

# Sharing Solutions: A Successful Strategy for Tuberculosis that may be Used to Treat HIV/AIDS in Developing Countries

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## Abstract

Directly-Observed Treatment Short-Course (DOTS) is a strategy used in the treatment of tuberculosis. The purpose of DOTS is to increase the overall detection of the disease and improve adherence to drug therapy. Recent studies have shown that this model can be applied successfully to the treatment of HIV/AIDS. The most effective method of treating patients with HIV/AIDS is highly active anti-retroviral therapy (HAART), a combination of several anti-retroviral (ARV) agents. A study implementing directly-observed therapy (DOT)-HAART in Malawi demonstrated an increase in CD4 levels and a decrease in viral load in study participants. A DOT-HAART model that focuses on the rights and autonomy of the individual, as well as the empowerment of affected communities, is an effective way to ensure this adherence in the developing world.

## Introduction

**H**IV/AIDS poses an imminent threat to the well-being of the global population. HIV infection rates are increasing in most parts of the world, particularly in Sub-Saharan Africa, where an estimated 3.2 million people in the region became newly infected in 2005.<sup>1</sup> Rates of infection are likely to continue increasing unless innovative solutions are adopted to halt the spread of disease. Strategies that have proven effective in combating other worldwide pandemics, such as tuberculosis (TB), may also be effective in the treatment of HIV/AIDS.

## An Overview of DOTS for TB

The World Bank has listed Directly-Observed Treatment Short-Course (DOTS) for TB as the “most cost-effective” of all health interventions.<sup>2</sup> This strategy emphasizes the importance of combining diagnosis and treatment with clinical follow-up. The idea of a strategy to observe drug intake for TB was proposed in the 1970s by the International Union Against TB and Lung Disease.<sup>2</sup> After numerous modifications, the current DOTS strategy was proposed and recommended for all national TB control programs.

The DOTS strategy usually includes a four-month course of isoniazid, rifampin, and pyrazinamide, followed by a two-month regimen of isoniazid, rifampin and streptomycin. Some of these drugs may be combined and taken as one pill over the course of six to twelve months.<sup>3</sup> DOTS has been suc-

cessful at curbing TB prevalence rates, and it has also helped reduce the occurrence of drug resistance.<sup>4,5</sup> The components of a successful DOTS program are broad, and involve various sectors of society (Table 1).

- Government commitment to sustaining TB control activities
- Case detection by microscopic examination of a sputum sample among symptomatic patients who seek health services
- Standardized treatment regimen for at least six to eight months for all patients with positive sputum exams, using DOTS for at least the first two months
- Regular, uninterrupted supply of all essential anti-TB drugs
- Standardized recording and reporting system that allows for assessment of treatment results for each patient and of the TB control program as a whole

Table 1. Components of DOTS for TB<sup>2</sup>

Drug compliance is encouraged through political commitment, as well as by ensuring a regular supply of medications. Monitoring of TB case burden and treatment outcome is also essential, and is conducted using standard indicators. DOTS is most effective when medications are provided free of charge.<sup>6</sup> Further, DOTS pays homage to the principles of comprehensive primary health care, by serving to strengthen public health infrastructure. Indeed, TB control programs are often the most well-developed health initiatives in many developing countries.

## Current Treatment of HIV/AIDS

In developing nations, Highly Active Anti-Retroviral Therapy (HAART) is most often given to AIDS patients in the most advanced stages (stage III or IV) of the disease. In contrast, in developed countries, HAART is often given to those in earlier stages of the disease. HAART reduces the likelihood of transmission and has also been responsible for transforming the disease from a terminal illness to a chronic condition.<sup>7</sup> In addition, HAART encourages people to seek voluntary counseling and testing (VCT) for HIV/AIDS.<sup>6,7</sup>

HAART is composed of a number of medications, such as zidovudine, 3TC and a protease inhibitor. Effectiveness is generally determined as the ability to raise the CD4 count and lower HIV-1 RNA levels in the body.

## Modified DOTS for HIV/AIDS: the “DOT-HAART” Approach

Many of the characteristics of TB and its treatment are similar to AIDS. It has been proposed that a strategy similar to DOTS for TB should be modified and applied to HAART for AIDS patients. DOT for HIV/AIDS is not technically a

“short-course” (hence the elimination of the “S” in “DOTS”), as HIV/AIDS has no cure and can only be managed as a chronic condition. Components of a possible ARV package modeled after DOTS therapy for TB can be seen in Table 2. DOTS has been successfully applied to other diseases, such as Hepatitis C.<sup>10</sup> Numerous names exist for this type of treatment, such as “Modified DOT” or simply, “MDOT.”

The main goal of DOT for any disease is to increase adherence to medication and improve patient outcome. The WHO defines adherence as “the extent to which a person’s behaviour... corresponds with agreed recommendations from a health care provider.”<sup>11</sup> Adherence can be threatened by social problems and fragmented health services.

With respect to HIV/AIDS, adherence to medication is the “ability of the person living with HIV/AIDS to be involved in choosing, starting, managing, and maintaining a given therapeutic combination medication regimen to control viral (HIV) replication and improve immune function.”<sup>12</sup> For HIV/AIDS, adherence to medication at levels less than 95% may lead to the development of drug resistance.<sup>11</sup> Directly-observed ART has been effective at reducing vertical transmission.<sup>13</sup> Similar short-course therapy for HIV-positive prisoners has been also met with success.<sup>3,14,15</sup>

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1. Sustained government and political commitment
    - nationwide coverage of the service
    - central, regional, and district units
    - full integration of the service into the health system at all levels
    - ARV drugs as part of an essential package of care for HIV/AIDS patients
  2. Case detection through passive case-finding, ensuring access to high-quality voluntary counseling and HIV testing
    - focus should be on HIV-positive patients with symptoms who have undergone voluntary counseling and HIV testing (e.g. those fulfilling the WHO case definition for AIDS in Africa)
  3. Administration of standardized ARV regimens under proper conditions of case management, including DOT
    - choice of drugs depends on simplicity, efficacy, cost, and safety
    - once-a-day administration is preferable
    - protease inhibitors are best avoided because of interactions with rifampicin
    - first- and second-line regimens are required in case of adverse effects and development of drug resistance
  4. An uninterrupted supply of drugs of assured high-quality, with reliable drug procurement and distribution systems
  5. A recording and reporting system permitting assessment of the outcome of each patient and of overall programme performance
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**Table 2.** Components of a possible ARV policy package for DOT<sup>7</sup>

One study asked patients to undergo DOT-HAART for 24 weeks, followed by weekly phone contact with health personnel (who reminded patients to take their medications) for another 24 weeks.<sup>8</sup> This particular study found that DOT-HAART was effective at reducing viral loads to less than 400 copies/mL in 74% of patients, and to less than 50 copies/ml in 53% of patients. Thus, DOT-HAART can be effective even

without continuous observation, provided that weekly communication by other methods is incorporated.

### DOT-ARV in Malawi

In the district of Thyolo, in Malawi, a DOT strategy for ART has been successfully implemented.<sup>16</sup> The program included only patients that were known to be HIV seropositive, were aware of the DOT approach, and were at the more advanced clinical stages.<sup>9</sup>

An HIV clinic was responsible for diagnosing and staging patients, after which patients would receive ART provided free-of-charge by *Médecins Sans Frontières*. Patients would receive a regimen of ARVs, and were switched to second-line medications if they became drug-toxic or -resistant. In this project, patients showed a decrease in viral load and an increase in CD4 count.<sup>9</sup> Compliance was monitored through direct observation by health care workers and validated by pill counts.

Long-term health sector reform is necessary to ensure the sustainability of the program. It may be beneficial in this case to ensure that ARVs are part of an essential package of care for HIV/AIDS patients.<sup>9</sup> This would entail a “broad package of support” for HIV-infected Malawians.<sup>16</sup> Malawi is a case where registration, monitoring, treatment, and the availability of free drugs have contributed to a successful DOT strategy. DOT for ARVs generally, and specifically for HAART, may be successful if modeled after the Malawian example.

### DOT-HAART in Haiti

Haiti is the poorest country in the Western hemisphere. Dr. Paul Farmer and his colleagues, partnering with his *Zanmi Lasante* (Partners in Health) clinics, led a successful initiative for DOT-HAART in Haiti. They argued that by relying on existing infrastructure for TB, DOT with HAART can be successfully implemented.<sup>17</sup> The project was aided by the availability of free treatment for clinic patients. Due to the lack of laboratory facilities to test CD4 and viral load in rural Haiti, specific lab-based criteria (as in the Malawian case), were not used. Instead, observational clinical criteria (Table 3) were used by Farmer et al. to determine who would be eligible for DOT-HAART.

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- Absence of active TB
  - Recurrent opportunistic infections difficult to manage with antibiotics or antifungals
  - Chronic enteropathy with wasting
  - Otherwise unexplained and significant weight loss
  - Severe neurologic complications attributable to HIV
  - Severe leucopenia, anaemia, or thrombocytopenia
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**Table 3.** Guidelines for Inclusion in DOT-HAART Project, Clinique Bon Saveur<sup>8</sup>

The main vehicle for the DOT-HAART model in Haiti is the *accompagnateur*, often a community health worker, who is responsible for overseeing the drug administration of an AIDS-infected patient. The *accompagnateur* serves a similar function to a “near-peer” outreach worker for DOT-ARV strategies described elsewhere.<sup>3</sup>

*Accompagnateurs* oversee the ingestion of medication and offer moral and social support.<sup>17</sup> Usually, they observe the patient take the first dose of medication, and leave the second dose for the patient to take without observation. However, *accompagnateurs* will often volunteer to attend to the patient's second ingestion of medication.<sup>11</sup> *Accompagnateurs* may also be HIV-infected, and have their own *accompagnateurs* to observe their drug intake. This creates a type of "virtuous social cycle" which instils a sense of community in the fight against the disease.<sup>11</sup> Further, each patient is encouraged to attend group sessions with other patients to discuss their illness.<sup>6</sup> The attendance at such sessions is quite high. A similar initiative implemented in inner-city Boston has also been successful.<sup>11</sup>

The Haiti project helped contribute to a decrease in viral load (to almost undetectable levels) in most patients.<sup>17</sup> This achievement has helped decrease transmission rates. Moreover, the cost-effective approach has caused a decline in the number of opportunistic infections and hospital admissions. DOT-HAART in Haiti serves as part of a "minimum package" of services for AIDS patients, similar to the package suggested in Malawi. This package also includes prophylaxis, diagnosis and treatment of opportunistic infections, and social support for patients and their families.<sup>6</sup>

Farmer and his colleagues believe that if the DOT-HAART model can be successful in Haiti, it can be implemented in any resource-poor setting, and may even increase voluntary testing and decrease stigma associated with the disease.<sup>6,17</sup> Although the inclusion of "unskilled" *accompagnateurs* has received some criticism, the availability of simpler regimens does make lay observation easier.<sup>6</sup>

### Drawbacks of DOT-HAART

It should be pointed out that a DOT strategy for AIDS focuses on medical solutions, and fails to address non-medical causes of the disease, which fall within the domain of public health. However, strengthening such components as health infrastructure, drug procurement, and patient registration comprises a significant portion of a good DOT-HAART program.<sup>6</sup> Others point out that DOT-HAART may benefit only certain groups, such as children or injection drug users,<sup>3,12</sup> who are more likely to have problems adhering to drug regimens. Although this is a valid criticism, studies for TB and multidrug-resistant TB<sup>5</sup> have suggested that many diverse groups are prone to non-compliance, and that this is unpredictable. Further, even forgetting to take one pill has consequences, and puts the patient at risk of drug resistance. Adherence is a dynamic process<sup>12</sup>: thus, many patient groups could benefit from DOT-HAART.

Objections also arise regarding the vast differences between TB and AIDS medications. For example, a TB patient may be required to take only three pills per week, whereas AIDS patients may take up to three pills per day.<sup>3</sup> This may pose complications for traditional DOT strategies. New once-daily medications composed of a combination protease-inhibitor<sup>18</sup> may simplify the regimen, and could therefore be an alternative to current DOT-HAART strategies.

If DOT becomes coercive, patients may decide to salvage their autonomy by avoiding the medical system altogether, and seek alternative ways of obtaining therapy.<sup>3</sup> To avoid coer-

cion, DOT-HAART workers should be trained in aspects of community empowerment. Other objections caution against using a DOT model altogether. Taking a "rights-based approach," DOT strategies may be viewed as *inherently* paternalistic, as they presuppose that patients are unable to take their medications autonomously. Farmer's *accompagnateur* model relies on the aspect of 'disclosure,' which can cause anxiety in the patient, and perhaps worsen the patient's condition. If a DOT-HAART approach is adopted, it should be completely voluntary.

### Applying DOT-HAART in Developing Countries

Patients should participate in a DOT-HAART initiative on a voluntary basis. Treatment should be available free-of-charge, and the drug supply should be regular and unlimited.<sup>6,9</sup> The approach should be based on a rights-based foundation that emphasizes community empowerment and the autonomy of infected individuals. This is in concordance with the WHO definition of adherence to HIV/AIDS treatment, which emphasizes the control of the patient in "choosing, starting, managing, and maintaining"<sup>11</sup> their regimen and condition.

An important pillar of DOT for HIV/AIDS is the psychosocial support that peer observers provide for the patients, and the availability of resources and services to deal with mental and social issues.<sup>10</sup> In addition to peer "direct observers," health care workers should be included in the DOT-HAART program, particularly in the clinic setting. A model similar to the one utilized in Haiti, with *accompagnateurs*, may be effective, and should include peer observers who are also HIV-positive to strengthen community commitment to fight the disease.

The effects of having individual or group support to help the patient deal with the social and psychological consequences of the disease are significant.<sup>3,6</sup> The peer direct observer network, as seen in Haiti, is relatively simple, and involves the participation and mobilization of the whole community. The initiative should begin in a nation where the epidemic is controlled, and be implemented in other countries if the pilot program is successful. Lastly, counselling and education for all patients should be included in the DOT-HAART strategy. This is essential to promote long-term change, and decrease the incidence of HIV/AIDS. Education and counselling should work synergistically with all existing treatment programs.

In order to halt the spread of the disease, it is crucial that failures in existing AIDS treatment programs are acknowledged, and promising solutions incorporated. HAART is an efficacious therapy for most AIDS patients, particularly for those in the later stages. Adherence to HAART is crucial to ensure a better quality of life and improve health outcomes for AIDS-infected patients. A DOT-HAART model that focuses on the rights and autonomy of the individual, as well as the empowerment of affected communities, is an effective way to ensure this adherence in the developing world.

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