iDART

THE INTELLIGENT DISPENSING OF ANTIRETROVIRAL TREATMENT

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Last Updated by: Ilda Ladeira (ladeira.ilda@gmail.com)

Physical Address: 1st Floor, CPUT BARC Building, 80 Roeland St, Gardens, 8001
Postal Address: Cell-Life PO Box 34152, Rhodes Gift, 7707
Cape Town, South Africa
Internet: www.cell-life.org
Tel: +27 21 469-1114 Fax: +27 21 496-1126
1 iDART Overview

iDART is a software solution designed to assist ART patient monitoring as well as the supply chain management of ARV drugs in the public health sector in South Africa. The intended target users are ARV pharmacists. In December 2007, iDART was being used in 11 public healthcare facilities, in five provinces across South Africa. Over 17500 HIV+ patients were being monitored through iDART.

2 Key Benefits

- Accurate tracking of patient treatment (including history)
- Automatic generation of government and donar reports
- Accurate ARV stock control management
- Time saving of pharmacy dispensing through faster processing
- Reduces and identifies loss of ARVs
- Operates through clearly identifiable, multi-lingual bar-coded labels which are created for each and every drug and patient package

3 Needs Addressed:

- **Increase capacity of pharmacies in public health clinics**
  - Focus on dispensing of ARV drugs to patients (not on IT systems and manual reporting)
  - Basic pharmacy management (monitor stock levels, prescriptions, dispensed drugs)
  - Increase motivation and professionalism in under-resouced HR sector
  - Improved reporting to government & other donors

- **Facilitate dispensing in remote public health clinics**
  - Supporting the down referral process
  - Technological solutions suitable to the local context

- **Clinic information management**
  - Basic ART program monitoring and evaluation
  - Basic patient management
4 Goals of iDART

- To be the best ARV dispensing software in the public health sector in South Africa
  - Create knowledge base of ARV dispensing requirements in public health
  - Best system usability (minimal training time, easy to train others, fast for core pharmacy functions)

- To increase the capacity of pharmacies in public health clinics
  - Improve the quality of care patients receive (time savings through system use, pharmacists' attention remains focused on patient, not on IT systems)
  - Support and monitor dispensing of ARV drugs to remote clinics

5 System Description

The system comprises of two applications for different functions within the supply chain. The first application (iDART Pharmacy) is housed at a central supply pharmacy, and the second application (iDART Clinic) is installed at a remote clinic where patients collect their medication from a nurse. These two applications can operate in geographically different locations.

iDART allows for two types of dispensing:

- **Direct Dispensing:**
  Patients collect their month's supply of ARVs from the pharmacy directly. For this situation, iDART users have a choice between a further two methods of dispensing. They can either create packages for patients who are scheduled to visit the pharmacy on a given date (and have the packaged drugs ready for the patient when they arrive). Or, the iDART user can dispense directly to patients when they present themselves at the facility.
Remote Dispensing (Pre-packaging):
At the dispensing pharmacy, the pharmacist creates a physical package consisting of (typically) 3 ARV drugs for each patient enrolled on the system. Upon completion, the packages are sent to the remote ARV site by courier service. It is at this facility that ART patients visit regularly, for medical consultations and to fetch their medication. When a patient receives the packaged drugs, the nurse scans out the package using a handheld barcode scanner and through iDART, creates a feedback mechanism, prompting the pharmacist at the central pharmacy to create the next month’s drug package.

Using iDART, the pharmacist is able to monitor the drug supply chain from the time the stock is entered into the system, through the dispensing process and to drug delivery to any individual patient.
iDART is capable of providing real-time assessment of an ARV programme through the generation of a variety of reports. Report examples are appended to this report, and include pharmacy management (such as monthly receipts and issues of ARVs), funder-specific (e.g. PEPFAR), or ARV clinic management (such as number of patients initiating ARV therapy by date, drug switches and retention of patients on treatment).

iDART has been developed in the Java programming language and connects to a PostgreSQL database management system. Other open source technologies have also been used, and iDART is released under GPL (General Public License - [www.opensource.org](http://www.opensource.org)). Benefits of this license and open-source principles are that updates are regularly done on the software (both in terms of new, additional features as well as bug fixes to existing features), and these updates are freely available to iDART users. The system was developed by Cell-Life in conjunction with the Desmond Tutu HIV Centre.

### 6 The Equipment

**iDART Hardware Requirements**

- Standard personal computer (minimum recommendation of 512Mb of RAM) running Windows or Ubuntu
- Zebra Label Printer (recommended TLP2844)
- Handheld barcode scanner (USB)
- Standard A4 printer (for reports)
- GSM modem with data-enabled SIM card (if an offsite backup is required)
- Uninterruptable Power Supply (UPS)

**iDART Consumables**

- Labels - recommended: 75mm x 50mm standard vellum white labels
- Wax ribbon (out) - recommended 84mm width
- Paper and toner for standard A4 printer
Appendix A:

iDART Features

1. Patient Management
   - Add new patient, edit existing patient
   - Manage patients on treatment:
     • Mark patient as 'New Patient', 'Transferred In', 'Visitor In', etc. (configurable reasons)
     • Mark patient as 'Lost to Follow Up', 'Transferred Out', 'Deceased', etc. (configurable reasons)
     • ARV Start Date
   - Patient Search (through barcode scanner input)
   - A variety of non-compulsory fields, including 'Treatment Supporter' for follow-up

2. Prescription Management
   - Preloading previously prescribed drugs
   - ARV drug regimens
   - Add a new drug to a prescription
   - Remove a drug from a prescription
   - Standard dosages
   - Shortcut to doctor management
   - Prescription notes
   - Patient search (through barcode scanner input)

3. Dispensing Drugs
   - Dispense in individual units, default to one container
   - Shortcut for number of issues dispensed (e.g. 2 months supply)
   - Ability to change the number of drug labels to print
   - Automatic summary label of dispensed items (can be placed on physical prescription and signed)
   - Pre-packaging for returning patients (at pharmacy)
   - Pre-packaging for patients who receive drugs from remote clinic (down-referral system)
   - Patient search (through barcode scanner input)

4. Label Printing
   - Patient Information Label (barcode enabled)
- Drug Label (configurable to different forms of drugs)
- Script Summary Label (drugs dispensed to patient, to be placed on physical prescription and signed)
- Package label for down-referral system (barcode enabled)
- Custom, blank labels

### 5. Comprehensive Reports
- Patient History Report
- PEPFAR Report
- Patient Defaulters Report
- Daily Dispensing Totals
- Transaction Log Report
- Monthly Stock Receipts
- Monthly Clinic Indicator Report
- Patients Expected on a Day Report
- ARV Drug Usage Report
- Monthly Receipts and Issues Report
- Stock Take Report
- Package Tracking Report
- Prescribing Doctor Report

### 6. Stock Management
- Stock take
- Receiving bulk stock from central depot
- Destroy Stock

### 7. Remote Clinic Module
- Allow for pre-packaging of months supply of drugs
- Scanning out package to remote clinic
- Scanning in package at remote clinic
- Scanning out package to patient at remote clinic

### 8. Data Export
- Dynamic data export functionality
Appendix B:
Sample Labels Created through iDART

Sample Labels for Antiretroviral Drugs Dispensed Using iDART

The following four labels are examples of ARV drugs that are dispensed through iDART. iDART is configurable in terms of languages used on the labels (a choice of 1, 2 or 3 languages). The example labels below demonstrate this.

The labels include the Patient ID (in this case patient 12345), the date the drugs were dispensed, the issue / repeat number, as well as optional additional fields, namely patient name and the next appointment date.
Sample Labels for General Dispensing Using iDART

The following three examples are other labels generated through iDART.

### Patient Information Label

When a new patient is added to the system, the user is asked whether a Patient Information Label should be printed. It should be stuck onto the patient's folder, and the barcode can be used to identify the patient later in the dispensing process. This label includes the following details: patient ID, patient name, date of birth, sex and the clinic.

![Patient Information Label](image1)

### Script Summary Label

This label is printed out after a user dispensing drugs to a patient. It lists all the drugs dispensed at that time (including quantities). It also includes the pharmacy, the patient ID, patient name, the date that the dispensing took place and the next appointment date. Note that the displaying of patient name and next appointment date is optional.

![Script Summary Label](image2)

### Package Label

This label is printed out if the pharmacy pre-packages ARV drugs for their patients. It is usually stuck on the outside of the package, and the barcode is scanned when either the patient collects their ARV package, or the package is couriered to the remote clinic.

![Package Label](image3)
Appendix C:

iDART Site Descriptions

At the end of 2007, iDART was being used at 11 ARV pharmacies in 5 provinces across South Africa. At that time, over 17500 patients were being supported through iDART.

- The Desmond Tutu HIV Foundation, UCT Medical School & Nomzamo Clinic, Masiphumelele Noordhoek, Western Cape: Operational Jun 05
- The Hannan Crusaid Centre, Gugulethu (Western Cape): Operational Jun 05
- The Hillbrow Community Health Centre, Johannesburg (Gauteng): Operational 11 Oct 06
- The Taung Treatment Centre, Bophirima Health District (North West): Operational 02 Jul 06
- The Galeshewe Day Hospital, Kimberley (Northern Cape): Operational 06 Mar 07
- The Tshepong Wellness Centre, Klerksdorp (North West): Operational 17 May 07
- The Ganyese District Hospital, Ganyese (North West): Operational 16 Aug 07
- The Nyanga Community Health Centre, Nyanga (Western Cape): Operational Sept 07
- Klerksdorp Paediatric ARV Unit, Klerksdorp Hospital (North West): Operational 18 Sept 07
- Aliwal North Hospital, Aliwayl North (Eastern Cape): Operational Nov 07
- Impilisweni Hospital, Sterkspruit (Eastern Cape): Operational Nov 07

1 DTHC Pharmacy and Masiphumelele, Cape Town & Ocean View, Western Cape

The Desmond Tutu HIV Centre (DTHC) has been involved in dispensing ARV drugs to patients living in Masiphumelele since June 2004. Masiphumelele (meaning “We Will Succeed” in Xhosa) is an informal settlement situated in Ocean View, 40km south of Cape Town. A clinical study is under way to establish the HIV prevalence in this township, but current estimates have been high. One pharmacist works at the central pharmacy at DTHC, housed at the Medical School of the University of Cape Town, 30km from Masiphumelele. The pharmacist uses iDART to dispense monthly ARV drug supplies to patients visiting this remote ARV clinic. Two doctors, two nurses and two study coordinators work at this health care facility. In March 2005, the prototype system was installed and was used for 10 months. Then, in January 2006, the first installation of the down-referral clinic application of iDART was successfully launched at Masiphumelele. By December 2007, 600 patients are actively being monitored on the system. All clinical staff are involved in the scanning in of pre-packaged drug supplies, and scanning out of these packages to patients. Accurate reports are now accessible to the staff working at Masiphumelele, and to the pharmacist working at DTHC.
2 DTHC Pharmacy and Hannan Crusaid Centre, Gugulethu, Western Cape

The Hannan Crusaid ARV Treatment Centre is situated in Gugulethu, 20 km outside of Cape Town, and was the first dedicated ART Centre in the Western Province. Initially, the pharmacist working at the central pharmacy at DTHC created monthly ARV packages for all patients at the Hannan Crusaid Centre, in the same way as Masiphumelele. But, patient loads increased dramatically over the initial 12 months, resulting in dispensing moving to the pharmacy at the Hannan Crusaid Centre. With this move, iDART was modified in early 2006 to allow for direct dispensing to ART patients. Through out 2006, Cell-Life (in a partnership with eInnovation) developed iDART 2.0 - a system that is integrated with the Western Cape government's electronic patient record system (eKapa II). iDART is the dispensing module of this application and is being rolled out with the eKapa II project. The Hannan Crusaid Centre is the pilot site for this version of iDART. By December 2007, 2300 patients were being supported through iDART at this facility.

3 The Taung Treatment Centre, Bophirima District, North West Province

The Taung Treatment Centre is based at the Taung District Hospital and is the largest ART site in the North West province. In June 2006, iDART was successfully installed in this busy pharmacy who at the time, serviced over 1800 patients every month. Our two iDART users had little prior computing experience, but are now completely comfortable with the system and use it on a day to day basis. A number of new features were identified at this site, such as the identification through out the application of short cuts that if used, shorten the time it takes to dispense to a patient. The Taung Treatment Centre is the first (of five) ART sites in South Africa, that will receive the iDART system (both hardware and software) from Cell-Life free of charge. This donation is possible through a generous sponsorship from the Elton John AIDS Foundation. By December 2007, the Taung Treatment Centre were dispensing ARVs to over 2500 patients through iDART.

4 The Hillbrow Community Health Centre, Johannesburg, Gauteng

Cell-Life teamed up with the Reproductive Health Research Unit (RHRU) to expand the features and capabilities of iDART. In October 2006, Cell-Life installed the first release of this system at the Hillbrow CHC, and the pharmacist and pharmacy assistant started using iDART from that time. In December 2006, Cell-Life returned to Hillbrow to install the final version which incorporated all the required changes specific to their needs. Of particular interest at this site, was the identification of a number of new reports required by funders such as PEPFAR and local government. By December 2007, this pharmacy actively serves over 3200 HIV+ patients receiving ARVs and iDART has been used to assist the monitoring of stock levels and patient tracking.
5 The Galeshewe Day Hospital, Kimberley, Northern Cape

In March 2007, ARV pharmacists working at the Galeshewe Day Hospital used iDART for the first time to dispense ARV medication to their HIV+ patients. This is the second site identified for the Cell-Life project sponsored by the Elton John Aids Foundation. This site was also the first clinic to receive an iDART computer having the Ubuntu operating system (instead of the standard Windows). This is in line with governmental recommendations of using open-source software at government facilities. This choice of operating systems has resulted in Cell-Life spending less time supporting and maintaining the computers on which iDART is installed (e.g. virus and spyware attacks).

6 The Tshepong Wellness Centre, Klerksdorp, North West Province

In April 2007, the ARV pharmacy at the Tshepong Wellness Centre became the third Elton John Aids Foundation sponsored health care facility to receive the iDART system. In collaboration with the Klerksdorp Hospital, the Tshepong Wellness Centre is involved in a comprehensive down-referral system that is currently servicing over 6000 HIV+ patients. When iDART was introduced at this facility, a decision was made to manually enter every new patient onto the system (in previous implementations, we had used the import functionality of iDART). To assist with the initial couple of months of patient capturing, a second computer was loaned to the facility. This was the first time that two interconnected PCs were using iDART, accessing the same database. This is a great step forward, especially when looking at the suitability of iDART for larger facilities (such as government hospitals). After only two months of operations, iDART users at this facility have seen a reduction of up to two hours in the amount of time they spend at work! This is a remarkable, quantifiable achievement highlighting the effectiveness of the iDART system in busy public health care pharmacies.
Appendix D:

iDART Reports

A number of reports are accessible through iDART:

- Patient History Report
- PEPFAR Report
- Patient Defaulters Report
- Daily Dispensing Totals
- Transaction Log Report
- Monthly Stock Receipts
- Monthly Clinic Indicator Report
- Patients Expected on a Day Report
- ARV Drug Usage Report
- Monthly Receipts and Issues Report
- Stock Take Report
- Package Tracking Report
- Prescribing Doctor Report