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Hailu Tadeg*
Elias Geremew*
Mekdes Alemayehu*
Edmealem Ejigu*
Yared Yiegezu†
Edmund Rutta‡

* Management Sciences for Health, Systems for Improved Access to Pharmaceuticals and Services (SIAPS), Addis Ababa, Ethiopia
† Pharmaceuticals Fund and Supply Agency (PFSA), Addis Ababa, Ethiopia
‡ Management Sciences for Health, Center for Pharmaceutical Management, United States of America, Arlington

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Systems for Improved Access to Pharmaceuticals and Services
Management Sciences for Health
Ditsela Place, 1204 Park Street (Cnr Jan Shoba Street)
P.O. Box 11471, Hatfield, 0028, Gauteng
Telephone: +27 12 364-0400
Fax: +27 12 364 0416-0462
E-mail: siaps@msh.org
www.siapsprogram.org

KEY MESSAGE

As of September 2014, Ethiopia decreased the proportion of patients on stavudine-based regimens to 0.02% after a successful program to switch regimens without incidences of treatment disruptions and waste. This phaseout required well-coordinated transition plans that engaged multiple stakeholders. The program used nationally aggregated dispensing information to monitor performance and guide actions.

ABSTRACT

Background

In 2010 the World Health Organization (WHO) recommended that HIV patients on treatment be switched from regimens using stavudine (d4T) to safer alternatives such as regimens using tenofovir (TDF) and zidovudine (ZDV). Following this recommendation, Ethiopia amended its antiretroviral therapy (ART) guidelines to initiate all new patients on non-d4T-based regimens, and in September 2012, a decision was made to switch all adult patients from d4T to safer alternatives. This decision implied transition of 68,064 patients nationally. Switching such a large number of patients requires careful supply planning and clear guidance on prescribing practices. This study evaluates the switching process, achievements, and lessons learned.

Methods

This was a retrospective descriptive study that reviewed bimonthly ART pharmacy reports from September 2012 (205,832 patients) to September 2014 (269,779 patients). Trend analysis of regimen switches from d4T- to TDF- and ZDV-based regimens was conducted using an Excel software program.

Results

By September 2013, one year after implementation, 98% of patients were completely switched to TDF- and ZDV-based regimens. By September 2014, the proportion of patients on d4T-based regimens had further declined to 0.02% whereas the number of patients on TDF- and ZDV-based regimens increased from 32.6% to 53.6% and from 35.8% to 44.8%, respectively, which are the preferred safer alternatives in the amended guidelines.

Conclusion

Ethiopia successfully achieved the regimen switch with no incidents of disrupted ART services. Two factors were critical for the success. First, the Federal Ministry of Health prepared and implemented a clear and well-coordinated transition plan with its stakeholders and partners. Second, close monitoring of regimen prescribing patterns and trends generated by ART pharmacies on a bimonthly basis provided timely data for supply planning and monitoring of performance. This not only helped achieve a smooth transition, but also saved resources by preventing waste and expiry of the phased-out d4T.

INTRODUCTION

Background

According to the 2013 UNAIDS report, an estimated 35.3 million people were living with HIV worldwide in 2012[1] with the Sub-Saharan Africa region accounting for 71% of this number.[2] Ethiopia had an estimated 793,700 people living with HIV in 2013.[3] Based on the 2013 World Health Organization (WHO) criteria, the HIV treatment coverage in low- and middle-income countries was 34% of the 28.6 million people eligible in 2013.[1] The 2013 figures show that 40% of eligible patients were receiving antiretroviral therapy (ART) in Ethiopia. Disaggregation of the data reveals that only 9.5% of children were on treatment.[3]

The WHO advocates scaling up of ART programs to achieve better universal access for all eligible patients. This involves standardization and simplification of antiretroviral (ARV) regimens to support the efficient implementation of treatment programs in resource-limited settings.[4] The Government of Ethiopia launched its free ART initiative in 2005.[5] Since then, the country has seen a rapid increase in the number of ART service provision sites because of initiatives targeted at increasing funding, reducing prices of ARVs, and implementing a public health approach to ART delivery.[6] The scale-up of the service has been one of the success stories of the Ethiopian ART program, resulting in a substantial decrease in AIDS-related mortality. The massive scale-up of the ART program has also benefited from the continued standardization and simplification of ARV regimens, moving from complex regimens to simpler fixed-dose combinations (FDCs).

Stavudine (d4T) was an affordable ARV and a key component of highly active ART.[7, 8] As of 2010, it was reported that in resource-limited settings, about 56% of ART regimens contained d4T as the nucleoside reverse transcriptase inhibitor backbone.[7] However, in 2010 WHO recommended that countries should take steps to reduce the use of d4T in first-line regimens because of its well-recognized toxicities. The WHO also recommended that safer alternatives, namely zidovudine (ZDV) or tenofovir (TDF), would replace d4T in first-line ARV regimens.[7]

The d4T phaseout was prompted by significant adverse events that are known to cause long-term debilitating toxicities, which include lipoatrophy, peripheral neuropathy, and death due to lactic acidosis.[9] Addressing these adverse events will result in reduction of stigma caused by lipoatrophy, disability caused by peripheral neuropathy, and mortality due to lactic acidosis. Adherence to ARVs will also be improved if these disfiguring and unpleasant side effects are avoided.[9] Side effects, poor treatment adherence, and subsequent drug resistance are the major factors contributing to the need for changing ARV regimens.[10] Various studies in Ethiopia and elsewhere have also reported that the major reasons for changing first-line ARVs were adverse drug reactions.[11–13]

Phasing out d4T from the ART guidelines also has its downside. Stavudine had been a cheap, readily available ARV with a number of generic manufacturers. It was available in loose and FDC forms for both adults and pediatric patients. Replacing d4T would force ART programs to shift to more expensive alternatives. Besides the increased cost of ZDV- and TDF-based regimens, more laboratory monitoring could be needed for ZDV-associated anemia and renal

toxicity caused by TDF. Moreover, any phaseout of d4T would mean that some of the available stocks could be wasted.[9] However, clinical, psychological, and social problems associated with long-term d4T use offset its pharmaceutical and cost benefits. Hence d4T phaseout becomes a more plausible course of action for ART programs.[14]

After the WHO's 2010 recommendations came out, countries were at various levels of progress in implementing the new guidelines that advise ART programs to stop starting new patients on d4T-based regimens and to speed up the process of phaseout in patients already on treatment. Some of the challenges observed included high cost of ZDV or TDF; uncertainties regarding whom to prioritize for the phaseout; the need for donor support; and the need to avoid d4T waste.[14]

This study assesses and documents Ethiopia's experience in phasing out d4T-based regimens. The study evaluates the phaseout process, achievements, and lessons learned with particular focus on how data and information on prescribing patterns informed and guided successful phaseout programs. To the best of our knowledge, no studies have evaluated the critical role of pharmaceutical information management in such a large-scale regimen switch. We hope this paper adds to what is known about the role of the pharmaceutical information system on ARV regimen switch at a national scale.

Program Description (Ethiopian ART Program)

Ethiopia launched its ART program in 2003 in private health facilities, and starting from early 2005 the program was expanded to public health facilities. As of December 2014, 367,000 patients, including 23,400 children under 15 years of age, were on ART. These patients are served in more than 1,050 ART sites.[15] As part of monitoring patient uptake and prescribing practices, Ethiopia implemented a pharmaceutical management information system at all health facilities providing ART services. This information system was crucial for guiding decisions on ART program implementation and national quantification of ARV medicines. In addition, the country implements integrated pharmaceutical logistics systems to manage the supply of all essential and program medicines, including ARVs.[16] These efforts have resulted in uninterrupted availability of ARV and other HIV/AIDS commodities that have ensured patients have good treatment outcomes. The country has also seen a remarkable decline in HIV-related morbidity and mortality.[17]

National Planning and Coordination for Regimen Switch

Despite the 2010 WHO recommendation to gradually reduce the use of d4T, at the end of 2011, the number of people on all d4T-containing regimens in Ethiopia was high.[14] Ethiopia started implementing these guidelines by amending its treatment guidelines, which required all new patients on d4T-based regimens be switched to safer alternatives, mainly ZDV- or TDF-containing regimens, starting from September 2012.

From the outset, switching such a large number of patients was anticipated to require careful supply planning and clear guidance on prescribing practices. The Federal Ministry of Health of Ethiopia created a national taskforce that provided leadership and coordination for the d4T phaseout process. In 2012 the ministry issued guidelines that outlined the purpose of the change, targets, preparatory activities, the timeline for the change, how the changes were to be implemented, alternative regimens, responsibilities, and monitoring and evaluation mechanisms. According to this plan, by the end of June 2013, all patients would be switched to safer regimens. The phaseout began in September 2012 in regions with smaller patient loads on ART such as Dire Dawa (4,000), Harari (2,490), Somali (1,137), Gambella (2,980), B/Gumuz (2,144), and Afar (2,561). This strategy allowed the program to learn from the experiences of these regions and rapidly expand to other regions with bigger patient loads, such as Amhara (78,193), Oromia (52,748), Addis Ababa (54,667), Tigray (20,874), and SNNPR (19,388).[18]

The Federal Ministry of Health was actively involved in resource mobilization, advocacy, development of guides for the phaseout, training, development of documenting and reporting formats, and overall coordination. Regional Health Bureaus organized training and mentoring, follow-up implementation of the plan, and distribution of recording and reporting forms. Zonal and lower-level health offices were tasked with supportive supervision of health facilities to ensure that resources reached the service delivery sites and training of health workers. Health facilities reported available stocks of d4T; implemented the phaseout; reported on implementation progress, challenges, and solutions that worked; and conducted regular inventory to avoid stock-outs. The Pharmaceuticals Fund and Supply Agency (PFSA) was the ministry's delegated agency that played a central role in quantification, procurement, distribution, and monitoring the use of ARVs. Development partners were involved in mentoring, training, and supply management activities, according to their specific mandated roles. The Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program of the US Agency for International Development (USAID) supported the government's efforts by providing information on regimen prescribing patterns, which assisted the ministry and PFSA in monitoring the plan. The information was also used by PFSA in supply planning activities.

Information for Decision Making

As part of supporting the Ethiopian ART program, a comprehensive pharmaceutical management information system was established and maintained with support from USAID/SIAPS. In 2012, reports from routine patient uptake and regimen breakdown data collected from ART sites identified nonadherence to treatment guidelines. The findings indicated that substantial numbers of patients (34%) were still taking d4T-containing regimens. On further analysis, it was found out that 18% of new patients were initiated with D4T-based regimens, indicating that prescribing patterns did not follow guideline recommendations.[19] This information was shared with high-level officials at the ministry and key partners. The report was a key turning point that prompted a quick response from the ministry, Regional Health Bureaus, PFSA, and partners to strengthen facility-level support and improve their monitoring and evaluation efforts at the national, regional, and facility levels—thus the national phaseout program.

During the implementation of the phaseout program, the role of up-to-date and reliable information on ART patient uptake and regimen breakdown as well as availability of ARV

medicines from health facilities was critical for its success. This information was used for quantification and procurement as well as for making PFSA's distribution plans. Moreover, the data on regimen breakdown provided information on the implementation status of the national phaseout plan. This information was used as a monitoring mechanism whereby the progress of the phaseout plan was regularly reported for possible action to improve its implementation. The information was also used to track whether the treatment recommendations were adhered to by prescribers at all levels.

STUDY DESIGN

This was a descriptive retrospective study that used secondary data collected from ART service pharmacies' routine reports. The reports contained the patient's medication profiles on specific type of regimen. All first- and second-line regimens are captured by the reports. The study used data and reports from September 2012 to September 2014. About 205,832 patients were on ART by September 2012; this number increased to 269,779 at the end of September 2014 because of program expansion and increase in the uptake of patients into the ART program. The 2012 data were collected from 318 ART sites while the 2014 data were collected from 383 ART sites, the increase owing to ART program scale-up to new facilities. About 52.3% (200/383) of the sites used the electronic dispensing tool. The remaining facilities used standard manual formats to capture the medication profiles. Data obtained from the ART reports were entered into MS Excel. For descriptive statistics, percentages of patients on d4T-, ZDV-, and TDF- based regimens were calculated at two-month intervals covering the two-year study period. Then trends of regimen switch (from d4T- to ZDV- or TDF-based regimens) were analyzed by using tables and graphs. In addition, differences in trends between switches to ZDV- and TDF-containing regimens were assessed. Success was determined by the degree to which regimen switches were achieved in accordance with the plan without treatment interruptions.

RESULTS

ART Regimen Prescribing Patterns

At the start of the implementation of the d4T phaseout in September 2012, 205,832 adult patients were on ART, being treated at 318 ART sites (96 hospitals and 222 health centers), of whom 61,981 (30%) were on d4T-based regimens while 73,553 (36%) and 67,090 (33%) were on ZDV- and TDF-based regimens, respectively. There were also 412 (0.2%) patients on abacavir (ABC)-based regimens and 2,796 (1.4%) patients on other regimens, mainly second-line ARVs.

After two years of implementing the phaseout program, the data collected from 383 ART sites (269,779 patients from 103 hospitals and 280 health centers) show a significant decrease in the number of patients on d4T-based regimens. During the first year of implementation (September 2012 to September 2013), 98% of patients on d4T were successfully shifted to more tolerated regimens, mainly ZDV- and TDF-based regimens. During this period, the prescribing pattern of d4T-based regimens decreased from 30% to 1%. The second year of implementation witnessed further decline in d4T prescribing. Accordingly, the proportion of patients on d4T was reported to be 0.02% in September 2014 (figures 1 and 2).

The data also show that the number of patients on ZDV-based regimens grew from 36% to 44.4% while those on TDF-based regimens increased from 33% to 53.2%. The change in other regimens was not that substantial. Accordingly, patients on ABC increased to 0.23% of total active patients. Patients on other regimens, including second line, increased from 1.4% to 2.1%. At the end of the first year of implementation, both ZDV- and TDF-containing regimens grew by 14% from their baselines. During this time the majority (50%) of patients were on ZDV-based regimens. During the second year of implementation TDF-based regimens increased by 6.2% while ZDV-based regimens deceased slightly by 5.6%. On further analysis, the data showed that ZDV was combined more with nevirapine (NVP) than efavirenz (EFV). The reverse was true for TDF. Since November 2013 onward, TDF-based regimens are the most frequently prescribed ART medicines in Ethiopia.

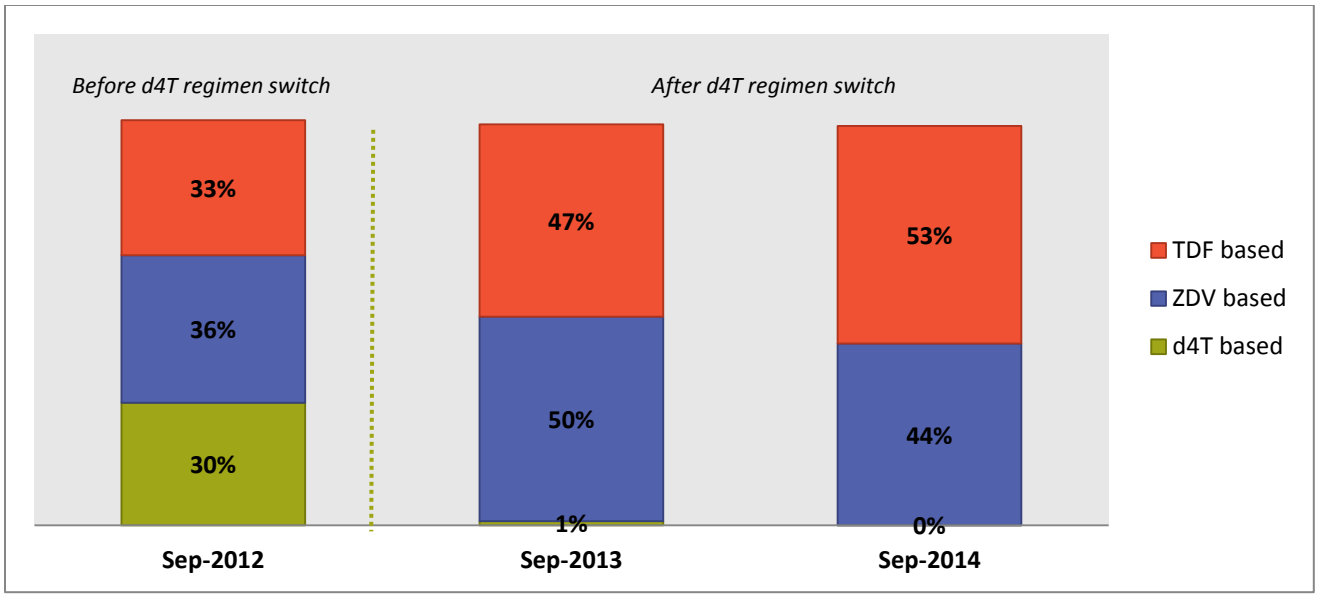

Figure 1. ARV prescription pattern in Ethiopia, September 2012–September 2014

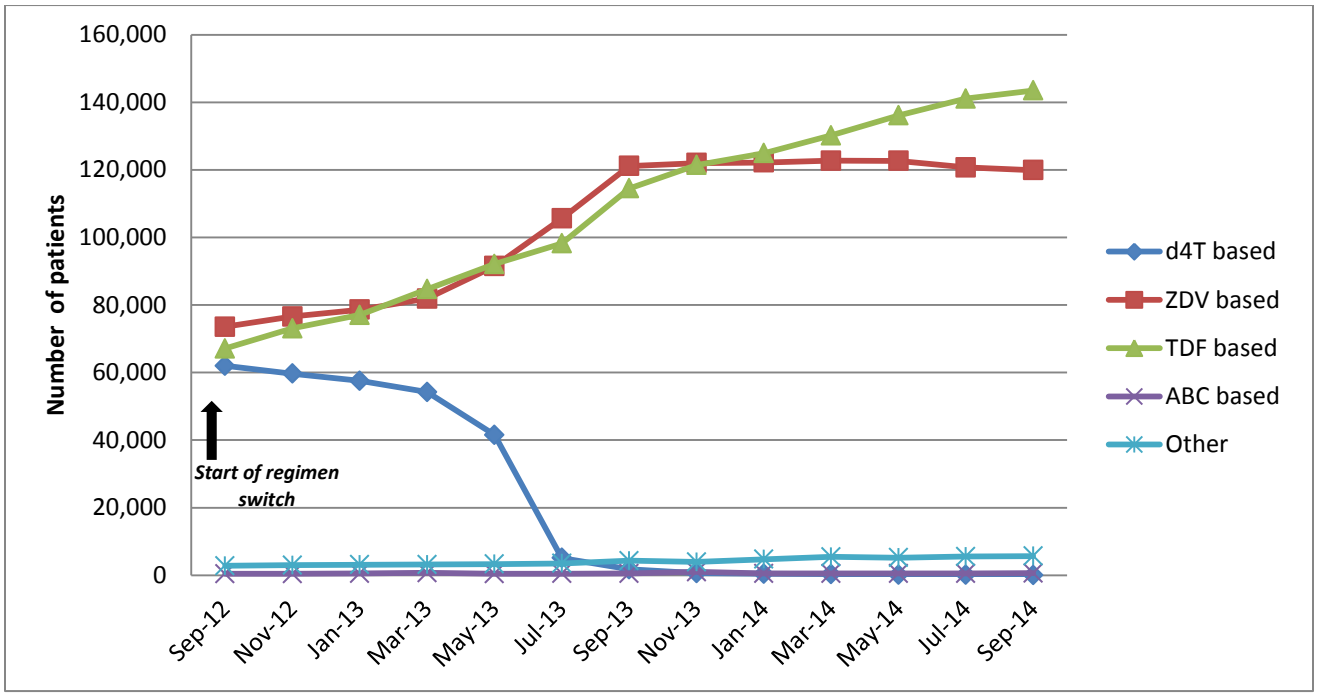

Figure 2. Bimonthly trends of ARV prescription, September 2012–September 2014

Table 1 shows the distribution for first-line and second-line ARV regimens during the study period. At the end of September 2014, first- and second-line ARVs account for 97.9% and 2.1% of patients, respectively. Among patients on first-line regimens, 53.2% were on TDF/3TC/EFV. Among second-line users, TDF/3TC/LOP/r (0.7%) was the most common regimen.

Table 1. Distribution of patients by ART regimen in September 2012, 2013, and 2014

	Before d4T regimen switch		After d4T regimen switch			
	September 2012		September 2013		September 2014	
Adult ARV regimen	Number	%	Number	%	Number	%
d4T/3TC/NVP	41,172	20.00	1,087	0.45	37	0.01
d4T/3TC/EFV	20,809	10.11	651	0.27	18	0.01
ZDV/3TC/NVP	48,310	23.47	82,287	33.97	81,089	30.06
ZDV/3TC/EFV	25,243	12.26	38,876	16.05	38,827	14.39
TDF/3TC/NVP	22,618	10.99	37,018	15.28	36,446	13.51
TDF/3TC/EFV	44,472	21.61	77,514	32.00	107,070	39.69
ABC/3TC/EFV	120	0.06	176	0.07	237	0.09
ABC/3TC/NVP	88	0.04	106	0.04	162	0.06
ABC/3TC/ZDV	204	0.10	260	0.11	226	0.08
TDF/3TC/LPV/r	1,184	0.58	1,700	0.70	2,007	0.74
ABC/ddi/LPV/r	580	0.28	943	0.39	767	0.28
ZDV/3TC/LPV/r	295	0.14	548	0.23	756	0.28
d4T/3TC/LPV/r	129	0.06	103	0.04	60	0.02
ABC/3TC/LPV/r	156	0.08	264	0.11	428	0.16
Others	452	0.22	728	0.30	1,649	0.61
Total	205,832	100.00	242,261	100.01	269,779	99.99

The data were further analyzed to see if any differences occurred in implementing the phaseout plan by type of health facility. Table 2 shows progress of implementation among hospitals compared with health centers. Even though health centers started with higher percentages of d4T users, the implementation results show that during the years under study, both types of health facilities achieved intended targets without any significant differences. This was also true across regional states: that is, the trend of d4T decline and increases in ZDV and TDF were similar across all regions of the country (table 3).

Table 2. Trend of ART Regimen Switch at Health Centers vs. Hospitals, September 2012–September 2014

Type of health facility	Regimen	Year					
		2012		2013		2014	
		Number	%	Number	%	Number	%
Hospital	d4T	30,854	25.5	912	0.8	100	0.1
	TDF	45,998	38.0	50,314	45.0	80,064	55.7
	ZDV	42,730	35.3	60,394	54.1	61,131	42.6
	Others	1,336	1.1	2,133	1.6	2,351	1.6
Health center	d4T	31,256	36.8	929	0.7	15	0.0
	TDF	22,495	26.5	66,396	50.6	66,387	52.3
	ZDV	31,118	36.6	61,883	47.1	60,435	47.6
	Others	45	0.1	109	0.1	122	0.1

Table 3. Trend of ART Regimen Change across Regional States, September 2012–September 2014

Region	Regimen	Year		
		2012	2013	2014
Addis Ababa	d4T	31.4	0.5	0.1
	TDF	39.0	50.4	55.8
	ZDV	28.8	48.2	43.1
Oromia	d4T	31.4	0.5	0.1
	TDF	39.0	50.4	55.8
	ZDV	28.8	48.2	43.1
SNNP	d4T	33.9	1.8	0.0
	TDF	35.8	52.2	57.9
	ZDV	29.7	45.4	41.3
Tigray	d4T	34.5	0.6	0.0
	TDF	27.0	46.5	53.8
	ZDV	38.1	52.3	45.5
Amhara	d4T	36.3	1.0	0.0
	TDF	24.3	40.9	47.5
	ZDV	38.9	57.3	51.6
Others	d4T	25.1	0.2	0.0
	TDF	47.8	57.2	60.6
	ZDV	26.2	42.0	38.7

Stock-Outs and Waste Reduction (Expiry and Damage)

Routine monitoring reports at the time of implementation have consistently indicated that because of the effective national-level coordination, the phaseout program ended without any stock-outs of ARV medicines. It was also reported that the country faced no waste of d4T caused by expiry because of effective strategies put in place by the Federal Ministry of Health.

DISCUSSION

The supplementary section to the 2013 WHO consolidated guidelines on the use of ARVs for treating and preventing HIV infection reported that Ethiopia was one of a number of countries to have achieved less than 50% reduction in the use d4T between 2010 and 2011.[14] Hence the Government of Ethiopia was tasked with implementing the 2010 WHO recommendations more aggressively by coordinating a sector-wide response to these reports. In spite of some delays during the first few months of implementation, the phaseout process was successfully coordinated and completed.

The phaseout pattern shows that, as of September 2014, only 55 (0.02%) active ART patients were taking d4T-containing ARVs. This could mainly be caused by patients refusing to be switched to the newer regimens or by physicians opting to keep patients on d4T for clinical reasons. However, the pace of implementation from 2012 to September 2014 has been satisfactory and comparable to that of other similar counties. A Ugandan study conducted to assess facility-based ART programs in relation to trends in ART initiation characteristics showed a rapid transition away from d4T-based drug regimens and toward those with TDF-based regimens between 2008 and 2012.[20] Another study that conducted a retrospective analysis of first-line ART regimens in a sample of health facilities in Kenya, Uganda, and Zambia between 2007–2008 and 2011–2012 showed a marked increase in TDF prescriptions with a simultaneous and marked decrease in d4T prescribing.[21] The results from the Ethiopian experience show similar success as these African examples despite the differences in periods of implementation. However, Ethiopia registered better results than Singapore, where a study found the prevalence of patients taking d4T-based regimens was more than 18% after two years of implementation.[22]

The Ethiopian phaseout experience shows that between September 2012 and September 2013 more shift to ZDV-based regimens occurred, while the next year shows more shift to TDF-based regimens. Other studies, however, show that TDF was the major alternative regimen.[20,21,23] According to WHO's survey on ARV use in 2011, Ethiopia was one of 27 countries included in the report that opted to use ZDV as an alternative ARV for the regimen switch during the period 2010–2011.[23] Another study that analyzed trends in adoption of WHO ART guidelines and use of first-line ART in 80 developing countries from 2006 to 2012 shows that approximately 68% received either ZDV- or TDF-based regimens (44.0% and 24%, respectively), and 31% received d4T-containing first-line combinations.[24] This study shows that the progress of countries during 2012 was similar to that in Ethiopia, that is, 30% d4T use in Ethiopia compared with 31% in the study countries. Another WHO survey reported by the same author in 2014 that shows evolution of d4T, ZDV, and TDF use in adult first-line ART revealed that 60% used TDF, 34% ZDV, and 5% d4T. The report shows ZDV use was higher in Ethiopia (44.4%), whereas the use of TDF- and d4T- based regimens was higher in the study countries than in Ethiopia.[25] Accordingly, Ethiopia had achieved better results in the d4T phaseout program.

The regimen switch in Ethiopia was implemented in a phased-in manner to allow available d4T to be used up and prevent its expiry at facility level. This approach was also instrumental in equitably distributing available stocks of ZDV and TDF to regions without the danger of possible stock-outs. Overall, the experience of regions with smaller patient load was crucial in better management of the phaseout plan in the bigger regions. The importance of effective coordination

and leadership was learned as well as the value of having a well-designed support structure that extends to health facilities; the importance of efficient distribution mechanisms for available and newly arrived ARVs; strengthening the recording and reporting practices from health facilities on patient uptake and regimen profiles and stock levels of ARVs for timely decision making; and close monitoring of progress of implementation.

The supply management of the alternative ARVs (ZDV and TDF) was very effective in that no stock-out was reported from health facilities, demonstrating the country's capacity to design and implement its own supply system for such massive national-level undertakings. Some facilities reported that a few of their patients resisted the change because they were very stable on the d4T-based regimen for a long time. This could have been a setback to the progress of the implementation, but national and regional teams worked with facilities to explain the purpose and benefits of the change in the long term. This has proved successful, and patients responded positively.

The facility-level bimonthly regimen reports with detailed data on patient uptake and regimen breakdown played a significant role in two major aspects. First, they were used to track adherence to treatment recommendations and signal any national, regional, or facility-level deviations that may need intervention. Teams of government stakeholders and partners were given the responsibility of supporting health facilities to monitor adherence to the guidelines through such information, which resulted in a huge improvement in adherence levels and rapid realization of the phaseout plan. Second, the information was used for forecasting and resupply of needed ARVs. Based on the reports on rate of regimen switches from health facilities, PFSA was able to plan its resupply schedule more effectively. The reports also contributed to preventing waste of d4T by allowing health facilities to finish their stocks of d4T before sending out the ZDV- and TDF-based regimens.

One of the most important aspects of this national undertaking was its high-level coordination by the ministry, which was able to technically coordinate throughout the entire implementation period, thereby allowing its partners and stakeholders to provide pertinent and timely support. The guidelines developed clearly outlined what needed to be done at all levels and the responsibilities of all actors. The success of the d4T phaseout program in Ethiopia can be ascribed to this overall coordination and technical leadership.

The phaseout program was not without its challenges. The existing stocks of d4T at all levels of the supply chain in addition to d4T stocks on order from a supplier were a big problem. However, expiry of the medicines was avoided by implementing a phased approach as previously described: larger regions with more patient numbers would continue to use the d4T on stable patients while smaller regions started the shift first, according to the schedule.

The enormity of the phaseout plan in a large country like Ethiopia with a large number of patients and facilities providing ART services distributed all over the country could not have been achieved had it not been for the seamless coordination between all stakeholders. From the start the need to address this big logistics challenge proactively was obvious. Extensive sensitization workshops starting from Regional Health Bureaus down to implementers at health facilities were instrumental in creating awareness about the purpose, implementation steps, and roles and responsibilities of stakeholders at all levels. As a result, the data show that no

substantial differences were observed among regional states or between hospitals and health centers. This is a better finding than the Ugandan study, which reported differences in prescribing practices among hospitals and health centers.[20]

There were challenges with requests and resupply. Facilities were not able to adjust their requests of ZDV and TDF based on anticipated shifts, existing ZDV/TDF consumption, and new patients. Therefore a structured format was developed and distributed to ART sites to avoid this problem. Stakeholders and partners were also involved in site-level support to produce the necessary resupply information from health facilities. Some uncertainties also surrounded stocks of ZDV and TDF. Some hospitals in the bigger regions started the switch before the official date, which caused fear of stock-outs of these ARVs. But the strong partnership created at all levels enabled them to take proactive measures before facing problems.

Overall, the challenges encountered during the implementation of the plan for the d4T regimen switch were effectively managed, and the transition was accomplished as intended. The adult d4T phaseout program has taught a number of lessons that could be used for similar programs in the future. Based on these lessons, we recommend the following possible courses of action in similar nationwide phaseout programs:

- High-level leadership and coordination by the relevant government body (mainly the Ministry of Health) are crucial. This leadership role should be expressed in terms of setting up a central and regional high-level task force that comprises all the pertinent stakeholders and partners.
- A clear national implementation plan should be developed and communicated to all stakeholders and partners, and its implementation should be followed up strictly. Phased implementation of the plan can save a lot of resources and gives the implementers a chance to learn from experiences of smaller regions, correct gaps, and improve on practicable interventions.
- Development of phaseout guidelines and strategy needs to be given priority and should be available at all levels starting from the ministry down to the health facility.
- Documentation, collection, and aggregation of relevant patient-level data from ART facilities would guide the whole plan by providing reliable data for forecasting and supply activities as well as for tracking the patterns of regimen changes and take corrective actions to improve adherence.
- Information related to phasing out, including existing stocks, should be timely communicated to relevant stakeholders and partners.

LIMITATION OF THE STUDY

This study is based on secondary data collected from health facilities on a bimonthly basis. Despite best efforts to validate data, reported figures could have some inconsistencies. However, because the reports were collected from a representative number of health facilities, the small amount of data not collected from the remaining health facilities might show a slightly different trend in implementation. But official statements from the Federal Ministry of Health support the information presented in this report.[26]

RECOMMENDATIONS

Further study is recommended to study the factors for success from patients' standpoints so that such factors would be considered in future nationwide regimen switches. We also recommend that further studies be conducted to evaluate the success of the d4T phaseout program in terms of supply chain perspectives, especially mitigation of waste caused by expiry and stock-outs.

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