV in antenatal and sexually transmitted infection clinics. HIV prevalence estimates for each site were collected from 2014 MoH estimates, and catchment area population estimates were abstracted from government data. Data describing testing coverage at tuberculosis clinic were abstracted from tuberculosis treatment registers maintained by the MoH.

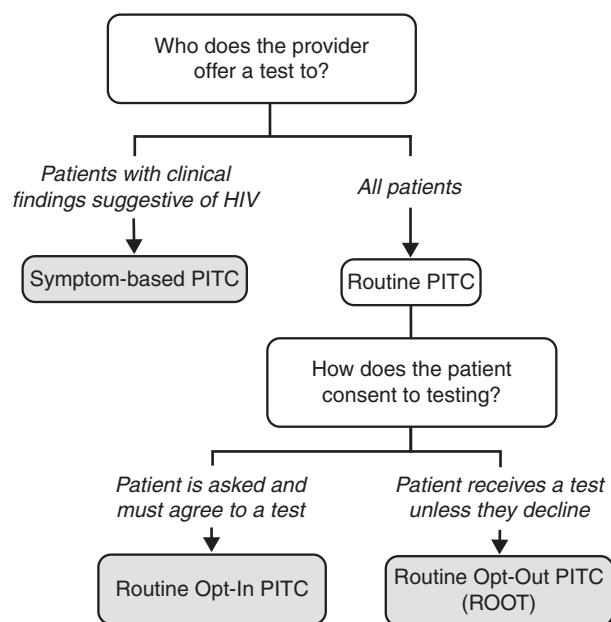


Figure 1 Standardized definitions for models of provider-initiated testing and counselling.

Statistical analysis

Data were aggregated into a Microsoft Excel® database and imported into Stata® SE (version 14.0; StataCorp, College Station, TX, USA) for analysis. Continuous variables were analysed using two-tailed Student's *t*-tests. Odds ratios (OR) with 95% confidence intervals (95% CI) and robust standard errors were estimated using generalised estimating equations to account for correlation between observations at the same site. The study protocol was approved by the institutional review boards of the Malawi National Health Science Research Committee and Baylor College of Medicine in Houston, TX, USA.

Results

Facility characteristics

A total of 118 departments at 12 health care facilities were surveyed. Most facilities, and all hospitals, were in rural settings (Table I). Estimated HIV prevalence was higher at health centres than at hospitals (8.8% *vs.* 4.5%, *P* = 0.037). The median number of HIV tests

performed per site in 2014 was 8343 (IQR 4279–11 168).

PITC model utilised

Variable models of PITC were reported across departments (Table II). Symptom-based PITC was most commonly reported. Routine opt-out PITC was reported primarily at antenatal clinics (11/12) and maternity wards (8/12). Use of a PITC register varied significantly by department type and was associated with ROOT implementation (OR = 11.2, 95% CI 3.7–33.9).

Testing coverage

Excluding two sites because of missing data, there were 1 063 526 patient visits in 2014 at the ten remaining facilities and 71 372 recorded HIV tests during this period, representing approximately 1 HIV test for every 15 clinic visits. Subgroup analysis demonstrated that HIV status was ascertained (i.e. HIV status was determined and those with unknown

Table I Characteristics of facilities surveyed

	Total (<i>N</i> = 12)	Health center (<i>N</i> = 6)	Hospital (<i>N</i> = 6)
Facility setting – <i>n</i> (%)			
Urban	3	3	0
Rural	9	3	6
Catchment area population in thousands – median (IQR)	57 (41–108)	81 (31–121)	54 (48–110)
Catchment area estimated % HIV prevalence – median (IQR)	6.4 (4.5–9.6)	8.8 (5.3–10.4)	4.5 (2.2–8.1)
HIV tests done in 2014 – median (IQR)	8343 (4279–11 168)	6225 (3512–11 940)	9553 (5322–10 396)

Table II Reported provider initiated testing and counseling (PITC) model and use of PITC register according to department type

Department type (<i>N</i>)	Type of PITC reported			PITC Register in use <i>n</i> (%)
	Routine opt-out <i>n</i> (%)	Routine opt-in <i>n</i> (%)	Symptom-based <i>n</i> (%)	
TB Clinic (12)	6 (50)	5 (42)	1 (8)	12 (100)
Antenatal Clinic (12)	11 (92)	1 (8)	0 (0)	12 (100)
Maternity Ward (12)	8 (66)	4 (33)	0 (0)	12 (100)
Family Planning Clinic (11)	1 (9)	7 (64)	3 (27)	8 (73)
STI Clinic (6)	3 (50)	2 (33)	1 (17)	6 (100)
Outpatient Department (12)	0 (0)	1 (8)	11 (92)	0 (0)
Under-5 Clinic (12)	2 (17)	1 (8)	9 (75)	5 (42)
Malnutrition Clinic (10)	8 (80)	1 (10)	1 (10)	5 (50)
Immunization Clinic (12)	2 (17)	2 (17)	8 (67)	4 (33)
Adult Inpatient Ward (10)	0 (0)	2 (20)	8 (80)	1 (10)
Pediatric Inpatient Ward (9)	1 (11)	1 (11)	7 (78)	2 (22)
Total (118)	42 (36)	27 (23)	49 (42)	67 (57)

S. Ahmed *et al.* **Lost opportunities to treat HIV patients in Malawi**

status were tested) in 94.3% (5293/5615) of patients at TB clinic, in 92.6% (30 675/33 142) of patients at ANC clinic and in 49.4% (6871/13 914) of patients at STI clinic. Data describing the HIV status of patients are not routinely recorded in other departments and were not available.

Barriers to testing

Providers most commonly cited test kit shortages (71/71 providers), inadequate physical space (58/71) and inadequate number of HIV counsellors (32/71) as challenges in PITC implementation. Providers from inpatient units cited the inability to perform HIV tests on weekends (8/16) as the largest impediment to PITC. Providers reported that the average length of HIV testing and counselling was 40 min and the average length of time to receive HIV results was 15 min, totalling an average of 55 min for patients to receive their results.

Discussion

Improving HIV case finding in high burden countries has profound potential benefits both for individual patients and society at large. WHO, UNAIDS, PEPFAR and national MoH are placing increased emphasis on early HIV case detection, as mounting evidence demonstrates that patients who are initiated on antiretroviral therapy early have fewer opportunistic infections, reduced morbidity from non-AIDS-related conditions, reduced risk of transmission and improved survival [21–25]. Public health benefits of antiretroviral therapy – namely population-level reduction in risk of HIV acquisition – are most pronounced at higher levels of coverage [26]. Based on this evidence, Malawi has expanded eligibility for antiretroviral therapy [11] with potential plans for universal treatment in the coming years. Timely case finding is a clear prerequisite for realising these benefits of early treatment and PITC is one effective approach to improve case finding.

Previous studies have detailed discrepant coverage rates after implementation of PITC [27, 28], however this study is the first we are aware of that documents variability of the specific interpretation of PITC in different health care settings. Understanding how PITC is implemented is critical as patient satisfaction, and rates of testing uptake are strongly associated with the specific approach employed [29–34]. This evaluation demonstrates that variable interpretations of PITC have been implemented at the sample facilities in Malawi with ROOT adopted only in select departments, namely antenatal clinic and maternity ward.

That symptom-based PITC was most commonly reported is troubling. By targeting patients with clinical sequelae secondary to advanced disease, this testing modality only identifies those late in their disease course when mortality is high and the benefits of ART are attenuated [25]. Early initiation of ART in asymptomatic HIV-infected patients is associated with decreased all-cause mortality, however patients at this stage are missed with a symptom-based approach [25, 29].

ROOT offers an approach to maximise the benefits of ART by allowing early linkage to care for asymptomatic HIV-infected patients. Implementation of ROOT at ANC is associated with increased rates of testing coverage, higher numbers of HIV diagnoses and greater retention across the antenatal care cascade [7]. Higher patient satisfaction, testing uptake and number of tests performed per counsellor are all associated with ROOT compared to voluntary or symptom-based testing across various geographic and service delivery settings in sub-Saharan Africa [29–34]. In the present evaluation, more than an estimated 90% of patient visits did not involve an HIV test. Adoption of ROOT across all health facility departments would likely have led to fewer missed opportunities for the diagnosis and treatment of HIV.

There are a number of potential barriers to optimal implementation of PITC in Malawi. First, the availability of a PITC register varied significantly by department with only 57% of surveyed facilities using a register to track HIV testing. Providers most commonly cited a shortage of test kits, which was also identified as a barrier in evaluations of PITC in Uganda [35]. Providers also mentioned inadequate numbers of HIV counsellors, limited physical space, lengthy counselling procedures and the inability to perform HIV tests on weekends as impediments to routine PITC. Of note, while all facilities had at least one dedicated space for HTC, 82% of respondents reported lack of adequate space as a barrier to routine HIV testing. This finding suggests that one dedicated space for HTC is inadequate for the number of patients that require testing at the surveyed facilities. Expanding the available infrastructure for HTC will be critical in increasing HTC capacity and must be patient-centred in design – proximal to service delivery points, private and non-stigmatising. Overall, our results align with other studies reporting that high patient volumes and limited health care staff are barriers to effective PITC implementation [36–38]. Our findings add to this literature by suggesting that wide-scale adoption of routine opt-out PITC will require a reliable supply of test kits, physical space for testing and counselling, streamlined procedures for

pretest and post-test counselling and a skilled cadre of dedicated HIV counsellors.

Based on these baseline results, our programme has been working with the Malawi MoH and other partners to address these requirements with improvements in supply chain management and distribution of test kits, improvements in physical infrastructure for testing combined with community-based testing strategies, pilot testing of novel methods of pretest and post-test counselling using multimedia flipcharts and video and development of a dedicated cadre of HIV counsellors known as HIV Diagnostic Assistants (HDA). The framework for the HDA cadre was largely inspired by successful demonstration by our programme and others that lay counsellors can greatly expand HIV testing coverage [14, 15, 39–41]. Most importantly, we are helping develop clear policy on how PITC should be implemented. Designing registers that clearly capture the HIV status of every health care facility attendee is a simple first step for ROOT implementation. We are piloting such registers at all of the facilities included in this baseline assessment. While some have argued that routine opt-out PITC can be an invasion of patient autonomy [42], the benefits of increased early diagnosis and referral into care and treatment are legion [21–25]. Further, a number of surveys have suggested that patients seeking health care may, in fact, favour making HIV testing a routine part of medical care as it helps to normalise and decrease the associated stigma [43–47].

There are several limitations to this evaluation. Our data sources for facility attendance did not indicate how many unique individuals attended the facility, nor how many patients were already in HIV care and thus ineligible for testing. Therefore, our ratio of 1 HIV test to 15 facility visits is not an ideal proxy for testing coverage and underestimates this measure. Further, patients with a previous HIV-positive diagnosis on antiretroviral therapy who do not require testing contribute a comparatively large share of facility visits due to their regular visits to ART clinic. Although this ratio may therefore overestimate the gap in testing coverage, the magnitude of the ratio strongly suggests numerous missed opportunities and warrants discussion. Moreover, despite the diversity in size and patient population treated, our sample was not randomly collected and may not adequately represent the current state of PITC in facilities across Malawi. Finally, the use of a structured survey instead of direct observation introduces the possibility of response bias.

Conclusions

Various models of PITC currently exist at MoH facilities in Malawi. Only antenatal clinics and maternity clinics

demonstrated high rates of the routine opt-out testing (ROOT) form of PITC as recommended by the WHO. The low ratio of facility visits that included an HIV test suggest missed opportunities for HIV testing. However, the high proportion of patients at TB and antenatal clinics with known HIV status suggests that routine testing is feasible. These results emphasise the need to develop clear, standardised PITC policy and protocols and to address the obstacles of limited health commodities, infrastructures and human resources.

Acknowledgements

We thank the Malawi MoH staff that participated and assisted with this assessment. We are grateful to Dr. Elaine Abrams for critical review. This study was made possible by support from USAID cooperative agreement number 674-A-00-10-580 00093-00. MHK was supported by the Fogarty International Center of the National Institutes of Health under award number K01 TW009644. RJF was supported by the Doris Duke Charitable Foundation and the Fogarty Global Health Fellows Program (R25TW009340). The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

References

1. UNAIDS. The Gap Report [Internet], 2014. (Available from: http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Gap_report_en.pdf) [17 Aug 2015].
2. Roura M, Watson-Jones D, Kahawita TM, Ferguson L, Ross DA. Provider-initiated testing and counselling programmes in sub-Saharan Africa: a systematic review of their operational implementation. *AIDS* 2013; **27**: 617–626.
3. WHO. Guidance on Provider-Initiated HIV Testing and Counselling in Health Facilities [Internet], 2007. (Available from: http://www.who.int/hiv/pub/guidelines/9789241595568_en.pdf) [25 May 2015].
4. Chimzizi R, Gausi F, Bwanali A *et al.* Voluntary counselling, HIV testing and adjunctive cotrimoxazole are associated with improved TB treatment outcomes under routine conditions in Thyolo District, Malawi. *Int J Tuberc Lung Dis* 2004; **8**: 579–585.
5. Gammimo VM, Mboya JJ, Samandari T *et al.* Baseline evaluation of routine HIV testing among tuberculosis patients in Botswana. *Int J Tuberc Lung Dis* 2008; **12**: 92–94.
6. Hueriga H, Spillane H, Guerrero W, Odongo A, Varaine F. Impact of introducing human immunodeficiency virus testing, treatment and care in a tuberculosis clinic in rural Kenya. *Int J Tuberc Lung Dis* 2010; **14**: 611–615.
7. Chandisarewa W, Stranix-Chibanda L, Chirapa E *et al.* Routine offer of antenatal HIV testing (“opt-out” approach)

S. Ahmed *et al.* Lost opportunities to treat HIV patients in Malawi

- to prevent mother-to-child transmission of HIV in urban Zimbabwe. *Bull World Health Organ* 2007; 85: 843–850.
8. Leon N, Naidoo P, Mathews C, Lewin S, Lombard C. The impact of provider-initiated (opt-out) HIV testing and counseling of patients with sexually transmitted infection in Cape Town, South Africa: a controlled trial. *Implement Sci* 2010; 5: 8.
 9. Chersich MF, Luchters SMF, Othigo MJ, Yard E, Mandaliya K, Temmerman M. HIV testing and counselling for women attending child health clinics: an opportunity for entry to prevent mother-to-child transmission and HIV treatment. *Int J STD AIDS* 2008; 19: 42–46.
 10. UNAIDS. Global Report: UNAIDS Report on the Global AIDS Epidemic 2013 [Internet], 2013. (Available from: http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/epidemiology/2013/gr2013/UNAIDS_Global_Report_2013_en.pdf) [4 Jun 2015].
 11. Ministry of Health Malawi. *Clinical Management of HIV in Children and Adults*. Malawi Ministry of Health: Lilongwe, Malawi, 2014.
 12. Hensen B, Baggaley R, Wong VJ *et al.* Universal voluntary HIV testing in antenatal care settings: a review of the contribution of provider-initiated testing & counselling. *Trop Med Int Health* 2012; 17: 59–70.
 13. Lilongwe District Health Office. *Semi-Permanent Data*. Lilongwe District Health Office: Lilongwe, Malawi, 2013.
 14. Ahmed S, Kim MH, Dave AC *et al.* Improved identification and enrolment into care of HIV-exposed and -infected infants and children following a community health worker intervention in Lilongwe, Malawi. *J Int AIDS Soc* 2015; 18: 19305.
 15. Kim MH, Ahmed S, Buck WC *et al.* The Tingathe Programme: a pilot intervention using community health workers to create a continuum of care in the prevention of mother-to-child transmission of HIV (PMTCT) cascade of services in Malawi. *J Int AIDS Soc* 2012; 15: 17389.
 16. Malawi Ministry of Health. *Guidelines for HIV Testing and Counselling (HTC)*. Malawi Ministry of Health: Lilongwe, Malawi, 2009.
 17. Ministry of Health Malawi. *Integrated HIV Program Report Jan–Mar 2014*. Malawi Ministry of Health: Lilongwe, Malawi, 2014.
 18. Ministry of Health Malawi. *Integrated HIV Program Report Apr–Jun 2014*. Malawi Ministry of Health: Lilongwe, Malawi, 2014.
 19. Ministry of Health Malawi. *Integrated HIV Program Report Jul–Sep 2014*. Malawi Ministry of Health: Lilongwe, Malawi, 2014.
 20. Ministry of Health Malawi. *Integrated HIV Program Report Oct–Dec 2014*. Malawi Ministry of Health: Lilongwe, Malawi, 2014.
 21. Cohen MS, Chem YQ, McCauley M *et al.* Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med* 2011; 365: 493–505.
 22. Kitahata MM, Gange SJ, Abraham AG *et al.* Effect of early versus deferred antiretroviral therapy for HIV on survival. *N Engl J Med* 2009; 360: 1815–1826.
 23. Phillips AN, Neaton J, Lundgren J. The role of HIV in serious diseases other than AIDS. *AIDS* 2008; 22: 2409–2418.
 24. Severe P, Juste MA, Ambroise A *et al.* Early versus standard antiretroviral therapy for HIV-infected adults in Haiti. *N Engl J Med* 2010; 363: 257–265.
 25. INSIGHT START Study Group. Initiation of antiretroviral therapy in early asymptomatic HIV infection. *N Engl J Med* 2015; 373: 795–807.
 26. Tanser F, Barnighausen T, Grapsa E, Zaidi J, Newell ML. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. *Science* 2013; 339: 966–971.
 27. Fetene NW, Feleke AD. Missed opportunities for earlier HIV testing and diagnosis at the health facilities of Dessie town, North East Ethiopia. *BMC Public Health* 2010; 10: 362.
 28. Scott V, Chopra M, Azevedo V, Caldwell J, Naidoo P, Smuts B. Scaling up integration: development and results of a participatory assessment of HIV/TB services, South Africa. *Health Res Policy Syst* 2010; 8: 23.
 29. Silvestri DM, Modjarrad K, Blevins ML *et al.* A comparison of HIV detection rates using routine opt-out provider-initiated HIV testing and counseling versus a standard of care approach in a rural African setting. *J Acquir Immune Defic Syndr* 2011; 56: e9–e32.
 30. Perez F, Zvandziva C, Engelsmann B, Dabis F. Acceptability of routine HIV testing (“opt-out”) in antenatal services in two rural districts of Zimbabwe. *J Acquir Immune Defic Syndr* 2006; 41: 514–520.
 31. Pope DS, Deluca AN, Kali P *et al.* A cluster-randomized trial of provider-initiated (opt-out) HIV counseling and testing of tuberculosis patients in South Africa. *J Acquir Immune Defic Syndr* 2008; 48: 190–195.
 32. Kayigamba FR, Bakker MI, Lammers J *et al.* Provider-initiated HIV testing and counselling in Rwanda: acceptability among clinic attendees and workers, reasons for testing and predictors of testing. *PLoS One* 2014; 9: e95459.
 33. Byamugisha R, Tylleskär T, Kagawa MN, Onyango S, Karumagi CA, Tumwine JK. Dramatic and sustained increase in HIV-testing rates among antenatal attendees in Eastern Uganda after a policy change from voluntary counselling and testing to routine counselling and testing for HIV: a retrospective analysis of hospital records, 2002–2009. *BMC Health Serv Res* 2010; 10: 290.
 34. Topp SM, Chipukuma JM, Chiko MM, Wamulume CS, Bolton-Moore C, Reid SE. Opt-out provider-initiated HIV testing and counselling in primary care outpatient clinics in Zambia. *Bull World Health Organ* 2011; 5: 328–335A.
 35. Okot-Chono R, Mugisha F, Adatu F, Madraa E, Dlodlo R, Fujiwara P. Health system barriers affecting the implementation of collaborative TB-HIV services in Uganda. *Int J Tuberc Lung Dis* 2009; 13: 955–961.
 36. Ntuli AK, Kabengula JS, Msuya SE. Perceived barriers and attitudes of healthcare providers towards provider-initiated

S. Ahmed *et al.* **Lost opportunities to treat HIV patients in Malawi**

- HIV testing and counseling in Mbeya region, southern highland zone of Tanzania. *Pan Afr Med J* 2011; **8**: 17.
37. MacPherson P, Lalloo DG, Choko AT *et al.* Suboptimal patterns of provider initiated HIV testing and counselling, antiretroviral therapy eligibility assessment and referral in primary health clinic attendees in Blantyre, Malawi. *Trop Med Int Health* 2012; **17**: 507–517.
 38. Davyduke T, Pietersen I, Lowrance D, Amwaama S, Taegtmeier M. Opportunities for strengthening provider-initiated testing and counselling for HIV in Namibia. *AIDS Care* 2015; **27**: 990–994.
 39. McCollum ED, Preidis GA, Kabue MM *et al.* Task shifting routine inpatient pediatric HIV testing improves program outcomes in urban Malawi: a retrospective observational study. *PLoS One* 2010; **5**: e9626.
 40. Zachariah R, Ford N, Philips M *et al.* Task shifting in HIV/AIDS: opportunities, challenges, and proposed actions for sub-Saharan Africa. *Trans R Soc Trop Med Hyg* 2009; **103**: 549–558.
 41. WHO. Treat Train Retrain. Task shifting: Global recommendations and guidelines [Internet], 2007. (Available from: <http://www.who.int/healthsystems/TTR-TaskShifting.pdf>) [25 May 2015].
 42. Mora Cardenas CM, Monteiro S, Moreira CO. Expansion of HIV counseling and testing strategies: technical challenges and ethical-political tensions. *Salud Colect* 2014; **10**: 253–264.
 43. Weiser SD, Heisler M, Leiter K *et al.* Routine HIV testing in Botswana: a population-based study on attitudes, practices, and human rights concerns. *PLoS Med* 2006; **3**: e261.
 44. Nakanjako D, Kanya M, Daniel K *et al.* Acceptance of routine testing for HIV among adult patients at the medical emergency unit at a national referral hospital in Kampala, Uganda. *AIDS Behav* 2007; **11**: 753–758.
 45. Bassett IV, Giddy J, Nkera J *et al.* Routine voluntary HIV testing in Durban, South Africa: the experience from an outpatient department. *J Acquir Immune Defic Syndr* 2007; **46**: 181–186.
 46. Bassett IV, Walensky RP. Integrating HIV screening into routine health care in resource-limited settings. *Clin Infect Dis* 2010; **50**(Suppl 3): S77–S84.
 47. Greenwald JL. Routine rapid HIV testing in hospitals: another opportunity for hospitalists to improve care. *J Hosp Med* 2006; **1**: 106–112.

Corresponding Author Saeed Ahmed, Assistant Professor of Pediatrics, Baylor College of Medicine, 1102 Bates, FC 630, Houston, Texas, USA 77030. E-mails: saeeda@bcm.edu; deas518@gmail.com